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# THE SHIP'S MEDICINE CHEST AND MEDICAL AID AT SEA



# THE SHIP'S MEDICINE CHEST AND MEDICAL AID AT SEA

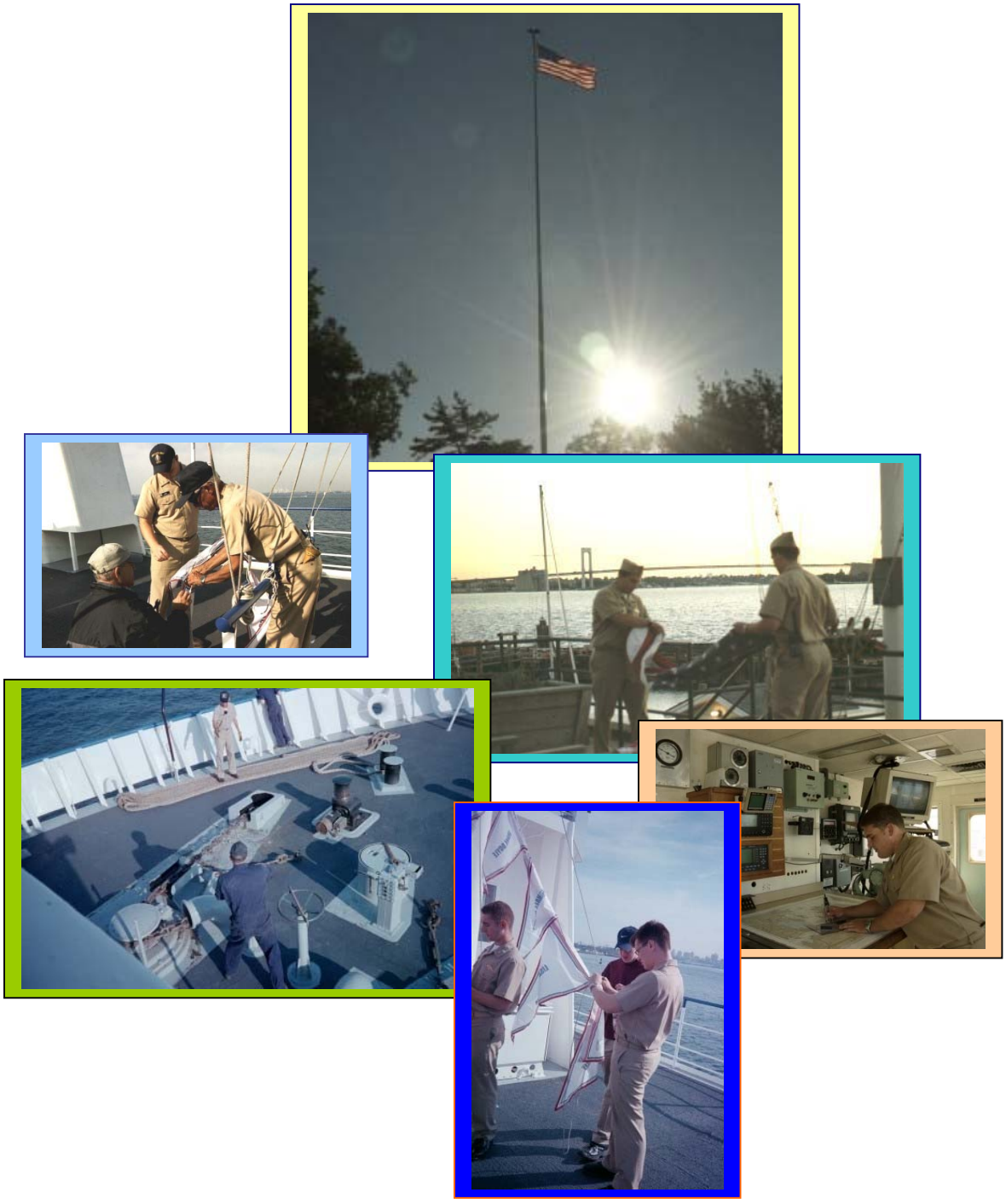
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**Public Health Service**
**Office of the Surgeon General**
**2003 Edition**

**This revision supercedes PHS Miscellaneous Publication No. 9 entitled: The Ship's Medicine Chest and First Aid at Sea, reprinted with additions and changes in 1955, 1978,and 1984.**

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**Note: The photographs on the cover and the dedication page were taken at the U.S. Merchant Marine Academy, Kings Point, New York by James A. Calderwood, Jr.**

**Dedicated to American Merchant Mariners and others who risk their lives at sea.**



# DISCLAIMER

The practice of medicine is an art and a science, and is evolving daily as new discoveries are made. Each individual medical provider is responsible for the individual medical care provided to each patient. Each provider must assess the patient and determine the specific clinical needs and most appropriate treatment for that patient. This book is not meant to be a substitute for medical practitioners or good clinical judgment, nor does it intend to determine the standards of medical care in any given situation.

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# TABLE OF CONTENTS

## THE SHIP'S MEDICINE CHEST AND MEDICAL AID AT SEA


| | | |
|---|---|---|
| Disclaimer | | i |
| Table of Contents | | ii |
| Historical Background | | iii |
| Editorial Board | | vi |
| Foreword | | xi |
| Introduction How To Use This Book | | xiii |
| Chapter 1 | History, Physical Examination and Basic Supportive Care | 1-i |
| Chapter 2 | Communicable Disease Prevention | 2-i |
| Chapter 3 | Ship Sanitation | 3-i |
| Chapter 4 | Substance Abuse | 4-i |
| Chapter 5 | Dental Care and Emergencies | 5-1 |
| Chapter 6 | Personal Preventive Practices | 6-i |
| Chapter 7 | Women's Health | 7-i |
| Chapter 8 | Responding to Potential Biological, Chemical and Nuclear/Radiological Terrorism Agents | 8-i |
| Chapter 9 | Legal Issues of Shipboard Medicine | 9-i |
| Chapter 10 | Immersion Hypothermia, Near-Drowning and Water Survival | 10-i |
| Appendix A | Standards of Training, Certification and Watchkeeping for Seafarers (STCW Code) | App. A-i |
| Appendix B | Standards of Competence for Seafarers Designated to Provide Elementary First Aid | App. B-i |
| Appendix C | Standard of Competence for Persons Designated to Provide Medical First Aid | App. C-i |
| Appendix D | Standards of Competence for Seafarers Designated to Take Charge of Medical Care on Board Ship | App. D-i |
| Appendix E | Standard of Competence for Seafarers Designated to Provide Personal Safety and Social Responsibilities | App. E-i |
| Appendix F | Additional Health Care Provider Capabilities | App. F-i |
| Appendix G | Sickbay and Medicine Chest | App. G-i |
| Appendix H | Infectious Disease | App. H-i |
| Appendix I | Medical Reference Recommendations | App. I-i |

# HISTORICAL BACKGROUND

This edition of *The Ship's Medicine Chest and Medical Aid at Sea* continues a tradition that extends back for more than a century. The first edition of this book was published by the Marine Hospital Service, forerunner of the United States Public Health Service, in 1881.

The Marine Hospital Service was established by the Federal Government in 1798 to provide medical care to sick and disabled American merchant seamen. The first permanent Marine hospital was authorized on May 3, 1802 to be built in Boston. The Service was just a loosely knit group of hospitals for merchant seamen until 1870 when it was reorganized and the administration of the hospitals centralized in Washington, D.C. A Supervising Surgeon, Dr. John Maynard Woodworth, was appointed to head the Service in 1871. His title was changed to Supervising Surgeon General (later Surgeon General) in 1875. Under Woodworth, the Marine Hospital Service began its transformation into the disciplined and broad-based Public Health Service (the name it received in 1912) of the future. Dr. Woodworth adopted a military model and put his physician "officers" in uniform. In 1889, the Service's Commissioned Corps was formally established by law.

Even before the establishment of the Marine Hospital Service, Federal legislation had been enacted in 1790 which required every American flag vessel over 150 tons with a crew of ten or more to carry a medicine chest. Since merchant ships typically did not carry a physician, there was obviously a need to provide some kind of basic medical instruction for the seamen that went beyond the simple directions that frequently accompanied medicine chests. Although there was no Government-issued manual for this purpose for almost a century after the passage of the 1790 law, merchant seamen could consult works published by private physicians, such as Joseph Bonds' *The Master-Mariners Guide in the Management of His Ship's Company, with Respect to Their Health, being Designed to Accompany a Ship's Medicine Chest* (Boston, 1847). Bond explained his reasons for preparing his book as follows:

"My apology for the undertaking is, that in the medicine-chests for the use of the vessels belonging to our posts, I have never seen books of directions that are suitable. This little work is to supply the deficiency which must have been felt by every shipmaster, having no other guide in the management of disease than the small book of directions usually accompanying medicine chests."

In 1881, the Marine Hospital Service decided to issue its own medical manual, the ancestor of the present volume, under the title, *Handbook for the Ship's Medicine Chest* (Washington, D.C., 1881). In his preface to the book, Supervising Surgeon General John B. Hamilton explained the purpose of the handbook as follows:

"This book is issued only to vessels subject to the payment of hospital dues, and is intended to be one to which the master or other officer in charge of a vessel

may refer for information upon the occasion of an injury to any of the crew or the appearance of sickness among them, to aid in obtaining a knowledge of the act of preventing disease, to give the necessary information as to the means of obtaining hospital or dispensary relief, and to serve as a guide to the proper use of the medicine chest required by law to be kept on board."

The book was divided into several sections. It began with a brief discussion of disease prevention, followed by a list of all of the medicines and supplies that should be in the ship's medicine chest. The longest portion of the book was a discussion of various accidents and illnesses and how to treat them. Also included in the work was information on the ports where Marine Hospital Service or contract physicians were available to treat seamen. Finally, an appendix provided information on the nature and purposes of the Marine Hospital Service and the laws related to it. Examples of items to be carried in the medicine chest were adhesive plaster, bandages, castor oil, calomel, chloroform liniment, fluid extract of ginger, opium, quinine, saltpeter, salicylic acid, sodium bicarbonate, surgeon's needles, and a tooth forceps. The ship's master was admonished to inspect the medicine chest carefully before starting out to sea to be sure that it was furnished with all of the items on the list. The many injuries and diseases discussed included fractures, dislocations, malarial fevers, dysentery, yellow fever, cholera, scurvy, syphilis, delirium tremors, and smallpox. Resuscitation after near drowning also received attention.

The case of yellow fever may be cited as an example of a treatment regimen for a disease. The caregiver was instructed to begin treatment with senna tea as a laxative. If the skin was very dry, the legs should be rubbed with mustard water. If the patient was vomiting, a nitre mixture (consisting of saltpeter, water, and an alcoholic solution of ethyl nitrite) would also be given. If the fever was high, quinine was also administered. The handbook goes on to discuss three cardinal rules to observe in treating yellow fever. First, insure that the patient gets sufficient rest by giving Dover's powder (which contained opium) and inducing the patient to remain in bed. Second, insure free action of the skin by warm baths and sweating medicines. Third, strengthen the patient by means of weak whiskey and water, beef tea, quinine, and other stimulants. The patients would not be given any solid food until after convalescence.

The handbook proved to be so useful that a second edition, revised and expanded appeared in 1904. Containing 101 pages, the second edition was more than twice the size of the original 45-page publication. The work continued to be revised and new editions issued over the course of the twentieth century. In addition to the two editions previously noted, the National Library of Medicine holds editions published in 1929, 1947 (reprinted with additions and changes in 1955), 1978, and 1984.

By the 1929 edition, the book's title had changed to *The Ship's Medicine Chest and First Aid at Sea*. With the 1978 edition, the title was slightly altered to *The Ship's Medicine Chest and Medical Aid at Sea*, perhaps to emphasize the fact that medical care going beyond what we normally think of as first aid would often be required aboard ships. By the time that the 1984 edition was issued,

legislation in 1981 had ended the entitlement of merchant seamen to the provision of health care by the Public Health Service and closed the PHS hospitals. Consistent with its origins as a health care system for merchant seamen, however, the PHS continues to produce the book. Although designed for use aboard merchant ships, the work has also found use over the years in other situations, such as on fishing vessels and in backwoods areas. For over 100 years it has filled a need for reliable medical information in cases where medical care by a health professional is not available.

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# FOREWORD

The need for medical care has been a constant since the day the first merchant ship sailed centuries ago. Concern for the health of merchant mariners has, from the beginning, been a part of our nation's history. In the 1700's, legislation mandated that a Medicine Chest be carried on each American Flag vessel of more than 150 tons, provided it had a crew of ten or more. By 1798, a loose network of marine hospitals, mainly in port cities, was established by Congress to care for sick and disabled American merchant seamen. Called the Marine Hospital Service, later the Public Health and Marine Hospital Service, and finally the Public Health Service, these federal entities continued to provide healthcare to merchant seamen until 1981.

*The Ship's Medicine Chest and Medical Aid at Sea* has been a part of much of this maritime history. This edition has evolved through many previous editions. The Public Health Service published the first Medicine Chest in 1881 under the title, *Handbook for the Ship's Medicine Chest*.

The early editions of the Medicine Chest provided step-by-step instructions on how to treat a variety of illnesses that might be expected underway when the ship was days from shore, and had limited communication with land. The master or designated crewmember had to independently manage whatever injury or illness might occur.

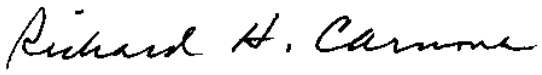
Fortunately, for the health of all merchant seamen and others at sea, the world has changed. Modern technology allows for nearly continual "real-time" communication between the ship and shore. With this, real-time access to medical consultation is nearly always available. In today's world, serious medical problems underway will be managed via communication with shore-based physicians and other medical resources. More sophisticated tele-medicine capabilities, often including video as well as audio components, are also continually being expanded.

As a result of these changes in technology and medical practice, this edition has limited the "how to" aspects of medical management. Instead, it identifies when medical consultation may be needed, and describes how to do a basic physical exam and then how to communicate these medical findings to shore-based experts. As in any aspect of treatment or consultation, effective communication is key to quality healthcare.

Another focus of this edition is prevention. Prevention, of both acute and chronic disease, will improve the quality of the merchant mariner's life while at sea, and also many years into retirement. Prevention will also maximize the productivity of the crew and its ability to meet its missions.

The edition, like past editions, has many audiences. The appendices on U.S. Coast Guard health capability requirements will be of particular value to merchant mariners. Much of the public health information has a much broader audience, and will be of value to those with private craft as well. Where possible, websites have been provided to assist in reaching additional reliable resources of information.

Ensuring your health and safety, as our merchant mariners, is a priority to all of us who greatly benefit from your service – we thank you for what you have and will do for America! And may you have fair winds and following seas….



Richard H. Carmona, M.D., M.P.H., F.A.C.S
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# INTRODUCTION AND HOW TO USE THIS BOOK

When the original edition of the predecessor to *The Ship's Medicine Chest* was published over a century ago, a ship at sea was alone. Depending upon location and other factors there was limited, if any, communication with other sea-going vessels or with shore-based medical facilities. If a crew member suffered illness or injury it had to be managed by another crew member. Thus, the earlier editions of this book focused on specific medical treatments.

With today's technology, the world is different. Medical practice underway is different. The ship's captain and the person on board assigned responsibility for medical care have many more tools available than did the health provider of the past. The internet and satellite communication have greatly expanded the immediately available knowledge base.

This edition of *The Ship's Medicine Chest and Medical Aid at Sea*, then, is very different from past editions. It is not meant to be a detailed "how to" book for specific diseases. Current information on specific diagnostic and treatment protocols is better obtained from onshore medical consultation and reliable internet sources (such as *The Virtual Naval Hospital* and other publicly available resources described throughout this book.) Instead, the purpose of this edition is to provide enough information so that someone, who has had the required classroom and other practical skills training, can examine a patient and appropriately communicate the medical findings to a shore-based practitioner. Some essential skills, such as cardio-pulmonary resuscitation, have been purposely omitted because they are continually being modified and are best taught in a classroom with "hands on" experience.

Further, in today's world, there is a new emphasis on prevention and public health. The health practitioner's role has expanded beyond the treatment of the individual patient. Responsibilities also include public health duties to assure the health and safety of the entire crew. Thus, the goal of this edition is to provide the reader with a basic understanding of the importance of public health practice as it relates to shipboard operation. The text is readable and provides a basic introduction of concepts. For example, this edition has chapters on communicable disease prevention, ship sanitation and legal issues. Specific chapters are devoted to dental emergencies, substance abuse and hypothermia because of the particular challenges they cause underway. Though public health is important, wellness and lifestyle are primarily personal responsibilities. Thus there are also chapters on personal preventive practices and women's health. Considering today's international and domestic risks, a chapter has been included on the medical aspects of terrorism.

Though today's shipboard health provider has new and expanded resources as compared to days past, some specific skills are also required. He/she must know how to treat minor conditions independently, and also to recognize when these minor conditions are a sign of something more serious. Further, to make effective use of shore-based consultation, the ship-board health provider must, among other things, know how to do a complete history and physical, and communicate the findings.

To better delineate these needed medical competencies. The International Maritime Organization (IMO) in London has adopted the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). These are qualification standards (including health care related standards) for masters, officers and watch personnel on seagoing merchant ships. The United States Coast Guard developed standards and procedures, and performance measures for use by designated examiners to evaluate competence in various areas. These are identified in Appendices A-E. These competencies are a pre-requisite to licensure. Appendix F provides a list of additional skills that have been found useful by some shipboard independent providers. Appendix G provides suggestions on how to equip a sickbay, recognizing that the specifics are dependent upon many variables such as the crew size, distance from ports and operational risk assessment.

For licensure, many aboard ship require specific health related credentials. Specific approved training classes are available for those needing to meet the STCW standards. *The Ship's Medicine Chest and Medical Aid at Sea* is not meant to be a substitute for these classes. Rather, it is meant to supplement them, though some sections of the book may be useful as course readings.

Many other sources are also available to help the health provider underway. Appendix I identifies some specific books and generally reliable internet resources that are useful references. The internet (or CD-ROMs where bandwidth and other factors may prevent reliable on-line access) provides an abundance of health-related resources, though care must be taken in selecting them as unreliable websites also exist.

The breadth and scope of the available web-based information has changed the function of this book. For example, *The Virtual Naval Hospital* (available at http://www.vnh.org) provides ready real-time on-line access to an entire medical library. (The WEBsite provides order information for a CD-ROM version for those without reliable internet access underway.) Each person responsible for medical care at sea is strongly encouraged to familiarize themselves with the WEBsite and the available references it provides long before there is a medical crisis. The midst of a medical emergency is not the time to begin exploring the contents of this valuable resource. *The Virtual Naval Hospital* provides detailed protocols and other information that is very useful in patient management and that is beyond the scope of this book.

Another resource available to the ship's health care provider is the capability for nearly constant real-time ship to shore communication. The ship's health care provider is no longer an "independent practitioner" except for minor complaints. When a crew member has a serious illness or injury, the ship's medical provider should contact a shore based physician or other health professional. Modern risk management requires this onshore back-up and consultation.

Arrangements for medical ship-to-shore communication must be made *before* they are needed. A shipping line should make arrangements to assure every ship's captain has access via radio (or other communication device) to primary care medical back-up with referral capability to the full range of medical specialties. It is critical that these medical communication networks are established *before* they are needed since there is not time to establish them in the height of a medical emergency.

Various arrangements for this coverage are possible, and various payment options also exist (fee-for-service, retainer, or a combination). To provide this ship-to-shore medical coverage, numerous medical consulting firms have been developed. They provide 24-hour primary care consultation with specialty referral available. Some also provide assistance if a crew member requires evacuation and/or medical care ashore in domestic or foreign ports.

Health care, in any setting, is a team effort. I hope that this book is helpful to every member of the health care team who is trying to assure the safest of voyages and the healthiest of crews.



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# CHAPTER 1

# HISTORY, PHYSICAL EXAMINATION AND BASIC SUPPORTIVE CARE


| | |
|---|---|
| Introduction | 1-1 |
| Creating the Sickbay Environment | 1-1 |
| Communication | 1-2 |
| Initial Assessment | 1-2 |
| Problem – Focused Health History | 1-2 |
| Physical Examination | 1-5 |
| Skin | 1-8 |
| Head and Neck | 1-8 |
| Ears, Nose and Throat | 1-8 |
| Eyes | 1-10 |
| Chest and Lungs | 1-10 |
| Heart | 1-11 |
| Abdomen | 1-12 |
| Musculoskeletal System | 1-12 |
| Neurological | 1-13 |
| Genitalia | 1-13 |
| Fluid Therapy | 1-14 |
| Dehydration | 1-14 |
| Treatment of Dehydration | 1-15 |
| Hypothermia & Hyperthermia | 1-16 |
| Hypothermia | 1-17 |
| Hyperthermia | 1-19 |
| Summary | 1-22 |
| Pain | 1-23 |
| Assessment of Pain | 1-23 |
| Interventions | 1-24 |
| Medication Administration | 1-25 |
| Equipment for Parenteral Injections | 1-26 |
| Preparation of Medications | 1-26 |
| Subcutaneous Injections | 1-27 |
| Intramuscular Injections | 1-28 |
| Intravenous Infusions or Injections | 1-28 |
| Recording | 1-30 |
| Checking the IV for Complications | 1-31 |
| Disposal of Needles and Equipment | 1-32 |
| Wound Care | 1-32 |
| Universal Precautions | 1-32 |
| Assessment | 1-33 |
| Control Bleeding | 1-33 |

| | |
|---|---|
| Principles of Bandaging | 1-34 |
| Splinting | 1-34 |
| Compression Bandages | 1-34 |
| Kinds of Wounds | 1-34 |
| Infection Control | 1-36 |
| Methods of Wound Closure | 1-37 |
| General Nutritional Status | 1-40 |
| Record Keeping/Flow Charting | 1-40 |

CHAPTER

1

# HISTORY, PHYSICAL EXAMINATION AND BASIC SUPPORTIVE CARE

## INTRODUCTION

Care of the health impaired sea-goer is a challenge for the health care provider, especially when there are miles separating the ship from shore. Some ships are equipped with well-trained health personnel and very sophisticated equipment while others rely on those with comparatively minimal training. This chapter will describe some approaches and procedures to provide initial care and comfort until professional health personnel and equipment are available to provide more definitive care.

## CREATING THE SICKBAY ENVIRONMENT

When the sea-goer, or patient, has a health complaint, it may range from a minor problem, such as a common head cold, to a more serious problem, such as appendicitis. The environment in which the patient is cared for should be a quiet spot, away from the main corridor of activity and noise; yet visible at all times to those caring for the patient. The ambient temperature should be comfortable. It should be away from any areas where noxious fumes may be present. Preferably, the area should also be a relatively safe spot, that is, an area not near the storage of gasoline or explosives, especially if oxygen is needed in the care of the patient. The area should be well-lit allowing observation of any changes in skin-color or behavior, yet an area which will allow the patient to obtain needed rest as well.

The environment should contain an area where the patient can lie down, if needed. If a formal sickbay is available, clean linens and blankets should be part of the standard equipment. Other standard equipment should include thermometers (both one for routine fever measurement and a rectal thermometer capable of low readings), blood pressure cuff and sphygmomanometer, stethoscope, otoscope, ophthalmoscope, tongue blades, flashlight, gloves and lubricant, reflex hammer, several washbasins, (with water supply) and scale.

## COMMUNICATION

Many patients come to the sick bay because of pain or anxiety. The health care provider should remain calm in his or her approach so as not add to the anxiety already present, and not to create further pain. Although it may seem as if help and assistance are miles away, most ships have some means of ship to shore communication which the health care provider should not hesitate to use for advice and consultation. Keeping the patient informed of what is going on at all times is important to allay anxiety and provide reassurance, even in the face of uncertainty.

## INITIAL ASSESSMENT

The traditional history and physical examination is comprehensive and complete. The purpose of conducting an assessment is to collect and use data in clinical decision making. A detailed description of the complete history and physical examination is beyond the capacity of this book. Therefore, an abbreviated version will be presented which is intended to serve as a guideline for the health care provider when confronted with a health impaired sea-goer. Furthermore, special emphasis will be placed on the problem-focused health history, which is used when collecting data about a specific problem system or region.

Normally, patients seek initial assistance from the health care provider for a health complaint, called the “chief complaint”. The patient begins by describing the problem. The history includes the patient's verbalized memories, perceptions and interpretations. This story provided by the patient provides some of the most important information in determining what is likely to be wrong with the patient. The patient's symptoms guide the focus and extent of the physical examination along with further laboratory investigation, when available. Appropriate interventions will be planned and initiated based on the findings of the history and physical examination, and possibly, the laboratory data results.

## PROBLEM - FOCUSED HEALTH HISTORY

The extent of the problem-focused health history will be determined by the circumstances. It should be recorded legibly and in detail to provide an official medical record on lined or unlined writing paper or in a formal chart and kept in a safe, secure place to preserve the patient's confidentiality. It should be made accessible only to health care providers or other individuals who have a right and a need to know specific information about the patient's condition or care.

The record includes and should record: the date, time, and other identifying data, such as age, sex, race or ethnicity, birthplace, and occupation. Generally, the history will be targeted to a specific chief complaint. The **“chief complaint”** is a short statement, recorded in the patient's own words and recorded in quotation marks. It indicates the purpose for the patient's request for health care. It is not a diagnostic statement. It should contain a notation of the problem's duration as well.

The “chief complaint” is followed by the **“history of present illness”** (HPI) section. The present illness section describes the information relevant to the chief complaint. It should be a clear concise account of the problem for which the patient is seeking care and presented in chronological narrative order. It should contain the onset of the problem, the setting in which it developed, duration, precipitating factors, its manifestations, and any past treatments. The principal symptoms should be described in terms of location, quality, quantity or severity, timing, the setting in which they occur, factors that aggravate or relieve them, and any other associated manifestations. The present illness section should include the patient's response to the problem and what the patient thinks has caused the problem.

The **“past medical history”** (PMH) section contains information about all of the patient's major health problems. Usually, this will include childhood illnesses, accidents and disabling injuries, hospitalizations, operations, and major illnesses.

Following the past history is the **current health information** section, which contains data about all major, current health-related information. This includes allergies, habits (such as alcohol ingestion, use of tobacco, drugs, and caffeine), medications taken regularly (prescription and over-the-counter medications), diet, exercise and sleep patterns.

The **family history section** contains data about the general health of the patient's blood relatives, and immediate family including spouse and children. The purpose is to identify any illnesses of an environmental, genetic, or familial nature that might have implications for the patient's current health problem(s).

Finally the **review of systems** (ROS) section contains data about the past and current health of each of the body systems. The ROS begins with a general review of the usual state of health, such as usual weight, any weakness, fatigue, fever. Then it progresses in a head to toe manner, reviewing each body system. The usual manner of progression is as follows: general, skin, head, eyes, ears, nose and sinuses, mouth and throat, neck, breasts, respiratory, cardiac, gastrointestinal, urinary, genital, peripheral vascular, musculoskeletal, neurologic, hematologic, endocrine, and psychiatric. The purpose is to identify any problems not uncovered previously in the history. ***In the problem-focused health history, emphasis will be on the system involved in the chief complaint unless otherwise indicated.***

**Common conditions** which might be asked about each body system include:

General: Usual weight, weight changes i.e. clothing fitting differently, weakness, fatigue, fever.

Skin: Rashes, lumps, sores, itching, dryness, color changes, changes in hair or nails, hair loss.

Head: Dizziness, headaches, trauma to head, pain, faintness.

Eyes: Vision, cataracts, changes in visual fields or vision, pain, double or blurred vision, spots, glaucoma, infections, redness, drainage, date of last eye examination, glasses or contact lenses.

Ears: Hearing acuity, infections, earaches, buzzing or ringing, hearing devices, pain, vertigo, and discharge.

Nose and sinuses: Smelling ability, discharge, nose bleeds, sinus infections, frequency of colds, hay fever, nasal stuffiness.

Mouth and throat: General condition of teeth and gums, bleeding or swelling of gums, dryness, difficulty swallowing, change in voice, hoarseness, sore throats, dentures, sore tongue, lesions, (i.e., sores, wounds, injuries or unusual tissue changes), unusual odors.

Neck and nodes: Lumps, node enlargement, pain with movement or palpation, swelling, tenderness, stiffness in neck.

Breasts: (for men and women) Lumps, pain, discharge from nipples, dimples, discharge, masses.

Respiratory: Cough, sputum, bloody sputum, past diagnoses of respiratory diseases, dyspnea (difficulty breathing), number of pillows needed to sleep at night, and wheezing.

Cardiac: Chest pain, high blood pressure, past diagnosis of cardiac diseases, swelling in ankles or legs, date of last electrocardiogram (EKG).

Gastrointestinal: Difficulty swallowing, appetite, regurgitation (vomiting or spitting up), changes in bowel habits, past diagnosis of gastrointestinal diseases, abdominal pain, constipation, diarrhea, indigestion, infections, jaundice, nausea, vomiting, rectal bleeding, rectal pain, changes in stool color, constipation, hemorrhoids.

Urinary: Frequency of urination, changes in stream, painful or burning on urination, flank pain, blood in urine, urination at night, large amounts of urine, stress incontinence, urgency, urine odor changes, past diagnosis of urinary tract diseases, stones.

Peripheral vascular: Leg cramps, varicose veins, clots in veins, pain, hot red areas on legs, swollen, edematous ankles.

Musculoskeletal: Muscle or joint pain, stiffness, arthritis, gout, backache, redness, heat, limitation of range of motion, fractures.

Neurological: Fainting spells, blackouts, seizures, weakness, numbness, tingling, loss of consciousness, changes in speech patterns, tremors, past diagnosis of neurological diseases.

Endocrine: Thyroid trouble, heat or cold intolerance, diabetes, excessive thirst or hunger.

Genital: Depends on age and gender of patient.

The extent to which each system described above is reviewed will depend on the problem identified in the problem-focused health history.

# PHYSICAL EXAMINATION

The physical examination follows the history, and like the history, can be comprehensive or focused on a specific body system or region dependent on the symptoms described by the patient. The health care provider will need to decide how extensive the physical examination should be. Influencing factors will be the patient's condition, symptoms, and demographic characteristics such as age and sex. An abbreviated version of the complete physical examination will be described in this section. The equipment needed is described in the beginning of this section. While the history includes subjective information from the patient, the physical examination is the objective information which is observed or measured by the health care provider.

Four basic assessment techniques are involved in the physical examination that is, **inspection, palpation, percussion,** and **auscultation**. All four are employed in the head to toe systematic physical examination of the patient. **Inspection** is the act of a thorough visualization, or looking at the patient's body parts. **Palpation** involves the use of the examiner's own hands to augment and verify the data gathered in inspection. The examiner uses the most sensitive parts of his or her own hands and may assess individual structures within the body cavities for position, size, shape, consistency and mobility. Detection of masses is done with the examining hand, as well. It is important to remember to always palpate painful and tender areas last. **Percussion** involves striking an object to elicit a sound or reaction of a body part. It may involve use of both hands at the same time, or the hand as a fist, or a percussion hammer. The sound that is produced is due to the vibrating structures underneath indicating the state of the structure being struck. **Auscultation** is the act of listening to the sounds produced by the human body, particularly those produced by the lungs, heart, and abdominal organs. This is normally done with a stethoscope. The bell-type head with a diaphragm stethoscope is recommended.

The physical examination begins with an **initial survey** or general inspection of the patient. The health care provider observes the general state of health, level of consciousness, stature, symmetry, weight and nutritional status, mental status, speech, general skin condition, any signs of distress or disorder. The visual inspection survey proceeds in a head to toe manner.

Next, the patient's **vital signs**: the **blood pressure**, **pulse**, **respiratory rate**, and body **temperature** are measured and recorded. Two methods exist for obtaining **blood pressure** measurement readings. Blood pressure is most commonly measured indirectly with a sphygmomanometer and stethoscope. The other method, less commonly used, is the palpation technique. To use a blood pressure cuff and stethoscope:

- Assist the patient to a comfortable sitting position, arm slightly flexed, with the forearm supported at heart level with the palm turned up. Expose as much of the upper arm as possible with no tight constrictive clothing to obstruct blood flow or interfere with reading. The patient should have rested for at least five minutes before taking the blood pressure reading. When possible, have the

patient avoid smoking for 30 minutes before taking the blood pressure reading. Either the right or left arm may be used.

- Palpate the brachial artery. Position the cuff about 1 inch above the brachial artery pulsation (about at the area where the inner crease of the elbow occurs). Center the arrow marked on the cuff directly over the brachial artery.
- Be sure the cuff is fully deflated. Wrap the cuff evenly and snugly around the patient's upper arm. Position the manometer so that is visible. The cuff diameter should be 20% to 25% wider than the arm. If the cuff is too narrow, the blood pressure readings will be erroneously high; likewise, if the cuff is too wide, the blood pressure readings will be erroneously low.
- If the patient's normal blood pressure is unknown, inflate the cuff to a pressure that is approximately 30 mm Hg above the point at which the patient's radial pulsation disappears. Fully deflate the cuff and wait at least 30 second before the next step.
- Put the stethoscope ear pieces in your (the examiner's) ears.
- Relocate the brachial artery and place the diaphragm or flat piece of the stethoscope over the artery.
- Screw the valve tightly closed and inflate the cuff again to at least 30 mm Hg above where the brachial artery pulse was felt.
- Slowly release the valve allowing the air to deflate from the cuff. It should fall about two to three mm Hg per second. Make careful note of the point on the manometer where the first clear sound is heard. This is the systolic reading. Continue slowly deflating the cuff making special note of the point where the sound is no longer heard or disappears altogether. This is the diastolic reading.
- At the point where all sounds disappear, deflate the cuff rapidly removing it from the patient's arm. The patient's blood pressure is the systolic/diastolic reading

Keep in mind that during anxiety or stress, the blood pressure may become elevated. A single elevated blood pressure reading is an indication that the blood pressure needs to be retaken. The Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure recommends that hypertension, elevated blood pressure, should be diagnosed only when a higher than normal level has been found on at least three consecutive readings.

The systolic blood pressure is the first sound heard and is recorded as the upper level while the diastolic blood pressure is the point where sound disappears and is recorded as the lower level. A blood pressure reading might be recorded as follows: 130/78.

Using the **diastolic** blood pressure readings, the Committee created the following categories:

| | |
|---|---|
| Severe hypertension | > 115 mm Hg |
| Moderate hypertension | 105 - 114 mm Hg |
| Mild hypertension | 90 - 104 mm Hg |
| High normal blood pressure | 85 – 89 mm Hg |
| Normal blood pressure | < 85 mm Hg |

The Committee also categorized blood pressure by the systolic level, particularly in the case in which the diastolic blood pressure is less than 90 mm Hg, as follows:

| | |
|---|---|
| Isolated systolic hypertension | > 160 mm Hg |
| Borderline isolated systolic hypertension | 140-159 mm Hg |
| Normal blood pressure | < 140 mm Hg |

Several electronic devices are available for taking and recording blood pressure and pulse. They must be calibrated for accurate results.

The **pulse** is another standard parameter measured as part of the patient's vital signs. The peripheral arterial pulse is a pressure wave transmitted from the left ventricle to the root of the aorta and to the peripheral vessels. The radial pulse at the patient's wrist is the site commonly used to assess the heart rate. This measure of peripheral pulsation gives an indication of cardiac function as well as perfusion of the peripheral tissues. The characteristics normally noted include rate, amplitude (indicating volume), rhythm, and symmetry. The rate is considered normal between 50 and 100 beats per minute as defined by the American Heart Association. Rates more than 100 beats per minute are suggestive of abnormality, particularly in the absence of physical exertion. If the rate and rhythm appear normal, count for 15 seconds and multiply times four; if the rate is unusually fast or slow, count it for a full 60 seconds. When the rhythm appears irregular, listen with the stethoscope to the actual heart contractions over the site of the heart on the patient's chest, just left of the center, and count the rate there. Also note the rhythm.

**Respiratory rate** is measured as the number of breaths per minute. Depth and ease of respiration is also noted.

**Temperature is discussed in the section on hypothermia/hyperthermia**

| UNIVERSAL PRECAUTIONS |
| --- |
| It is important to avoid contact with the patient's body fluids to minimize the possibility of transmitting pathogenic organisms. An effective measure is to wear disposable gloves when examining the patient. Disposable nasal specula and tongue blades must be available and appropriately disposed of after use. Wash hands before putting on gloves and after taking them off when examining each patient. |

**Skin**: The skin is inspected and palpated during the general overall survey. Observe for the moisture, texture, temperature, mobility and turgor of the skin. **Skin turgor** is the degree of fullness and elasticity observed in the skin, indicating circulation and hydration status. If there are lesions present, identify the location, size, note the configuration of any grouping of arrangement of the lesions, note the color, describe any other qualities and try to identify the type of lesion.

**Head and Neck**: The **head** is inspected by observing the position of the head and noting any unusual movements, size, shape, and symmetry of the skull. The **neck** is inspected for symmetry and stability in the usual position. Assessment of **muscle function** is done by checking for the range of movement by flexion, extension, and lateral rotation from side to side. The patient should be able to do this freely, smoothly and without experiencing pain or dizziness. The **midline neck structures** are palpated for presence of masses and for enlarged lymph nodes.

> The **thyroid gland** is palpated for enlargement and nodules. Generally, the normal thyroid gland is not palpable. The thyroid may be examined with the health care provider standing either in front of or behind the patient. However, it is easiest to examine standing behind the patient and using both hands to palpate the thyroid. With the patient's head slightly extended, the fingers are used to feel for the size, shape, consistency of the gland, and to identify any nodules or tenderness over the thyroid gland. Ask the patient to swallow and then palpate the thyroid gland as it rises during swallowing. If the thyroid is palpated, it should normally feel firm or hard to the examiner's fingers. A palpable mass of 5 mm or larger is considered to be a nodule; and, the location and size should be described. Every palpable mass requires a diagnostic follow-up.

**Ears, Nose and Throat**: Examine the **external portions of the ear** for position, size, symmetry, and presence of lumps or lesions. If gently palpating the area in front of the ear and manipulating the tip of the outer ear produces pain, the patient may have an external otitis. The **internal portions of the ear** are examined with the otoscope, using the largest ear speculum that the ear canal can accommodate. It is best to tip the patient's head toward the opposite side from the ear, which is being examined. Grasp the tip of the ear and gently pulling it upward, back, and slightly out. This helps to straighten the ear canal and makes it easier to visualize the middle ear structures. Insert the otoscope into the canal in a slightly downward and forward

manner. The **auditory canal** should be inspected for cerumen (wax), redness, and swelling.

The **tympanic membrane** is examined for color and identification of landmarks. The tympanic membrane in healthy people has a translucent pearly, gray appearance. Occasionally, some membranes have white flecks or plaques on them indicating previous healed inflammatory disease. A light reflex, or cone of light, is normally present. This triangular cone of reflected light is seen in the anteroinferior quadrant of the tympanic membrane (i.e., the lower quadrant of the membrane located toward the front of the head). The periphery of the membrane should be inspected for perforations. Fluid behind the middle ear is sometimes visible. Redness and bulging of the tympanic membrane is not normal.

Finally, **auditory acuity** may be assessed by a simple whisper test, testing one ear at a time. First, the opposite ear is occluded by cupping one's hand over the that ear. Then standing 1-2 feet away from the patient, a phrase or several words are whispered by the examiner. The patient is asked to repeat the words or phrase. To prevent lip-reading, the examiner may stand behind the patient, or if not feasible, the patient may be asked to close his or her eyes. Other bone and air conduction tests involve the use of a tuning fork and are normally performed when hearing is diminished.

The **external nose** is inspected for shape, size, color, and symmetry. The outer nostrils are inspected for flaring or discharge of mucous or fluids. Flaring is the expansion of motion of the ends of the nostrils outward and may indicate breathing difficulties. The assessment of the ability to identify fragrances will be discussed in the neurological examination. The nasal cavities are inspected with an otoscope with a short wide speculum. Both the upper and lower portions of the inner nose may be visualized. The nasal passages should appear narrow and the nasal mucosa should be pink. Note the nasal septum and any deviations, inflammation or perforation. Palpate the frontal sinuses by pressing up from under the eyebrows on each side. The maxillary sinuses can be palpated over the maxillary areas on the cheeks. Both areas can be percussed by lightly tapping with the examiner's index finger to determine any pain or discomfort in the area. Localized tenderness with pain in the area of the sinuses coupled with nasal discharge is suggestive of frontal or maxillary sinusitis.

The **mouth and throat** are inspected beginning with an external inspection of the mouth and jaw area. If dentures are present, the examiner asks the patient to remove them, so the entire mouth can be inspected. The oral mucosa normally appears light pink in color and moist with saliva. Use of a tongue blade will facilitate the moving of the tongue and cheek aside to inspect all structures. The teeth and gum areas should be inspected, and, missing teeth noted. The patient's palate and uvula are inspected. The patient is asked to repeat "Ah" and the rise of the soft palate and uvula are noted. Presence or absence of tonsils are noted.

**Eyes*:*** The eye examination can reveal information about both local and systemic health and disease processes of patients. **Visual acuity** for distance vision is assessed with the use of the traditional Snellen eye chart. Measurement of 20/20 vision means a patient can read 20mm letter at 20 feet. To test for near vision have the patient read a newspaper and note the distance at which the print is readable. One eye at a time is tested with the other eye covered lightly with anything opaque, but not the patient's fingers pressing against the closed eye. Patients with corrective lenses are tested both with and without the lenses which allow for an assessment of the correction. **Eyelids** and **eyelashes** are inspected for position, color, lesions, infection, or swelling. The **conjunctiva** and **sclera** are inspected by moving the lower lid downward over the bony orbit and having the patient look upward; the examiner observes for the presence of any swelling, infection, or foreign objects and the vascular pattern. **Pupils** are inspected for size, shape, and equality; and reaction to light. Normally, the pupils are round and equal in size. In a darkened room, a bright light, such as a flashlight, is directed into each pupil from the side of the eye, one at a time. The examiner observes for a constriction reaction in both the eye being examined as well as in the opposite eye. This reaction should occur concurrently in both eyes.

**Eye movement** is controlled through the coordinated action of six muscles collectively known as the extraocular muscles. Each of these muscles can be tested by asking the patient to move the eyes in the direction controlled by that muscle. These six muscles move the eye in a lateral (right to left) movement, and in a vertical (up and down) movement, and in a slanting (in an X) movement. Instruct the patient to follow the examiner's fingers in these same directions just described. Both eyes should move together in a parallel manner.

The **ophthalmoscopic examination** is performed next. This examination may be performed in a slightly darkened room to facilitate dilation of the patient's pupils. With the patient staring at a distant object in the room, the examiner approaches the patient by holding the ophthalmoscope in the same hand as the patient's eye to be examined. So, if the right eye is to be examined, the examiner holds the ophthalmoscope in the right hand. At about 15 inches away from the patient, with the light beam focused on the pupil, the examiner should be able to see the red reflex, or an orange glow in the patient's pupil. The recommended order of the structures to be examined is as follows: 1. optic disc, 2. retinal vessels, 3. retinal background, 4. macular area. The optic disc is examined for size, shape, color, margins, and the physiologic cup. The retinal vessels are examined for color, arteriovenous ratio, and any crossings of vessels.

**Chest and Lungs**: Assessment of the chest and lungs involves inspection, palpation, auscultation, and percussion. The approach is a systematic one. While examining one side of the chest and lungs, the other side serves as the comparison, noting differences and abnormalities. The patient remains in a sitting position. The examiner may begin on the top (superior) and work down to the bottom (inferior), or vice versa, or begin in the front (anterior) and work around to the back (posterior), or

vice versa. The examiner should always use a systematic approach regardless of where he or she begins the exam. **Inspection** of the chest is performed to assess the skin, respiratory pattern, and overall symmetry of the thorax. **Palpation** is performed next to identify any tender areas, palpate any observed abnormalities, and to assess respiratory expansion. **Percussion** is performed over the chest to assess the intensity, pitch, duration, and quality of the underlying tissue. Normal peripheral lung tissue resonates on percussion, the normal tone is loud in intensity, low in pitch, long in duration, and hollow-like in quality. Hyperresonance is an abnormal percussion tone in adults. Several areas should be percussed with one side serving as the comparison for the other side. **Auscultation** requires the diaphragm of the stethoscope. The patient is instructed to breathe through the mouth and inhale more deeply and slowly than normal. The examiner listens to the breath sounds for several full respiratory cycles. The normal breath sounds heard over the lung tissue are called vesicular breath sounds with the inspiratory phase more audible than the expiratory. Over the major bronchi, the normal sounds are bronchovesicular sounds in which the inspiratory and expiratory are equal in duration, and more moderate in pitch and intensity than the vesicular sounds. Over the trachea, the normal breath sounds are called bronchial sounds which are high-pitched, loud sounds with a short inspiratory phase and lengthened expiratory phase. There may be an audible gap separating the two phases.

> **Sounds** which are abnormal are known as adventitious or added sounds which are superimposed on the patient's breath sounds. The two most common sounds are likely to be crackles and wheezes/rhonchi. **Crackles** are discontinuous sounds which are intermittent, brief, nonmusical in nature. Taking a piece of head hair and rolling it back and forth between the fingers very close to one's outer ear can closely simulate the sound of crackles. Crackles can be either fine, (soft, high pitched and brief in duration) or coarse (somewhat louder, lower pitched, not as brief). **Wheezes** and rhonchi are more continuous sounds which last notably longer than crackles and have more of a musical quality to them. Wheezes are relatively high pitched with a hissing, shrill-like quality, whereas, **rhonchi** are more relatively low pitched with a snoring quality. When these continuous sounds are heard, it suggests a narrowing of the air passageways which can be due to a tumor, foreign body, or more generalized situations such as bronchospasm, accumulated secretions or edema of the bronchial mucosa.

**Heart**: The examination begins with the patient in the supine or lying position. A stethoscope with both a diaphragm and bell piece will be needed for this examination. Inspection and palpation are performed to determine the presence and extent of normal and abnormal pulsations over the precordium (area of the chest directly over the heart). They may be manifested as the apex beat over the heart area on the chest or as heaves or lifts of the chest as the heart beats. The force and contraction of the left ventricle may produce a visible pulsation which, when felt with the examiner's hand, is referred to as the apical impulse. Five prominent areas to become familiar with in describing the heart assessment findings are: **right 2nd interspace, left 2nd interspace, left sternal border or right ventricular area, apex or left ventricular area**, and the **epigastric area**. Percussion has limited

value in assessment of the heart. Auscultation is done at the five areas just mentioned as well as in other areas as well. The **stethoscope diaphragm** is used to detect the high-pitched sounds, like the first and second heart sounds, or S1 and S2, murmurs, and pericardial friction rubs. The **bell piece** is more likely to detect the more low pitched sounds like the third and fourth heart sounds, or S3 and S4, and other murmurs. The examiner should listen at each of the five areas, paying particular attention to the location and intensity of each sound, and for the presence of any "splitting" of the sounds. Sounds that are heard in between the sounds should be noted. Sounds that are heard in between the regular heart sounds may be accentuated by having the patient sit up, lean forward, exhale completely and stop breathing momentarily in expiration. The examiner listens carefully along the left sternal border and at the apex. Allow the patient to breathe normally, periodically catching his breath throughout the exam.

**Abdomen**: The abdomen is best assessed with the patient in the supine position (lying on the back) with an empty bladder. Taking the time to make the patient as relaxed as possible will facilitate the examination. Inspection of the abdomen requires a good lighting source. Examination for symmetry, distention, masses, skin condition (striae or stretch marks, color, scars, venous patterns, condition of the umbilicus), effect of respirations on abdominal movement, and visible peristalsis is included. Auscultation is employed next before palpation or percussion which may stimulate peristalsis. The examiner should listen with the diaphragm piece in all four quadrants of the abdomen. The examiner should listen for the presence or absence of peristaltic sounds, and, vascular sounds. The sounds of air and fluid moving through the gastrointestinal tract are easily audible and produce high pitched, gurgling noises about every five to 15 seconds. The frequency of sounds is related to digestion. The absence of peristalsis may be due to disease including obstruction. Palpation is performed after ascertaining the presence of any painful areas. First, light palpation is used to identify muscle resistance, abdominal tenderness and some superficial organs and masses. Deep palpation is then used to delineate abdominal masses and deeper structures. Percussion is employed to detect fluid, gaseous distention, and to assess the more solid structures in the abdominal cavity, such as the liver and spleen. Tympany (a low-pitched, drum like sound) is the characteristic sound of abdominal percussion.

**Musculoskeletal system**: The musculoskeletal assessment is an evaluation of the function and structure of the human body. The ability of the body to move is dependent upon the joints and muscles being able to execute the full range of motion for each particular joint. The examiner should note the coordination, speed, strength of motion, and any clumsy, awkward, or involuntary motions. Inspection includes noting symmetry, contour, size, gross deformities, any swelling or edema, painful areas, ecchymoses (bruises), and general posture and body alignment. Beginning with the head and neck area, the temporomandibular joint and the cervical spine can be assessed with the patient sitting up. The hands, fingers, elbows, shoulders and related structures are assessed by putting each joint through a full range of motion. One side of the patient is compared with the other to note asymmetry and to identify abnormalities. The ankles and feet, knees and hips are also assessed for full range

of motion. The patient's spine is inspected for the normal curvature. The assessment includes palpation of the joints; if pain is present, the painful and tender joints are palpated lightly. If during inspection, any abnormalities are observed, these should be palpated. The usual sequence for performing the assessment of the joints is inspection, palpation, range of active and passive motion, and muscle strength testing.

**Neurological:** The neurological assessment is quite detailed. In most apparently healthy individuals, a screening assessment is adequate. Also, some portions of the neurological assessment can be included in the assessment of other systems, such as the musculoskeletal system. Generally, the neurological assessment can be organized into the following: mental status and speech, cranial nerves, motor system, sensory system, and reflexes. A brief explanation will be offered in each of these. **Mental status** and **speech** include the patient's appearance, general behavior, affect, mood, motor activity, speech, orientation, thought processes, judgments and memory. The individual's level of consciousness is particularly important as an indication of awareness and responsiveness to his or her experiences. A tool used is the Glasgow coma scale, which describes the state of consciousness during or following coma. All 12 **cranial nerves** can be assessed. The examiner can observe the patient during portions preceding the actual examination for assessment of some of the cranial nerves. The **motor system** can be screened by observing for involuntary movements or abnormal positions, observing for muscle bulk, assessing the muscle tone, and testing for rapid alternating movements in the hands. The **sensory assessment** includes checking for pain and temperature in the hands and feet, position and vibration in the hands and feet, and comparing light touch in both arms and both legs. **Reflexes** are assessed by striking over the tendon briskly and observing the response elicited. The commonly tested deep tendon reflexes include: biceps, triceps, abdominal, knee, ankle, and plantar. Reflexes can be graded on a 0 to 4+ scale; 4+ indicating a very brisk hyperactive response, 3+ indicating a brisker than average response, 2+ indicating an average or normal response, 1+ indicating a diminished, low normal response, and 0 is the absence of any response.

**Genitalia**: Except when specifically related to the chief complaint, the genitalia exam would usually not be expected to be done at sea aboard a vessel. If rape or sexual assault is reported, forensic, as well as medical, issues must be considered.

**Assessment Summary**: Once the health care provider completes the history and physical assessment, it is necessary to review all notations and to devise a list of all significant problems identified during this process. This final problem list or summary of problems are known as the **assessment summary** and usually is written as the final section of the health assessment. The assessment summary assists the health care provider in determining what the health care problems are, and what actions to take to resolve them.

# FLUID THERAPY

Maintaining hydration is usually taken for granted. However, the availability of adequate fluids is essential to maintain normal body functioning. Although a person can go without food or nutrition for a fairly long period of time, no one can survive very long without fluids.

## Dehydration

Dehydration is a progressive loss of body fluids and electrolytes (body salts) altering the internal chemical environment of the body. Since the human body only operates within narrowly defined limits of chemical and fluid balances, these alterations lead to decreasing ability to function. If left untreated, dehydration results in a downward spiral that further depletes essential fluids and electrolytes (primarily water, potassium, sodium chloride and bicarbonate and resulting changes in acid-base balance). These fluids and electrolyte shifts can lead to altered mental status, headaches, weakness, cramping, fainting, convulsions, shock, coma and even death. Dehydration is common in people laboring in hot environments such as those found in the working areas inside of a ship. Such individuals are often at least 3 percent dehydrated and do not easily replace fluid lost by exertion, in spite of the availability of customary fluids to drink. Much of this fluid and electrolyte loss can be explained by the sweating process which can account for fluid loss of up to 1.5 liters/hour. Sodium and potassium are also lost by sweating, but because of the lost water's effect on circulating blood volume, the loss of water is usually more acutely important than is the loss of electrolytes.

Additional common causes of dehydration include vomiting, severe diarrhea, chronic or acute blood loss, alcohol withdrawal, burns, diabetic ketoacidosis, hyperventilation, sweating and increased insensible losses secondary to high body temperatures. Some medicines that increase urinary output or increase gastrointestinal motility can also lead to dehydration. Another common cause of dehydration is simply inadequate fluid intake due either to non-availability, inconvenience, or severe illness. In a marine environment, prolonged exposure to elements or immersion in seawater can also result in dehydration.

In the adult, **assessment of hydration** status is often based on observation of clinical signs and symptoms. The heart rate and respiratory rate both increase. Urine output, skin turgor, mental status and muscular strength decrease. The patient frequently complains of feeling weak or dizzy when in the upright position. The specific gravity of the urine increases with dehydration as the urine becomes more concentrated until urine output stops as a fluid saving adaptation by the kidneys.

The most specific test for determining fluid status is **postural vital signs**. This is because changing from a lying to a standing position tends to cause pooling of circulating fluid volume in the large blood vessels of the legs and trunk. A normal, non-volume depleted person rapidly adapts to these postural changes by vasoconstriction of the vessels where blood tends to pool. This adjustment is not possible for the volume depleted person whose vasoconstriction potential has

already been utilized to maintain adequate circulation in the face of substantial fluid loss.

**Measuring postural vital signs** as the patient changes position, comparing changes in pulse and blood pressure provides the information necessary for making rehydration clinical decisions. Be certain to protect the patient from fainting and falling during the assessment of postural vital signs to prevent injury. After having the patient lie flat on his back for one minute, measure the blood pressure and pulse in that position. Next, have the patient sit up to a 90-degree angle with the legs hanging down in a dependent position. Wait one minute and retake the blood pressure and pulse in the changed position. Finally, have the patient stand upright in a vertical position and after waiting one minute again, obtain the blood pressure and pulse in the changed position. If significant changes occur in level of consciousness or if dizziness develops or worsens or the patient's symptoms become acute when moving from lying to sitting or standing position, consider the test positive. Postural vital signs change (from lying to sitting or standing) that result in a decreased systolic blood pressure of 20 mm Hg or more, or an increased pulse rate of 20 beats/minute. or more, indicate a positive test result. The patient should be considered hypovolemic and in need of fluid replacement. The patient may experience weakness, dizziness, visual disturbance or even fainting during the test. These symptoms are usually eliminated by having the patient lie down again and by rehydration. Such a response to changes in position should be considered a symptomatically positive test.

### Treatment of Dehydration

Once a patient has become dehydrated the two available routes of fluid replacement are oral and intravenous. There are objectives of treatment:

- Rehydration and prevention of further dehydration
- Specific treatment of the underlying cause
- Symptomatic treatment to decrease discomfort

**Oral replacement** should attempt to replace both fluids and electrolytes lost in the dehydration process. Sodium and glucose transport are coupled in the small intestines because the presence of glucose stimulates the intestinal absorption of water and solutes. For this reason, oral rehydration solutions should contain water, sugar and salt. The World Health Organization (WHO) recommends a solution of 20 grams of glucose, 3.5 grams sodium chloride, 2.5 grams sodium bicarbonate, and 1.5 grams of potassium chloride added to 1 liter of water. A reasonable approximation of this can be made by adding 1 ½ tablespoons of sugar, ½ teaspoon of table salt, 3/4 teaspoon of baking soda and 1/4 teaspoon of salt substitute to a liter or quart of water. The resulting solution can be seasoned to taste by adding lemon juice, punch concentrate or dissolved flavored gelatin mix. Starting with starchy water in which rice, potatoes or pasta have been boiled adds sugar polymers to the electrolyte solution to speed the absorption of water and solutes.

**Intravenous (IV) rehydration** is best accomplished with an isotonic solution of either Half Normal Saline or Lactated Ringer's solution. These IV fluids tend to stay in the vascular system and support circulation longer than fluids containing glucose, which is drawn out of circulation faster. Additionally, 10-20 milliequivalent (mEq) of potassium chloride (KCL) and 25-50 mEq of Sodium Bicarbonate (NaHCO) may be added to each liter of IV fluid if labwork shows the patient to be hypokalemic (low potassium K) or acidotic due to dehydration. Rehydration fluids are to be given to the otherwise healthy patient until:

- the patient can maintain normal urine output levels of 50-100 ml/hour for an adult.
- the urine color approaches a light yellow (straw) color
- the specific gravity returns to normal range (1.003-1.023)
- reduced clinical signs and symptoms of dehydration mentioned earlier

Adequate oral electrolyte maintenance solution should always be made available to people in working environments where the risk of dehydration is evident. Several commercially prepared solutions are readily available in grocery stores. Oral maintenance solutions are similar to rehydration solutions, but the amount of sodium chloride can be cut in half. Mixed with crushed ice to form a slushy drink, this solution will replace fluid and electrolyte losses if taken in good quantity by people working in hot environments. This same maintenance solution can be used after rehydrating a patient to avoid further depletion of fluid and solutes.

If possible, the underlying cause of fluid and electrolyte loss should be identified and treated. If vomiting is the cause, an anti-emetic may be useful. Diarrhea with blood or white blood cells in it may require specific antibiotic therapy. Fluid replacement by itself will greatly reduce the discomfort level for the patient and relieve the dizziness experienced when standing. Acetaminophen may be given for headache or fever.

Early communication with medical specialists ashore is critical in taking care of a markedly dehydrated patient at sea. Be prepared for questions about the patient's underlying cause of fluid loss. Also, have current vital signs including postural measures of pulse and blood pressure in lying, sitting and standing positions. The on shore medical consultant will also want to know about current symptoms and response to treatment provided. If possible, measure and record urine output and be prepared to provide information on how much urine the patient is producing per hour. With awareness of the serious nature of dehydration and early recognition, treatment and rehydration can frequently be conducted without need of highly sophisticated medical care facilities.

# HYPOTHERMIA AND HYPERTHERMIA

With frequent exposure to water, sun, and weather, the sea-goer risks serious and potentially fatal effects from a body temperature which may become too high or too low. Prevention is the best medicine. The sea-goer must dress appropriately for the conditions, be vigilant and respond to changing weather and seas. This includes outfitting the vessel with all recommended safety gear and appropriately using it, a

complete first aid kit including blankets, knowing how to get medical assistance, eating nutritious foods, drinking adequate non-dehydrating fluids, avoiding alcohol and minimizing caffeine, and maintaining good overall health.

The normal body temperature is 37° Centigrade or 98.6° Fahrenheit. The conversion between Fahrenheit and Centigrade is: °C = 5/9 (°F - 32) and °F = 9/5°C + 32. Hypothermia refers to a body temperature below the normal level. Hyperthermia refers to a body temperature above the normal level. However, every person is different and there is a range within which the temperature may still be considered normal. A temperature of 36.5° Centigrade (97° Fahrenheit) to 37.2° Centigrade (99° Fahrenheit) is generally considered normal variation.

The body has three general temperature zones. The superficial zone is the temperature of the skin and is influenced by the air temperature. The intermediate zone is the temperature of the muscle and tissue under the skin. The core zone is the innermost zone and the temperature of the body's inner organs including the heart, liver, kidneys, and brain. The core zone can be several degrees higher than the superficial zone. When assessing the body's temperature, the core zone should be assessed. All temperatures in this section refer to core temperatures (e.g. rectal, esophageal, gastric or tympanic.) Of these, the esophageal temperature correlates most closely with the heart temperature, although the rectal temperature is more easily measured. When assessing an individual's temperature that is either rising or falling to dangerous levels, one should rely strictly on the core temperature.

The inability to maintain a normal body temperature can have many causes. In addition to exposure to the elements, some *causes* of hypothermia or hyperthermia are endocrine conditions, such as abnormalities of the thyroid gland; brain lesions such as tumors, or strokes; spinal cord injuries; alcohol consumption; infection; drugs; anesthesia; and inadequate fluid or nutrition. Hypothermia and hyperthermia may range from mild to profound. Survival depends upon the body's core temperature, the length of time the sea-goer remains in the abnormal state of temperature regulation, how the body responds, and treatment interventions. As body temperatures rise or fall to dangerous levels, medical assistance should be sought and the advice thoroughly followed.

**Hypothermia**

Hypothermia occurs when a person's body temperature drops below the normal range. It is a serious condition and can endanger the life of a person, if left untreated. People at sea can become hypothermic when they get wet and cold, and when they are in cool or windy places without proper clothing or protection. Hypothermia often accompanies drowning. Some medical reasons for hypothermia include environmental exposure, hypoglycemia (low blood sugar), diseases of the adrenal glands and pituitary gland, poor nutrition, Parkinson's disease, alcohol toxicity, medications for depression and sedation, some illicit or "street" drugs, rapid infusion of cold intravenous fluids, and stroke.

There are three stages of hypothermia with differing signs and symptoms in each one. The elderly and those individuals who are intoxicated may not demonstrate symptoms or signs reliably. Keeping this exception in mind, the stages are as follows:

- The **first stage** is mild hypothermia (32.2$^{o}$C to 35$^{o}$C or 90$^{o}$F to 95$^{o}$F). Common signs and symptoms will include uncontrolled shivering mental changes, poor judgment, confusion, poor coordination, difficulty walking, clumsy use of hands, difficulty talking, and drowsiness.
- The **second stage** is moderate hypothermia (27.8$^{o}$C to 32.2$^{o}$ C or 82$^{o}$F to 90$^{o}$F). Common signs and symptoms include irregular heart beat, a slowed heart beat (about ½ of normal) and metabolism (about ½ of normal). Pupils frequently do not react to light, shivering stops, and probable loss of consciousness may follow.
- The **third stage** is deep hypothermia (<27.8$^{o}$C or <82$^{o}$F). Common signs and symptoms in this stage include the absence of reflexes, breathing may cease and the heart may stop. At these temperatures, there are documented cases of survival, even with no heart beat or breathing.

Cardiopulmonary resuscitation (CPR) should be attempted and continued until the body temperature is warmed to the normal range before discontinuing and determining that the patient is dead. It is important to remember that a cold or hypothermic patient should not be pronounced dead until they have been warmed.

Most thermometers only register down to 94$^{o}$ F, so unless there is a special low reading thermometer available, it is nearly impossible to obtain the patient's lower temperatures. If no low reading thermometer is available, it is wise to consider the patient to be in severe hypothermia if the following signs and symptoms are present:

- no shivering in spite of being very cold
- mental changes such as drowsiness, confusion or unconsciousness
- abnormal coordination, trouble walking or using the hands, and difficulty talking.

Other signs and symptoms are: a slow pulse and decreased respiratory rate. The skin will feel cold, the body stiff, and a severe illness or injury that may have contributed to the low body temperature may be present.

**Treatment**: It is important to treat the hypothermic patient very gently to prevent abnormal heart rhythms. Check the ABCs, or the airway, breathing, and circulation of the patient. It may be difficult to detect a pulse. See current recommendations. Hypothermic patients have very slow pulses and slow shallow breathing. Do not begin chest compressions if the patient has any heart beat or pulse, even if it is very slow. This could cause dangerous abnormal heart rhythms and further complications. If it is necessary to begin CPR, continue until the patient's temperature is brought up to normal range and as long as there are still no pulse or

respirations. This may be a very long time to continue CPR, so whenever possible, obtain the assistance of another person.

Prevent additional heat loss by protecting the patient from exposure to cold. Move the patient to a warm sheltered area as soon as possible. Remove any wet or cold clothing. Dry the patient and replace with dry warm coverings over and under the patient and around the head. Examine the patient. Obtain the pulse and respiratory rate. If possible, take the blood pressure. If a low temperature scale thermometer is available, take the temperature. Carefully check the entire body for injuries and frostbite.

As soon as possible, contact shore medical personnel for further assistance. Gather as much known information about how the patient got into this situation. The degree of exposure to cold and the length of time will be helpful information. Air temperatures, clothing which the patient wore, whether exposure to wetness occurred, whether alcohol consumption or other substance abuse occurred, the patient's state of health prior to exposure, the presence of any other illnesses just prior to the hypothermia episode, and any medications that the patient was taking are considered vital information to report.

Refer to Chapter 10 for more detailed management of the hypothermic patient.

**Prevention**: Remember, prevention is the best medicine for hypothermia. Always be alert to changing weather and sea conditions. Never ignore shivering--it is a warning sign that the body is getting too cold. Prepare for the weather by wearing the proper clothing and staying dry. Keeping one's energy level up through proper nutrition, drinking adequate fluids, and avoiding alcohol are important preventive measures to observe. Getting adequate rest is also important. Obtain a special low reading thermometer especially if there is a risk for hypothermia. Keep warm blankets and hot water bottles aboard. Most important, plan ahead!

### Hyperthermia

Hyperthermia occurs when the body's temperature rises above the normal range of $37.2^{o}$ C or $99^{o}$ F. Whereas hypothermia slows the body's metabolic processes and in some cases even acts as a protective mechanism, hyperthermia acts essentially just the opposite and speeds up the metabolic processes leading to organ distress and irreversible organ damage. Prolonged periods of moderate to critical levels of hyperthermia can cause nerve dysfunction, the breakdown of body proteins, coma, and even death.

Some causes of hyperthermia include infection, hormonal dysfunction, thyroid crisis, reactions to medications and anesthesia. At sea, the most likely causes of hyperthermia in a person who was previously well are fever associated with the body's natural response to illness and infection, exposure to sun and weather, and a hot working environment. For this reason, fever, heat cramps, heat exhaustion, and heat stroke will be dealt with here. But first, a review of some information about the general effects of hyperthermia on the body will be covered.

**Stages of Hyperthermia**: While experts do not agree completely, hyperthermia can be described according to stages, as was the case with hypothermia. At each stage one is likely to see specific effects on the body which produce the characteristic signs and symptoms.

- **Mild hyperthermia** occurs within the body temperature ranges of 37.2$^{o}$C to 38.8$^{o}$C or 99$^{o}$F to 102$^{o}$F. The signs and symptoms which are likely to be present include: possible dehydration, possible irregular or abnormal heart beats, and an increased respiratory rate.
- **Moderate hyperthermia** occurs within the body temperature ranges of 38.8$^{o}$ C to 40.0$^{o}$C or 102$^{o}$F to 104$^{o}$F. The signs and symptoms at this stage include: dehydration, an increased probability of irregular or abnormal heart beats, and confusion.
- **Critical hyperthermia** occurs within the body temperature ranges of 40.0$^{o}$C to 42.7$^{o}$C or 104$^{o}$F to 109$^{o}$F. The signs and symptoms which are likely to be present include: altered mental abilities, irregular or abnormal heart beat, and the possibility of seizures, coma, and cardiac arrest. The upper limit of temperature for any chances survival is about 109$^{o}$ F.

Fever is the body's natural response to tissue injury. It is thought to be the body's own attempt to heal itself through a number of mechanisms. Fever accompanies many illnesses and is often an important physical sign that disease is present. Occasionally, in health care settings, fever may not be treated until the cause is identified. In general, the fever should be treated when the patient begins to experience harmful effects or the patient experiences discomfort from the fever.

When experiencing elevated temperatures, or a febrile state, and depending on the temperature, the patient should be dressed lightly and not covered with heavy clothing or blankets. This facilitates the body to release its own heat. Keeping the patient dressed lightly and uncovered may be difficult because the febrile patient perceives that he or she is cold, even though hot to the touch. The patient usually wants to be covered. However, try to keep the patient as uncovered as possible. This may seem to go against conventional wisdom of many who are of the common belief that an individual should be kept warm and covered with many blankets in order to "break the fever." Covering the patient can, in fact, drive the temperature even higher. This patient's perception of being cold is the first phase of the fever, known as the "chill phase."

During the **"chill phase,"** as the temperature is rising, there is an imbalance between the amount of heat generated within the body and the amount of heat lost from the body. The body tries to compensate for this imbalance by increasing its body surface area so more heat can be dissipated. The result is the characteristic goose pimples with increased muscle tone and shivering. The next phase of fever is the **"hot phase"** in which the high temperature registers within the temperature regulation center in the brain and the patient ceases shivering and feels hot. The final phase of the fever is the **"defervescence phase"** which means the time when the fever

begins to descend toward normal. During this phase, the temperature regulation center in the brain is reset, allowing the temperature to lower.

As the temperature rises from mild toward moderate, medical assistance should be sought. Be prepared to offer as much information as can be gathered about the nature of the illness, the patient's past health history, the fever pattern, and the current rectal temperature. If contact with medical expertise cannot be made, and, if the patient experiences any of the dangerous symptoms mentioned above, there are two treatments that should be instituted: antipyretic drugs and cooling measures.

Antipyretic drugs are those that reduce fever. The two most common are acetylsalicylic acid and acetaminophen. Avoid acetylsalicylic acid use if the patient is a child or young adult. Follow the directions on the container for the dose and frequency of administration. These drugs should be given regularly, as directed, until the problem is identified and controlled. Using these drugs irregularly may cause the patient to suffer unnecessarily from sweats and chills. Acetaminophen should be used cautiously in patients with liver disease. Occasionally, a patient taking aspirin will experience a drop in temperature below normal as well as a drop in blood pressure. Some patients also have allergies to aspirin. These patients should be given acetaminophen instead of aspirin.

The other treatment for fever is instituting gentle cooling measures. Wet sheets rung out of cool water placed on the patient or tepid (20-25$^{o}$ C or 68-77$^{o}$ F) sponge baths with water or salt water may be helpful. The patient should be watched closely during these procedures. Excessive shivering can be produced, actually increasing the fever, rather than lowering it. Discontinue cooling measures once the fever lowers to about 38$^{o}$ C or 100.4$^{o}$ F.

**Heat Exposure**: The sea-goer is at increased risk for conditions caused by environmental exposure to the heat found inside cabins and engine rooms, the sun, high humidity, hot weather, and radiant heat and light off the water. Increased risk exists for those individuals prone to conditions from heat exposure. This includes persons who are elderly or very young, obese, febrile or have heart disease, or people with diseases that prevent sweating such as scleroderma or cystic fibrosis, or individuals who are dehydrated. Persons who are on some drugs for depression, antihistamines, and antispasmodics are at increased risk. Heat exposure may produce a wide range of conditions with the most common being cramps, heat exhaustion, and heat stroke. As always, prevention is the best treatment. The sea-goer must dress for the weather and conditions at sea, utilize appropriate sun screens to prevent sun burn, stock adequate fluids aboard the vessel, drink adequate amounts of non-dehydrating fluids such as water, and electrolyte drinks (such as sugared sports drinks), be vigilant to changing weather conditions, and maintain good general health.

**Heat Cramps**: Heat cramps are the mildest form of the heat illnesses. These cramps occur during exercise or heavy work. When a muscle or groups of muscles are used over and over without rest periods, a cramp may result. The cramp can

occur during the activity or up to several hours later. The treatment for heat cramps is rest in a cool environment and adequate amounts of oral fluids such as juice or electrolyte drinks such as sugared sports drinks.

**Heat Exhaustion**: Heat exhaustion is serious and can rapidly progress to heat stroke. Heat exhaustion is not well understood, but believed to be a group of symptoms that occur together when a person works or exercises over a period of several days in a hot environment. These symptoms are nonspecific and may include: headache, giddiness, poor appetite, nausea, vomiting, a tired feeling, thirst, muscle twitching and cramps, irritability, and poor judgment. In heat exhaustion the skin may be moist, clammy, and ashen-grey in color. The temperature may be near normal, and therefore, not be useful as a guide. In some cases, patients have low blood pressure when standing up from a seated or reclining position. The patient may develop a rapid heart rate and fainting may occur. Treatment should be guided by medical advice. However, if none is available, the patient should rest in a cool environment, be hydrated, and have no further heat exposure for several days.

**Heat Stroke: Heat stroke is a serious life-threatening condition, requiring immediate expert medical consultation by radio or phone.** In a heat stroke, the body's temperature control is lost. The temperature rises quickly and results in damage to body cells and organs. Even when medical treatment is immediately available, the death rate from heat strokes is very high (up to 80%). The skin feels hot and very dry. Heat stroke from exertion usually occurs in a person unaccustomed to the heat. It develops over a period of hours. In exertional heat stroke, perspiration may still be present. In general, the person suffering from heat stroke appears very ill and demonstrates an altered mental state including confusion, delirium, or coma. The temperature exceeds 40.6$^{o}$ C or 105$^{o}$ F and the respiratory rate is very rapid with the blood pressure below normal.

Heat stroke victims must be **transported** to medical facilities as quickly as possible. However, while the transport process is being arranged and carried out, the victim must be carefully cooled **following onshore medical advice**. If the patient survives the first 24 hours, it is likely he or she will recover but may still develop liver and heart failure, kidney damage, and abnormalities with the clotting mechanisms of the blood. Therefore, even if the core temperature drops to the normal range, transport the patient to medical assistance as soon as possible.

### Summary

When the body temperature is too high or too low, serious conditions and complications can arise to quickly become a life threatening emergency, and onshore consultation is critical. The seriousness of these conditions cannot be overemphasized because permanent damage and even death can occur. The sea-goer must be continuously aware that there is nothing better in the ship's medicine chest than prevention.

# PAIN

The symptom of pain is likely to be one of the most common reasons for an individual to seek assistance for health care. Pain is a very subjective and a highly individualized experience. No other person can experience the same sensation of pain, except the person having it at the time. Therefore, pain is what the person says it is, and, exists whenever the person says it does. A cardinal rule to keep in mind when caring for patients with pain is that all pain is real, regardless of the cause (even when the cause remains unknown). Verification of pain is based simply on the patient's indication of its presence.

Two basic categories of pain are considered to exist: **acute pain** and **chronic pain. Acute pain** is a common occurrence, usually of a recent onset and most often associated with a specific injury. It is generally thought that acute pain indicates some degree of damage has occurred within the body which often require some form of treatment or intervention. As healing progresses with an organic disease or injury, the pain subsides and gradually disappears. **Chronic pain**, on the other hand, is often defined as pain that lasts for six months or longer. Chronic pain persists beyond the healing time and frequently cannot be attributed to a specific cause or injury. The onset is not well-defined, and response to treatment or interventions directed at its cause are often variable and poor.

### Assessment of Pain

The sensation of pain may be influenced by a variety of different factors. Any one of the various factors may increase or decrease the patient's perception of pain, increase or decrease tolerance for pain, and even produce a particular set of unique behavioral responses. Most important is to keep in mind that only the patient is experiencing the pain, and, therefore, only the patient can rate the degree of pain present. Therefore, ask the patient to rate the pain on a verbal or numerical scale (e.g., none, slight, moderate, severe, very severe: or, 0 to 10, where 0=none and 10=worst possible pain). It may be helpful to have the patient describe previous episodes of pain and compare this episode to others. Other information may be obtained with the following guideline used to assess the patient's pain:

- Assess the characteristics of the pain (sharp, dull, throbbing, etc.)
- Severity of pain
- Quality, location, duration, rhythmicity of pain
- Tolerance for pain
- Harmful effects of pain on patient's recovery
- Strategies the patient believes help in pain relief
- Concerns the patient has about the pain
- Assess the patient's behavior responses to the pain
- Determine if the pain is acute or chronic
- Observe for behavioral responses
- Physiological responses (changes in blood pressure, pulse, respiratory rate etc.)
- Verbal statements and vocal responses

- Facial expressions and body movements
- Alterations in response to the environment
- Adaptation of physiological or behavioral responses
- Effect on ability to communicate and carry out usual activities of daily living
- Assess factors that influence responses to pain
- Ethnic and cultural factors
- Previous pain experience
- Meaning of the pain experience
- Patient's response to pain relief strategies
- Assess for allergic responses to any medications

**Interventions**

There are a variety of interventions available for pain management and relief. Administration of analgesics is one frequently used method. Medication is most effective when the dose and interval between doses are individualized to meet the patient's need. Before administering any medication, always ascertain any history of allergies. It is best to administer analgesics before the pain reaches a severe or intense level. If the patient's pain is expected to occur around-the-clock, a regular around-the-clock schedule may be indicated. Waiting for the intensity of the pain to reach severe levels before the patient requests pain medication is defeating the purpose of comfort and may result in a higher dose to achieve pain relief. When a "preventive approach" with regular dosing is used, a smaller dose may be required to relieve mild pain or to prevent the occurrence of pain. By being aware of the patient's need for pain relief over a twenty-four hour period, less medication may actually be needed. In addition to more effective pain relief, side effects, such as sedation and constipation, may be avoided. The patient is less likely to experience extreme peaks of severe pain and spends less time in pain.

Are there any situations when withholding pain medication is considered appropriate and strongly advised? This may be the case when the patient has sustained a head injury. It is important to continually assess the patient's level of consciousness and orientation along with the ability to respond to verbal commands. These parameters are indications of the higher functions controlled in the cranial cavity. When there is a head injury, swelling or bleeding in the brain may impair the ability to verbally respond and may result in increased drowsiness and depressed respirations. The patient needs to be awakened frequently, even during sleeping periods to assess the level of consciousness. Administering pain medication that is a central nervous system depressant can further complicate the patient's condition.

Whenever possible and appropriate, local applications of cold to a local painful part may also be considered as an adjunct therapy. This approach is an under used, but highly effective, method of pain relief. Cold relieves pain faster and the effect often lasts longer. Local application of cold does not necessarily cause muscle contractions. It may slow the conduction of impulses that maintain muscle tone and promote muscle relaxation. Thus, cold is indicated to reduce bleeding and swelling of new injuries, but may also be continued for pain relief. However, use care to avoid injury to the tissues.

# MEDICATION ADMINISTRATION

The following chart outlines the various routes of administration of medications:

| |
|---|
| **Orally:** or by mouth: a solid or liquid medication is absorbed from the gastrointestinal tract |
| **Sublingual:** under the tongue and absorbed by mucous membranes |
| **Inhalation:** a gaseous or vaporous medication is inhaled and absorbed through the lungs |
| **Topical:** liquid or semi-solid creams or lotions that are rubbed on and absorbed through the skin |
| **Dermal:** patch applied to skin for absorbption |
| **Rectal suppositories:** suppositories are administered into the rectal cavity for absorption |
| **Parenteral:** routes in which the medicine is in solution or suspension and is given by injection<br>**Intradermal:** injects medication between the layers the skin itself<br>**Subcutaneous:** which injects medication under the skin into the connective tissue<br>**Insulin injection:** a form of subcutaneous injection, has some special considerations<br>**Intramuscular:** injections which place medication into muscle tissue directly<br>**Intravenous:** injects medication directly into a vein for immediate distribution into body |

Every patient should be able to expect that he or she is receiving the correct medication for their condition. This requires the vial or bottle be checked carefully to assure that it is the correct medication before administering it. Unlabeled bottles or medications should not be used. The quality of the drug must be checked-don't give a medication that has changed color, or consistency, or has an unusual odor, for this could indicate that the medication has deteriorated and is unsafe to use. The right dose or amount of the needed medication must be given. It is incumbent upon the care giver to carefully check the dosage and the amount being prepared. If a mathematical calculation is required, the math should be double checked and, optimally, checked with another person. Use special care in converting from English to metric measurement systems. Finally, care must be taken that the correct patient gets the correct medication. If more than one person is being cared for at the same time, proper identification is mandatory.

| **"Rights" of Administration of Medications** | | | | |
|---|---|---|---|---|
| **Right Drug** | **Right Dose** | **Right Route** | **Right Time** | **Right Patient** |

Timing is especially important when administering a series of medications. Many drugs are therapeutic only when they reach and maintain a specific level in the blood. It is best to be as consistent and close to that time interval as possible. Commonly ordered time intervals follow:

**Common Intervals for Medication Administration**

| | |
|---|---|
| Twice a day (b.i.d.) | 6 am & 6 pm<br>0600 & 1800 hrs |
| Three times a day (t.i.d.) | 6 am, 2 pm, & 10 pm<br>0600, 1400, & 2200 hrs |
| Four times a day (q.i.d.) | 6 am, 12 pm, 6 pm,&12am<br>0600, 1200, 1800, & 2400 |

Additionally, there is one more right, the right of refusal. If the patient is alert and oriented, he/she still has control over his/her body when mentally competent. The patient has the right to refuse medication or treatment of any kind. The care giver must be certain the patient is competent to refuse the care. If this is the case, the care giver should record that the medication (or procedure) was refused and the reason why. Consent from the patient should be obtained whenever feasible prior to any intervention. In some cases, the patient should write the refusal on the chart.

**Equipment for Parenteral Injections:**

- Medication, in vial or bottle
- Alcohol sponges and sterile gauze, bandaids
- Syringe (parts are the barrel and the plunger)
- Needle, based upon type of injection planned:
  - intradermal - ½", 25 gauge
  - subcutaneous - ½ to 1", 25 to 23 gauge
  - intramuscular - 1 ½", 20 gauge

**Preparation of Medication:**

Medications should be prepared immediately before administering them, but if the medication is stable, medications can be prepared up to ½ hour before administration if necessary. When the vial is removed from the storage locker, the label must be read carefully and the dosage or amount per ml noted appropriately and recorded in the chart.

- Check medication as removed from storage.
- Clean stopper with alcohol sponge.
- Select a syringe that will hold the necessary amount of medication: If the syringe has pre-attached needles, check to make sure the size and gauge are correct. If the needle is not correct or if the needle is not attached, select the correct needle and attach the needle according to manufacturers' package directions.
- Remove needle guard/cap.
- Draw up air into syringe equal to dosage amount; for 1 ml of medication, draw up 1 ml of air, according to indicator markings on barrel of syringe.
- Insert needle through the stopper into the bottle and inject air into vial. This increases pressure inside the bottle and makes it easier to draw out the medicine.
- Slowly pull back plunger and draw the necessary amount of medicine into syringe.
- Expel air from the syringe, if needed, by pointing the needle upwards and waiting for any air bubbles to rise to the top. Slowly expel air until a drop of liquid lies on the tip.
- Exit from the vial, and protect needle from contamination and exposure until the injection is given.

Prefilled syringes are available for some of the most commonly used parenteral medications. When using prefilled syringes, check the medication already in the

syringe. Discard any amount that will not be used and then proceed to give the injection.

Some medications are stored in **ampules** which are small glass containers. To break the ampule open, score the neck of the ampule with a razor blade, if not prescored. Then wrap the neck of the ampule with gauze and break at the neck. Medication may then be drawn up into the syringe. Extra care must be taken to eliminate air from the syringe.

### Subcutaneous Injections

Subcutaneous injections, informally called "subQ" are usually given in the upper arm or outer aspect of the thigh, but other surfaces may be used. Caution must be used to avoid blood vessels and nerves. Having selected an area for the injection site, avoid a spot with open sores or wounds, skin irritation, scars, moles, tattoos, etc.

- Cleanse the skin with alcohol. Begin in the center of the site and wipe in a circular motion outward from the center. Wipe off excess alcohol with a second sponge.
- Grasp skin and "pinch" up to accumulate a well-defined roll of skin and to elevate the skin from underlying muscle.
- Hold syringe like a dart, and insert needle at a 45 degree angle quickly and smoothly.
- Release tissue.
- Using the left hand, hold the barrel of the syringe and with the right hand*, pull the plunger of the syringe back slightly to check the position of the needle, if a red flashback of blood occurs, the needle is in a blood vessel.
- If needle is in blood vessel, draw back syringe slightly, insert in new direction and recheck position of the needle.
- When needle is not in blood vessel, inject medication slowly and smoothly by pushing the plunger into the syringe.
- Withdraw quickly and apply light pressure with a gauze sponge. Put a bandaid over the site to avoid leaking and blood on the patient’s clothes.

*** The care giver can reverse the hand position if the care giver is left-handed**.

The procedure for insulin administration for a diabetic patient is essentially the same as administering a subcutaneous injection. It is extremely important with insulin to double check the dosage needed and to coordinate this amount with the patient's schedule based on blood and urine testing. If possible, double check the dosage drawn up with another health care provider or with the patient, if necessary.

When insulin is administered, the skin is **NOT** pinched up but held taut, and the needle of the insulin syringe is inserted at a 90 degree angle. After the insulin is injected, the needle is left in place for 30 to 60 seconds and then quickly withdrawn. This is done to prevent insulin from leaking out of the injection site. If insulin does leak back out, the care giver should try to estimate the amount lost. This may change the patient's reaction and necessitate another injection or other action.

If the health care provider is responsible for giving the insulin, the injection site should be rotated according to the patient's plan. The site used must be noted in the record or on the site rotation chart if the patient uses one. If the patient is going to be exercising the area chosen for the injection immediately after the injection, it would be wise to choose another site. The increased activity in that area may increase the absorption of the insulin and result in an adverse reaction for the patient. For example, if the patient is scheduled to be walking a long distance or is planning to go jogging, it would not be wise to inject the insulin in the patient's thigh but rather to use an abdominal or upper arm site. If the patient is able to administer his or her own insulin, let the patient do so. The patient may need assistance with some part of the procedure. It is appropriate for the health care provider to help as requested.

**Intramuscular Injections**

The most common site is in the upper outer quadrant of the buttock. The deltoid muscle (upper arm) is acceptable for small amounts (2 cc or less) of medications such as immunizations.

- If using the gluteal muscles (buttocks), have the patient relax by turning their toes inward and taking their weight off the selected leg.
- Clean the injection site with alcohol as with subcutaneous injections. Begin in the center of the site and wipe in a circular motion outward from the center. Wipe off excess alcohol with a second sponge.
- Don't grasp or pinch the skin.
- Hold syringe (like a dart) at 90 degree angle (perpendicular) to the skin, and quickly and smoothly insert the needle.
- Check position by drawing back on the plunger and watching for a red "flashback" of blood. If a flashback occurs, a blood vessel has been entered, withdraw the needle a little way and redirect the path. Recheck position, if no flashback occurs,
- Inject the medication slowly and smoothly.
- Withdraw quickly and apply light pressure with a gauze sponge. Put a bandaid over the site to avoid leaking and blood on the patient's clothes

**Intravenous Infusions or Injections**

Intravenous infusions are commonly referred to by the abbreviation IV. Either an injection of an emergency drug or the administration of larger amounts of fluid may be rapidly accomplished via this route. The equipment and length of time differ but the technique for choosing a vein, inserting the needle and removing the needle is the same. A syringe or infusion set is required for administration. With an IV infusion, stabilization of the needle and the IV tubing occurs while the fluid is running.

Criteria for selecting a site: Choose the largest convenient vein just below a venous junction. If possible, select the antecubital fossa, the inner aspect of the arm below the elbow. Veins here are large and usually easily accessible. This requires limitation of the affected arm's movement so stay below the elbow crease for the patient's comfort, if possible. Alternate sites include the back of the hand and

forearm. The ankle and foot can be used in extreme emergencies but risk of infection increases, and should be avoided if possible.

Checking the vein prior to IV insertion: Apply the tourniquet lightly above the selected site. Have patient periodically clench the fist of the arm which will be used for the IV site. The arm may be placed below heart level, if needed, to further fill the veins and aid in selecting an injection site.

Any solid material such as wood, solid plastic, etc., may be padded with foam or a towel to stabilize the arm and to increase patient comfort. The arm board is usually about 3-4 inches wide and 12-18 inches long. Place it under the arm and lightly restrain the arm before insertion. After insertion, secure the arm more firmly by wrapping the arm and the board with gauze at the wrist and the upper arm to prevent the elbow from bending. Check the pulse at the wrist to make sure that circulation is not impaired by the straps being too tight.

The average rate of flow for an IV infusion is 60 drops per minute; this can be faster for dehydrated patients or slower for elderly or cardiac patients, or to just keep the access open. Mechanical or equipment factors which affect the rate of flow include the control valve position and other settings. The diameter and length of the IV tubing, the height at which the IV fluid is held, and the size of the needle used also affect flow. Another influence on the rate of flow is the viscosity of fluid - the thicker the fluid, the slower the flow rate.

The drops per milliliter as counted in the drip chamber of an IV infusion set vary with the commercial manufacturer. Check the set directions or check the rate by counting the drops falling into the drip chamber for one minute. The formula uses the amount of IV solution specified to give, multiplied by the drops per milliliter of fluid, divided by the time period for the infusion. For example, the patient needs to have 1 liter (1000 ml) of 5% Dextrose in Water fluid infused in approximately 2 ½ hours. The administration set indicates that there are 10 drops in 1 ml. How many drops per minute are needed to infuse this liquid in that time?

| **CALCULATING FLOW RATE** |
|---|
| ?? drops/min = total volume x drops/ml divided by total time in minutes<br>**example:** ***drops/min = 1000 ml x 10 drops/ml = 65 drops/min***<br>***150 min*** |

Equipment:

- Needle size: 2 ½ to 4"; #18 – 21 gauge needle (may use prepacked IV angiocatheters)
- IV infusion set-tubing, drip chamber, flow gauge
- IV solution
- IV pole or method to hold IV solution above patient's head

Procedure:

*Preparation*

- Inform patient of procedure and purpose.
- If possible, place the patient is semi-sitting position and adjust patient's sleeve.
- Position tourniquet (DO NOT TIGHTEN) under an upper arm, just above the elbow.
- Connect IV materials, hang fluid receptacle on the pole.
- Recheck bottle label for correct solution and recheck calculations.
- Allow IV fluid to flow through system until liquid drips from the needle. This should remove air bubbles. Drain more fluid if necessary to remove more air bubbles.
- Tighten clamp on fluid and lay sterile needle in or on a sterile surface until the arm is prepared.

*Insertion*

- Tighten the tourniquet.
- Have patient open and close the fist. Palpate and note the site.
- Cleanse the skin thoroughly, using an antiseptic, such as iodine prep and washing from the center of the site outward in a circular motion. Use a second alcohol sponge to remove excess fluid. Use antiseptic at room temperature since a cold application could cause the vein to constrict and make insertion more difficult.
- Use a thumb to apply tension to tissue and vein about 2 inches (5 cm) BELOW injection site.
- Hold needle at 45 degree angle alongside the vein wall, in the direction of insertion.
- Pierce the skin
- Decrease the angle of the needle until nearly parallel to the skin and still slightly to one side of the vein. Apply pressure in the same direction and pierce the vein.
- If there is a backflow of blood through the needle the vein has been entered. Advance the needle slowly about 1 inch (2.5 cm).
- Release the tourniquet. (At this point, if an injection is to be given, slowly depress the plunger and inject the medication. Some medications must be injected very slowly.)
- Release the clamp (flow gauge).
- Slide a gauze square (folded in half, if necessary) under the needle to hold it in the proper position.
- Anchor the needle in place using narrow adhesive strips. Fasten a loop of tubing to the arm to prevent pulling on the needle.
- Regulate the flow of the solution to the calculated rate.

**Recording**

When an IV is inserted, the written medication record should include the IV site, size of needle, type of solution infused, flow rate and amount of fluid actually given. Any other medications given through the IV should be carefully recorded. Finally, record whether there were any problems encountered and the patient's reaction to the procedure.

**Checking the IV for Complications**

There are a number of reasons why a well-placed IV can fail such as mechanical problems or infiltration. For each of these situations there are symptoms and remedial actions that can be taken.

Sources of Mechanical Failure Include:

- Needle may clog due to clotting (see Thrombophlebitis below).
- Needle may slip from position.
- The equipment may have a kink in the tube or occlusion.
- Symptoms include:
  - Swelling (edema) at the site.
  - Fluid doesn't not flow properly

To Correct:

- Check tubing for kinking and gently straighten or remove obstruction.
- Rotate needle slightly to see if the bevel is lying against the vein wall.
- Gently move the arm of the patient to a new position.
- Lower IV bottle below level of patient to check for blood
  - Flashback-this will demonstrate if needle is patent or clear.
- If none of these suggestions work, stop the flow, remove needle and restart IV using a new, sterile needle.

Infiltration: (The needle becomes dislodged and is lying in tissue).

Symptoms at the injection site include:

- Edema and blanching of skin
- Discomfort and pain
- IV fluid slows or stops flowing

To Correct::

- Stop infusion and remove IV.

Fluid Overload: occurs when the patient receives an excessive amount of fluid in a brief time. Symptoms may include a headache, flushed skin, rapid pulse, and the veins appear distended. When the blood pressure is checked, it is usually increased and may be accompanied by coughing, shortness of breath, and increased respirations.

To Correct:

- Stop the infusion immediately and raise patient to sitting position, if possible, to make breathing easier. Monitor the patient closely.

Thrombophlebitis: A clot with inflammation forms in a vein. This clot occludes, or closes, the vein and stops the IV flow. The clot may be at or above the infusion site. Symptoms include tenderness and then pain along the course of the vein. It may be accompanied by edema, redness, and warmth at an injection site.

To Correct:

- Discontinue the IV. Apply cold compresses to relieve pain and inflammation at the site and follow later with warm compresses to stimulate circulation.
- Loosen adhesive tape and place a sterile gauze square over the needle site.
- Gently withdraw the needle and exert pressure on the needle site until blood has clotted.
- Place a clean gauze pad and secure with tape or a bandaid over site.
- Enter note in flowsheet and medical record.

**Disposal of Needles and Equipment**

Needles, syringes, and IV equipment should NOT be reused. Needles should not be recapped in order to guard against an inadvertent needle stick. Needles and syringes should be disposed of in an impermeable container, preferably one designed for the purpose, or if necessary, something such as a coffee can or a glass jar. The container should be labeled as containing contaminated needles and syringes. Used tubing, alcohol sponges, and other soft, non-sharp materials should be placed in a biohazard (red plastic) or labeled bag for proper disposal at a later time.

# WOUND CARE

This section will present basic guidelines in the management of a soft tissue injury. Four key areas will be addressed: universal precautions (specifically with regard to wounds), control of bleeding, control of infection, and preservation of function in the injured part.

**Universal Precautions**

For a more extensive discussion, the reader is referred to the Center for Disease Control (CDC) website on universal precautions. Care must be taken to prevent the transmission of HIV or other blood-borne pathogens. Universal blood and body-fluid precautions must be taken with all patients.

First, wear gloves when touching blood and other body fluids, mucous membranes, or nonintact skin, and when handling items or surfaces soiled with blood or body fluids. Masks and protective eyewear or face shields should be worn during procedures that are likely to generate droplets of blood or other body fluids Gowns or aprons should be worn during procedures that are likely to generate splashes of blood or other body fluids.

Second, any skin surfaces contaminated with blood or other body fluids should be washed immediately. Furthermore, hands should be washed immediately after removing gloves. Third, the caregiver must use extraordinary care to prevent injuries

to himself/herself with any sharp instrument contaminated with potentially infectious material. After use, place all sharp items in a puncture-resistant container for disposal. Fourth, avoid handling equipment or devices contaminated with potentially infectious material. Fifth, **a disinfectant solution such as chlorine bleach should be used to clean spills of blood or body fluids immediately after they occur.**

Last, immediate treatment of accidental exposure to blood or body fluids should include flushing the site well with soap and water and seeking medical attention as soon as possible. Specific treatment may be indicated for the caregiver exposed to the patient's body fluids. Seek immediate shore consultation for advice on this treatment.

**Assessment**

A quick, but thorough, assessment of the patient and the injury must be done initially. Note the injury site, cause of injury, and degree of injury. It is important to assess the life-threatening potential of the injury, and observe for signs of shock (paleness, rapid and shallow respirations, thirst, nausea and vomiting, weak and rapid pulse, restlessness, excitement and anxiety). Fainting is not uncommon for the injured person during the assessment due to the loss of blood, deformity and pain. It is best to have the individual lie down to prevent a possible fall and further injury.

**Control of Bleeding**

External Bleeding - **APPLY PRESSURE**. Place several pieces of sterile gauze or clean cloths directly over the wound. Apply **direct pressure** on the gauze or cloths with the hands. Hold or maintain the pressure for 4-6 minutes. If bleeding continues, apply a pressure bandage. A pressure bandage is applied in the following manner: keep the first layer of gauze in place; remove all other soaked gauze and replace with clean gauze layers. Then, wrap the wound tightly, in a spiral fashion, with continuous bandage or 2" or 3" strip of cloth to continue pressure. It is important to check the nearest pulse most immediately past the wound. **DO NOT CUT OFF BLOOD FLOW PAST WOUND**. Wrap the entire involved limb further beyond the wound to prevent undue swelling or tissue damage. The direction in which the wound is wrapped is also important. Wrap in the direction that is furthest from the heart to the area that is closest to the heart, using even pressure throughout. Estimate blood loss and seek medical consultation. After one to two days, with frequent checks for blood flow to the limb, remove the pressure bandage and replace with a smaller bandage.

IF SERIOUS BLEEDING CANNOT BE STOPPED, or if the injury includes loss of a limb, apply a tourniquet, as the last resort. This is accomplished in the following manner: wrap a large, broad cloth around the end of the limb on the heart side of the wound; tie a knot; place a stick or other object 6" or so long across the knot, and hold the stick in place with another knot. Then, twist the stick until the bleeding stops, securing the stick to prevent unwinding. Note the date and time applied**. EVACUATE THE PATIENT TO THE PHYSICIAN IMMEDIATELY.** ***NOTE:***

***Tourniquet use is dangerous and may cause unwanted loss of the limb.*** Keep the area uncovered and the tourniquet tight until ordered to be loosened by a physician.

In general, if the bandaging was applied to control bleeding, do not remove. Seek medical care.

Several principles of bandaging are presented in this section. They are applicable regardless of the location or type of bandage to be applied.

**Principles of Bandaging.**

- Thoroughly cleanse wound with sterile saline solution, or clean water. Be sure and remove all visible dirt and foreign material.
- Place sterile gauze on the wound.
- Add extra gauze/cloth to absorb fluid and provide compression to the wound area.
- Wrap with gauze roll or cloth strips, in spiral or a figure 8 fashion to secure. All dressings should be changed daily.

When handling dressings, thorough washing of hands with soap and water is extremely important. If at all possible, use sterile gloves when handling wounds and removing or reapplying new dressings. Use of sterile gauze is recommended. However, if sterile supplies are not available, use clean sheets, towels, or clothing torn into 2" or 3" strips. If linens are used, iron to sanitize before applying to wound, if possible.

**Splinting**

Splinting is used to decrease mobility and promote wound healing. Bandages may be used to prevent movement and protect the area from further trauma. More gauze or cloth wrappings may be used. A stiff board on the outside undersurface of the bandaged area may be used.

**Compression Bandages**

Some wounds will require a compression bandage. The extra wrapping will prevent swelling. It provides a bulkier style bandage.

**Kinds of Wounds**

**Lacerations:** A laceration is a disruption in the tissue where the resultant edges of the wound are left jagged or straight-edged. It is usually caused by either cutting or tearing of the tissue. Apply any non-stick gauze, "TELFA," or other material and bandage. A large laceration may require suturing. Medical care should be sought if damage to nerves, vessels, or muscles is suspected.

**Puncture Wounds:** A puncture wound occurs when a foreign object pierces the body. Bleeding from the wound is encouraged to flush out the foreign material. Foreign objects which are protruding from the wound and easily grasped should be

removed with a sterile tweezers if removal will not further damage tissues. Place a small piece of sterile gauze with sterile tweezers in the wound opening to allow further drainage. This is a wound with a high risk potential for infections. (Removing a fish hook generally requires alternate procedures to avoid further tissue damage.) LEAVE OBJECTS STUCK INTO THE SKULL AND BRAIN IN PLACE. SECURE THE FOREIGN OBJECTS WITH A BANDAGE. EVACUATE THE PATIENT TO THE PHYSICIAN IMMEDIATELY.

**Abrasions:** An abrasion occurs when the skin is rubbed or scraped off. It can be either deep or superficial. It is important to rinse the affected area thoroughly with sterile saline solution or clean water. Any large foreign body should be removed with **sterile** tweezers. The area should be covered with sterile gauze or special pads that prevent the gauze from sticking to the wound so the area will not be further traumatized when the gauze is removed. The initial layer of gauze is then covered with a bandage. These wounds tend to "ooze". There is a high risk for infection with abrasions. Small abrasions are often left open to air dry after cleaning.

**Avulsion: An avulsion is a tear or separation. Small:** Cleanse the wound with clean water or sterile saline solution, including small flaps of skin when present. Attempt to place the skin back into place, apply sterile gauze and bandage the wound. If the skin flaps become black and turn necrotic at the edges seek medical care. If medical care is not available trim the area with sterile scissors and re-bandage the wound. **Large:** In a large avulsion, flush the area with clean or sterile water or saline. Place sterile petroleum gauze over the wound base. Attempt to reposition larger skin flaps, apply sterile gauze and bandage the wound. **EVACUATE THE PATIENT TO THE PHYSICIAN IMMEDIATELY.**

**Contusions:** A contusion is a closed, superficial wound usually caused by a blow from a blunt object, a bump against a stationary object, or a crush. Blood seeping into soft tissues from injured vessels and capillaries causes swelling and pain that may be severe at the site of the injury. If the injury is over a bone, consider the possibility of a fracture.

Contusions can also involve hemorrhages of the brain that result from the mechanical forces that move the hemispheres of the brain relative to the skull. Trauma sufficient to cause prolonged loss of consciousness usually produces such lesions. Clinically this may present as specific cranial nerve findings such as a gaze preference. Dependent on the location, though, this may also present with altered mentation and combativeness, and may even progress to death. **EVACUATE THE PATIENT TO THE PHYSICIAN IMMEDIATELY.**

**Wounds of Hands and Feet:** Cleanse these wounds thoroughly with clean water or sterile saline. Place clean gauze on the wound, separate toes or fingers with gauze, and apply a compression bandage.

A fishhook is generally best removed by a physician or surgical team. A fishhook can be removed easily when only the point and not the barb penetrates the skin. If the

barb of the hook enters the skin, it must be pushed until it has penetrated through the skin on the opposite side. Then, the barb should be cut off with a wire cutting instrument and the rest of the hook removed. After the wound has been cleansed, a bandage should be applied. The wound should be observed for any signs of infection and tetanus toxoid given if required.

**Burns:** Cool burned tissue immediately with cold water. If blisters are present, leave them intact, do not break them. For **small superficial** burns, apply petroleum gauze to the area and bandage. It is important to change the bandage daily. In case charred white or black tissue is present, remove loose and dead tissue with sterile tweezers. Apply petroleum bandage. **EVACUATE THE PATIENT TO THE PHYSICIAN IMMEDIATELY. Burn patients require sophisticated medical management because of fluid and electrolyte and other complications.**

**Neck Wounds:** Treat minor wounds to the neck area as described above. When working in the neck area, avoid circular bandaging around the neck. Use care not to cut off the carotid arteries or respiration. If the patient's wounds are severe in this region, apply first aid and **EVACUATE THE PATIENT TO THE PHYSICIAN IMMEDIATELY.**

**Infection Control**

**Prevention:** The health care provider must scrub hands thoroughly, preferably with an antibacterial soap. If available, use sterile gloves. Be sure to cleanse the wound thoroughly. All visible fragments of dirt and/or foreign material should be removed with sterile forceps. If available, a local anesthetic can help permit adequate cleansing (see below for suturing). The skin area surrounding the wound should be cleansed, and the wound area itself should be flushed with sterile water. If antiseptics are used, select one which will not be harmful to surrounding tissue such as 1% silvedene, bacitracin, or neosporin.

**Signs of Infection:** The wound should be inspected frequently for signs of infection. Wound infection will be characterized by such local signs as pain, swelling, heat, redness, and/or limitation of motion. Signs of infection are an elevated oral temperature of $100^{o}$ F or greater one to two days after a severe injury, enlarged lymph nodes, evidence of "pus" in the wound or on the dressing, and a foul odor to the wound. In the normal healing by the second or third day after injury, there is a noticeable decrease in pain, swelling, heat, and redness around the wound site.

**Treatment of Wound**: After cleansing, the treatment of a wound consists of drainage, elevation, and antibiotic therapy. If a wound does become infected, it may be necessary to reopen the wound to promote drainage of the infection. Here again, sterile technique and equipment are important. Using sterile forceps, carefully open the wound for drainage purposes. Irrigate with sterile saline or water, or soak the wound in water sterilized by boiling and cooled to the touch. The wound can be dressed with sterile bandages. Apply moist heat three to four times daily for thirty minute periods to a dry dressing. If the wound is draining, change the dressing

frequently. If possible, elevate the injured part. Oral antibiotics are reserved for major and badly contaminated wounds with a high risk of infection, and for infected wounds. Otherwise, reserve antibiotic administration until signs of infection are present.

**Methods Of Wound Closure**

**Most wounds, even extensive ones, heal well without suturing**. Closure should hold the wound edges together continuously to allow healing, normally about ten days, regardless of the method chosen. In general, suturing should be avoided if a less invasive method will keep the wound closed during necessary activities. Wounds in areas of high use and tension, such as ones that cross joints, require more aggressive closure than wounds in areas where the skin doesn't move and stretch. Suturing by an inexperienced person can result in many complications, (including undesirable cosmetic results in visible portions of the body) and should be used only under extreme circumstances.

**Surface Closures:** (Butterfly strips, steri-strips, and medical tape). At no time should dirty or infected wounds be closed. Wounds that continue to bleed inside, particularly if deep, should not be closed either. The area around the skin must be dry for effective taping. Once the wound is cleansed and bleeding has ceased, try to hold the edges together, either touching or approximate, with butterfly strips or strips of half-inch tape directly over the wound. The strips should extend 1 1/2 to 2 inches on either side of the wound, and be placed over the wound with half-inch gaps between tapes. Pinch the wound closed and apply the tape to hold it, starting at the ends and working toward the middle of the wound. Evaluate the closure by putting the patient through gentle range of motion of the limb or area involved. If the wound closure holds for this, consider whether more vigorous use of the area may be essential, and whether this will disrupt the closure or not.

**Suturing:** Suturing of a wound should be considered only if other methods will not close the wound. There are some precautions to observe if suturing becomes necessary. Certain types of wounds should not be closed. Wounds that are already infected or dirty should not be sutured. Deep wounds with extensive underlying tissue damage, such as major crush wounds, should not be sutured. Wounds that are more than twenty-four hours old should not be sutured; in fact, it is advisable to avoid suturing wounds that are more than eight hours old. Try to avoid suturing animal or human bites because these wounds frequently become infected. Do not pull skin together to close a wound particularly if it leaves a large empty space open underneath the skin. When in doubt, seek the advice of a more experienced health care provider to make the decision.

Equipment**:**

- A well-stocked medical kit (these items will be present in most disposable suture kits) which contains the following:
  - Disinfectant (Betadine or equivalent)

- Sterile gloves
- Sterile drapes (available as prepacked disposable items)
- Needle holder (hemostat could suffice, but not optimal)
- Forceps (has other uses as well)
- Surgical scissors
- Suture material (4-0 Nylon with a curved needle will serve most emergency purposes)
- Anesthetic (1% Xylocaine)
- Syringes and needles for anesthetic (several 3 ml syringes and 22 to 27 gauge needles)
- Gauze pads

Remember, disposable kits of any kind, whether a suture set or any other kind of kit, are **DISPOSABLE. DO NOT REUSE ANY ITEM FROM THE KIT**. Properly dispose of all items including used needles, other sharp items, dressings and gauze.

**Local Anesthesia:** With the smallest needle available, using proper injection technique with aspiration, inject small volumes (0.5 ml) of xylocaine at the wound edge every 3/4 inch on both sides of the wound. Insert the needle just under the skin and parallel to the surface about 1/4-1/2 inch deep from the edge of the wound. Wait five minutes for the anesthetic to take effect, then test for feeling by pricking the patient's skin gently with a sterile or other clean, sharp object. Add more anesthetic as needed. Xylocaine will be effective for 45-90 minutes.

**Suturing Procedure:** Preparation: Arrange adequate lighting so that the bottom of the wound is well visualized. When the wound is well anesthetized, clean it more thoroughly with betadine. Scrub the skin around the wound edge with betadine on a gauze pad at least four inches from all sides of the wound. Start at the center of the wound and work outward. Pick and scrub any remaining contaminants and blood clots from the wound before suturing. This will help to prevent microbes on the skin from contaminating the wound further. This scrubbing process should be carried on for a period of time, and the golden lather resulting should be allowed to remain on the area for about three to five minutes. This cleaning may start fresh bleeding, which should be controlled with direct pressure. After cleaning, rinse the area off with sterile gauze saturated with sterile water or sterile normal saline. The area around the wound should then be covered with sterile drape material, but the wound itself should be exposed. This will keep the suture material and the suture needle from touching non-sterile areas. After cleaning the area with betadine, keep a sterile towel under the area being sutured.

It is important to plan the closure ahead of time. Sutures once in place will hold wounds closed under tension. It is important to keep in mind that tension causes increased scarring and skin breakdown. The more sutures used, the less tension on each suture. Usually, sutures work best placed every ½ inch`. Gaping wounds and wounds over joints will require closer spacing. The initial suture is best placed at one end of the wound which gives an opportunity to see how much tension it takes to hold the wound closed. If it is difficult to make the knots stay in place, the sutures

can be placed closer together. The sutures should be planned so that they bring corresponding parts of the wound back together. For curved or irregular wounds, this may be particularly difficult. If there is enough suture material, one should not hesitate to cut out and replace any sutures that are poorly positioned.

**Suture Technique:** Begin by holding the needle holder about 3/4 of the way up the curve from the point. The needle should enter the skin about 1/4 inch from the wound edge, or more, depending upon the thickness of the skin and tension of the wound. Deeper and higher-tension wounds require wider sutures. Pass into the tissue about as deep as the distance from the wound edge to the suture, then arc under to come out in the wound itself. Then pass into the other side of the wound at the same level exited from the first side, passing up to the skin surface at the same distance entered initially, and grasp the needle with the forceps and lead it through the skin. Use the forceps gently, trying not to damage more tissue by crushing skin edges. Pull the suture through until 3 inches remain above the skin, tie a surgeon's knot or a square knot to finish the suture, and cut the suture ends ½ inch above the knot. Repeat the steps over and over until the wound is closed.

Cover the sutures with a dry dressing and keep the wound covered and dry for 24 hours. After 24 hours, depending upon the injury, the sutures may be either left exposed or covered. It may be more comfortable to cover them, especially if the sutures snag on clothing or other material. The wound area should be protected from water, bathing and swimming, for at least seven days.

**Suture Removal:** Skin sutures may be left in place between seven to 14 days, depending on the amount of strain on the sutures. Less time minimizes scarring, so remove facial and hand sutures early. More time maximizes strength. If a wound becomes infected, remove the sutures immediately with sterile instruments. Pull one end of the suture with forceps until the knot rises free from the wound. Cut the loop of the suture on one side of the knot only, and continue to pull until the entire suture comes out. If there are any doubts about the strength of the wound after the sutures are removed, it is best to reinforce the closure with butterfly closures or tapes as previously described.

**Range of Motion:** If many days elapse without medical help, the patient may suffer from loss of motion of the joints. To prevent loss of joint motion and promote blood flow, healing can be promoted with having the patient go through either active or passive range of motion exercises. Passive range of motion is done by the health care provider, while active range of motion is accomplished by the patient. It is important to ascertain that bleeding has stopped in the wound or area involved. Slowly and gently move all joints on either side of the wound through usual motion available to the joint involved. **DO NOT PUSH THROUGH SEVERE PAIN.** It is recommended that this be done twice daily. Move all body joints for or with the patient, particularly if prolonged bed rest is expected. **Do not move fractured areas**.

**Immunization:** While tetanus is not a usual health hazard when at sea, it is important to determine the patient's last tetanus booster when an injury occurs. Typically, the spores causing tetanus are introduced into the body through a puncture wound contaminated with soil, street dust, or animal or human feces, through lacerations, burns and trivial or unnoticed wounds, or by injected contaminated street drugs. Active Tetanus protection should be maintained by a Tetanus (Td) booster every 10 years. Wound management prophylaxis can be accomplished by the following recommendations:

- Clean and uncomplicated wounds - Booster immediately, if Td immunization was greater than 10 years ago.
- Major or contaminated wounds – Start antibiotic prophylaxis and booster, if five or more years since last Td.
- Begin Penicillin 500 mg immediately (after checking for allergies), four times a day for seven days if Td vaccine is not available or if the patient's Td immunization status is unknown.

**Special Diets**

Seriously ill and recovering patients may not be able to tolerate a regular diet. The following are common special diets.

- Clear Liquid: Clear fluids and foods that are liquid at body temperature, such as broth, gelatin, popsicles and juices. Avoid milk and milk products.
- Full Liquid: Foods that are liquid or liquefy at body temperature such as strained meat and vegetable cream soups, ice cream, custards, and hot cereals.
- Soft Diet: Foods that are mildly flavored, non-gas forming and easily chewed, such as tender meat, cooked carrots, canned fruit, pudding and cake. Avoid hard foods, fried foods, most raw fruits and vegetables, and very coarse breads and cereals.

When there is injury in the mouth or oral cavity area, or when the patient is nauseous and vomiting, give a clear liquid diet. When there is acute abdominal pain present, and until a diagnosis is established, it is always best to provide only clear liquids or give the patient nothing by mouth.

# RECORD KEEPING/FLOW CHARTING

A formal written record must be prepared each time a patient is seen. The patient's privacy must be protected, and the record must be stored in a locked file cabinet or similar locked area. This documentation is important as a legal requirement, as essential information should the patient be referred to a shore facility, and as documentation of the patient's medical problem.

Each ship should have a standard format for medical record keeping. Progress notes can use the SOAP format – Subjective, Objective, Assessment and Plan. Flow

sheets are useful to log information such as vital signs, medications, changes in condition, treatments, fluids, intake and output. Flow sheets can show information in chart or graphic form, and can be reviewed quickly. They also graphically show significant changes which can be an important alert to the patient's changing condition.

All medical records should be legible and kept in a safe, secure place to preserve the patient's confidentiality from unnecessary intrusion. The patient's medical record is considered a legal document. Only those health care providers or other individuals aboard the vessel who have a real need to know specific information about the patient's condition or care may have access to the patient's health records. All medications (including narcotic substances) administered to the patient should be recorded in the patient's health record. This includes the dosage, route, time, and any reactions.

Each and every patient visit should be clearly documented in a medical record format. Each medical record entry must be timed, dated and signed. Medical records must be completed at the time patients are seen. Complete and accurate written records are an essential component of quality medical care, and are the responsibility of every health care provider.

# CHAPTER 2

# COMMUNICABLE DISEASE PREVENTION


| | |
|---|---|
| Introduction | 2-1 |
| Communicable Disease | 2-1 |
| Infectious Agents | 2-2 |
| Disease Incidence (Occurrence) | 2-3 |
| Chain of Transmission | 2-3 |
| Reservoirs or Sources of Infection | 2-3 |
| Portals of Entry And Exit | 2-5 |
| Modes of Transmissions | 2-5 |
| Host Immunity and Resistance | 2-6 |
| Prevention Of Communicable Diseases | 2-7 |
| Vaccination | 2-7 |
| Reservoir Eradication | 2-9 |
| Interrupting Disease Transmission | 2-9 |
| Inactivating Infectious Agent | 2-10 |
| Personal Hygiene | 2-10 |
| Safe Food Practices | 2-10 |
| References | 2-13 |

CHAPTER

2

# COMMUNICABLE DISEASE PREVENTION

## INTRODUCTION

The practice of medicine includes the prevention of disease and injury as well as the treatment of illness. Prevention is the preferred method for maintaining good health. Aboard ship, maintenance of the health of passengers, crew, and staff is essential for a successful journey. Specific measures can be taken to prevent, control, or remove threats to the health of those aboard ship. Such measures may be aimed at preventing injury, chemical or other toxic exposure, or infectious diseases. Measures that prevent infectious disease include avoiding risky behaviors; proper sanitation and food hygiene; control of animals and insects that carry disease; and, when indicated, chemoprophylaxis (use of medication or other chemicals to prevent disease), immunization, and quarantine. Presenting educational talks and distributing pamphlets on how to minimize disease risk are also helpful. Those in command of the vessel are ultimately responsible for ensuring that effective preventive measures are in place.

## COMMUNICABLE DISEASES

A communicable (or infectious) disease is an illness caused by a specific infectious agent (such as a bacterium, virus, or fungus) or by a substance the infectious agent produces (toxin). The infectious agent or its toxic product may be transmitted directly from an infected person, animal, or the environment to a susceptible host patient, or it may be transmitted indirectly through an intermediate plant or animal host or a vector (often an insect).

Life aboard ship is a unique environment; one that has duties, routines, and activities that can increase a person's chances of acquiring a communicable disease. These elements include:

- **crowding** (easier to pass a cold to other crew in the bunkroom);
- **physical stress** (irregular sleep patterns, changes in diet, weather extremes, noise);
- **self-contained food and water systems** (susceptible to lapses in proper maintenance and cross-contamination with infectious agents);

- **exposure to cargos** (animals and animal products such as hides and wool);
- **travel to other countries** (exposure to diseases such as malaria, typhoid fever and cholera through contaminated food or water).

**What influences the occurrence and spread of a communicable (infectious) disease?** Three factors: **the agent** (e.g., a type of bacteria); **the host** (the individual or groups who are exposed to the agent); **the environment (route of transmission)**. Disease transmission requires an agent that is capable of causing a disease, a host that is susceptible to the agent, and an environment that permits the agent and host to come together. For an infectious disease to circulate within a population there must be a **chain of transmission** from one infected host to another and a suitable route of spread.

**Why is it essential to understand the principles of preventing and controlling communicable diseases?** The answer: to ensure safety aboard the ship. If most of the crew are ill (an outbreak), fewer will be able to operate the ship safely; medical supplies may run low and care may become inadequate. To prevent disease, one can direct efforts at the specific agent (e.g., *Staphylococcus aureus*), the host (vaccination to prevent measles) and/or the environment (sanitation improvements to prevent *Salmonella*). One can also target a specific point in the chain of transmission (e.g., *Escherichia coli* and adequately cooked hamburgers). Thus, it is important to know how various diseases are spread, what can be done to prevent their spread, and what can be done to control them once they appear.

### Infectious Agents

An **infectious agent** or its toxic product causes communicable disease in a susceptible host. Organisms that can *produce* disease in humans range in size from submicroscopic viruses to the fish tapeworm, a parasite that can attain a length of more than 30 feet. Several groups of **infectious agents** and toxins (and some examples of the diseases they cause) may be classified as follows:

- **Bacteria:** bacillary dysentery, cholera, plague, syphilis, tuberculosis;
- **Bacterial toxins:** botulism, staphylococcal food poisoning;
- **Viruses:** acquired immune deficiency syndrome (AIDS), hepatitis A, B and C, influenza, measles, common cold;
- **Rickettsiae**: Rocky Mountain spotted fever, typhus fever;
- **Parasites:** malaria, hookworm, African sleeping sickness;
- **Fungi:** histoplasmosis, ringworm, athlete's foot.

Some illnesses may be caused by many agents. For example, infection with many different respiratory viruses can result in a common cold, and infectious diarrhea can be caused by many bacteria and viruses. Other diseases, such as tuberculosis or polio, occur only after infection with the specific infectious agent.

### Disease Incidence (Occurrence)

Infection with an organism may be inapparent (symptom-free or asymptomatic) or it may result in disease. The likelihood of disease occurring depends on the following factors:

- **Pathogenicity:** the organism's ability to cause disease. The bacterial agent of spinal meningitis, *N. meningitidis*, has high pathogenicity, because infection with this bacteria is likely to lead to severe disease. Other organisms, such as those found normally on human skin, have low pathogenicity because they rarely cause disease.
- **Infectious dose:** the number of organisms to which the person is exposed.
- **Susceptibility:** of the host's ability to resist infection. Factors influencing host susceptibility are discussed later in this chapter.

Thus, an individual infected with an organism may or may not "get sick" or have symptoms.

### Chain of Transmission

The concept of the **chain of transmission** is basic to understanding the prevention and control of disease. When the **chain of transmission** is understood, ways to break the chain can be identified. If the chain is broken, then the disease will be controlled and future cases prevented.

A **chain of transmission or infection** contains the following links:

- **Reservoir:** or source of the agent;
- **Portal of exit:** or mode of escape of the agent from the reservoir or source;
- **Mode of transmission:** of the agent from the source to the new host;
- **Portal of entry:** into the new host;
- Susceptible **new host:** (who may become the source for additional transmission).

### Reservoirs or Sources of Infection

The **reservoir of infection** is where the organism is normally found. The **source of infection** is the location from which the organism is transmitted to the host (either directly or indirectly through a vehicle such as air or water). For example, the **reservoir** of the organism causing botulism, *Clostridium botulinum*, is the soil. The **source** of the toxin produced by this agent is often improperly processed food contaminated by soil. The **reservoir** and the **source** of an infectious agent may have different locations. Eliminating the **source** of the organism may not prevent further spread of infection if the **reservoir** remains intact.

Reservoirs and sources of infection may be human, animal, or environmental. Most of the infectious diseases harmful to man have a human source or reservoir, which means that the infection is transmitted directly or indirectly from a person with the disease. Examples of such diseases include: AIDS, measles, travelers' diarrhea, pertussis, and typhoid fever. An infection with an organism may lead to consequences ranging from no symptoms and signs, to mild or moderate illness, to serious disease or death.

A **carrier** is a person who harbors an infectious agent but may show no signs of illness. The period of carriage of an organism may occur during the incubation period (the time between infection with the agent and when the patient actually shows symptoms of illness), during an infection (whether apparent or inapparent), or following recovery from illness. Carriage of an infectious agent may be transient, lasting from the onset of infection through a portion of convalescence. It may be chronic lasting many months or years, or even a lifetime. **Asymptomatic** carriers serve as reservoirs of infection and play an important role in the spread of some diseases.

Diseases of animals (*zoonoses*) generally affect humans only accidentally. In such cases, humans are not the natural host for the infectious agent. However, for other zoonotic diseases, both man and another animal or animals are essential to the normal life cycle of the infecting agent. Thus an infectious agent may require two or more hosts for its development during different stages in its life cycle. The agent that causes malaria (a parasite that must live in two different hosts--mosquitoes and man--at different periods of its life cycle) is an example of such an organism. For some infectious agents, either man or another animal can serve as reservoirs of infection.

Animal species serving as reservoirs for infectious agents that affect humans (and examples of their associated diseases) include:

| ANIMAL | DISEASE |
|---|---|
| Snails | Schistosomiasis |
| Mosquitos | West Nile Virus, Yellow Fever, Malaria |
| Ticks | Rocky Mountain Spotted Fever, Lyme Disease |
| Raccoons, skunks, bats, dogs | Rabies |
| Wild rodents | Plague, Hantavirus Disease, Murine Typhus Fever, Lyme Disease |
| Cattle, swine, goat, sheep | Brucellosis |

Some infectious agents live in the soil; which becomes the reservoir of infection. Fungi (such as those causing coccidioidomycosis, histoplasmosis, and blastomycosis) and molds are found in soil and dust or on vegetation grown in endemic areas (places where the diseases are common). Certain species of bacteria that form spores also are found in the soil, but only if the soil has been

contaminated previously with the spores. Tetanus (lockjaw) and anthrax are examples of diseases that may be acquired through exposure to the environment.

### Portals of Entry and Exit

**Portals of entry** and **exit** are the routes through which the infectious agent enters and exits the body of the host. Often the portal of entry is the same as the portal of exit. **Portals of entry** and **exit** in the human body include the respiratory, digestive, and urinary systems, as well as the skin (including mucous surfaces such as the eye), wounds, and blood.

Often the causative organism enters and exits the body through the part of the body primarily involved in the disease process. This is true, for example, for illnesses such as the common cold as well as other respiratory and digestive system diseases. Conversely, the portal of entry may have no relation to the organ system involved in the disease. For example, the infectious agents for malaria and yellow fever, transmitted by mosquitoes, enter and leave the host through the skin, but involve other areas of the body (such as the liver and brain) in the disease process.

### Modes Of Transmission

The main modes of transmission of communicable diseases are person-to-person, common vehicle, airborne, vector-borne, sexual contact, and blood-borne spread. The chain of transmission of an illness can be broken by interrupting the route of transmission.

- **Person-to-person spread** occurs when the source and the host come in direct physical contact. This includes fecal-oral spread, in which fecal material from an infected person is transferred to the mouth of an uninfected person, usually by unwashed hands. The hands are often contaminated by touching an item, such as soiled clothing, and then touching the hands to the mouth. Examples of diseases spread from person-to-person include giardiasis, hepatitis A, rotavirus, and shigellosis.
- **Common vehicle spread** results when a single inanimate vehicle serves as the source of transmission of the infectious agent to multiple persons. Food and water are the most common causes of common vehicle outbreaks. Diseases transmitted through contaminated food and water include botulism, salmonellosis, campylobacteriosis, cholera, and *Escherichia coli* O157:H7.
- **Airborne spread** of disease consists of transmission of the infectious agent by droplets or dust. Droplets are produced whenever someone breathes out; these may be projected greater distances by a cough or a sneeze. These droplets remain suspended in the air. Once the moisture in the droplets evaporates, bacteria and viruses form *droplet nuclei* (tiny particles that can float in the air) that may subsequently be inhaled by susceptible hosts. Diseases spread by the airborne route include tuberculosis, legionellosis, pertussis, measles, rubella, and chickenpox.

- **Vector-borne disease spread** occurs through insects, either externally or internally. *Mechanical* transmission occurs when the contaminated mouth or feet of an insect vector physically transfers the infectious organism to the host or to food. For example, houseflies can carry diarrhea-causing bacteria from human waste to human food. Eating this food can cause subsequent illness. With *biologic transmission*, the vector (for example, the mosquito) carries the infectious agent within its body, and the agent passes through the skin via an insect bite. Examples of vector-borne diseases include Lyme disease, plague, and Rocky Mountain spotted fever.
- **Sexually transmitted diseases** are spread through sexual contact, either heterosexual or homosexual. Sexually transmitted diseases include AIDS, chlamydia, hepatitis B, syphilis, and gonorrhea.
- **Blood-borne diseases** are transmitted by contact with blood from an infected patient. This mode of transmission usually occurs in the health-care setting, with infusion of contaminated blood products or by skin puncture with a contaminated syringe. Sharing of needles among injecting drug users also transmits blood-borne diseases. Examples of blood-borne diseases include AIDS, hepatitis B, and hepatitis C. Malaria can also be a blood-borne disease.

Even when the source of an outbreak is unknown, understanding and interrupting the most likely route of transmission can prevent further disease.

### Host Immunity and Resistance

The host is the person or organism susceptible to the effect of the infectious agent. The general health status of the host, his/her genetic makeup, as well as other factors determine susceptibility to disease. Host defenses that contribute to resistance to infection include:

- **Mechanical barriers** (i.e., the skin and mucous surfaces of the respiratory, digestive, and urinary systems) and the action of coughing.
- **Bodily discharges** that either destroy, trap, or wash away infecting organisms. Tears, urine, digestive juices, perspiration, and respiratory mucus contain enzymes, acid, and nonspecific *antibodies* (a type of protein produced by the immune system) that combat infection.
- **Certain cells of the immune system**, found throughout the body, that remove infecting organisms from the body by engulfing and destroying them, in a process known as *phagocytosis*.
- **Competition between normal**, non-disease-causing (*commensal*) microorganisms normally found in the gut or on the skin and *pathogenic* (disease-causing) organisms to which the host is exposed.

These defenses may be overcome by exposure to a large number of organisms or repeated exposure over an extended period of time. Defense mechanisms may

diminish when another disease-causing infection is occurring at the same time, following previous treatment with antibiotics (which wipes out commensal organisms), or when a breakdown in a barrier exists (such as a skin wound).

Individuals can also develop a specific immune response to an infectious agent. This immunity may be acquired through natural infection (i.e. a host becomes immune after recovery from the illness or infection), by active vaccination with the agent, or by passive immunization with antibodies from other persons who have been infected with the agent. Natural immunity follows the natural occurrence of disease. This type of immunity usually lasts the longest period of time, often for the life of the host. Vaccination with weakened or killed infectious agents leads to active, induced immunity. In this case the body develops antibodies specific to the vaccine agent. Measles and polio vaccines are examples of active immunization. Injection of antibodies or antitoxin leads to a passive, temporary immunity to an agent. Use of gamma globulin to protect against chicken pox is an example of passive immunity.

# PREVENTION OF COMMUNICABLE DISEASES

Preventing communicable disease requires understanding the relationship between the agent with its reservoir, the susceptible host, and the route of transmission. To find ways to break the chain of disease transmission communicable diseases are prevented by

- increasing host resistance (through vaccinations);
- modifying the environment (to eliminate reservoirs or to interrupt transmission);
- inactivating the infectious agent.

**Vaccination**

Seagoing persons should be appropriately vaccinated against all diseases traditionally occurring during childhood (diphtheria, tetanus, poliomyelitis, measles, mumps, rubella, and chicken pox) and should consider vaccination to prevent hepatitis A and B. Though vaccines have reduced the occurrence of many of these diseases worldwide, susceptible travelers may still acquire these diseases.

Diphtheria and tetanus boosters are recommended every 10 years. Adults born after 1957 should either have received two doses of MMR (measles, mumps, and rubella-containing vaccine) or show evidence of immunity when their blood is tested for antibodies against these viruses. Vaccination against chicken pox is only necessary if there is no history of childhood infection. Vaccination against both hepatitis A and B and an inactivated poliomyelitis vaccine booster should be considered for adults who plan to travel and work in areas where these diseases are more common. Hepatitis A is contacted by the oral fecal route, such as from contaminated food or water. Hepatitis B may be acquired by direct or indirect contact with body fluids from an infected person. Certain personal practices, such as avoiding contaminated

needles (e.g., tattoo and syringe needles) and using condoms, help to prevent infection.

Travelers to endemic areas should consider vaccination for hepatitis A, typhoid fever, and cholera. Hepatitis A and/or typhoid vaccines are indicated for persons who travel regularly to less-developed countries and who anticipate eating locally prepared foods or drinking water. Travelers to less-developed countries are advised to avoid eating uncooked food, especially fish and shellfish, and to peel fruits themselves to minimize the risk of acquiring typhoid fever, cholera, hepatitis A, and other gastrointestinal diseases. Currently, no country or territory requires cholera vaccination as a condition for entry. Local authorities, however, may require documentation of cholera vaccination when coming from endemic or epidemic areas; in such cases, a single dose of vaccine is sufficient to satisfy local requirements. Otherwise, the risk of cholera to U.S. travelers is so low and the vaccine of so little efficacy that it is not currently recommended.

Certain diseases transmitted by mosquitos, such as yellow fever and Japanese encephalitis (a disease that occurs throughout eastern and southern Asia) may be prevented through vaccination and by avoiding mosquito bites by wearing appropriate clothing and using repellents and mosquito netting. Yellow fever vaccination is required at 10-year intervals for travel to many tropical American and African countries. Animal-borne disease such as plague and rabies may be prevented by vaccine and avoidance of unknown animals. Meningococcal disease may be prevented with vaccination when traveling to regions of higher risk: the sub-Saharan east-west belt of Africa, the Middle East, and the Asian subcontinent.

Every seaman should keep with his or her passport and other papers, written evidence of the vaccines and prophylaxis received. The World Health Organization publishes vaccine cards, which are recommended in order to keep an accurate record of all vaccinations (Fig 2-1). Up-to-date records will prevent repeated and unnecessary vaccinations when entering an infected port or one that requires vaccination documents. Some ports may require documentation of prior vaccination for yellow fever or cholera when traveling from areas with high disease activity.

NOTE: An International Certificate of Vaccination must be complete in every detail; if incomplete or inaccurate, it is not valid. This certificate is revised periodically, but older forms are usually acceptable. A copy of the International Certificate of Vaccination, (PHS-731) is available from most health departments and many medical practitioners. It may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, telephone 1-202-512-1800. The stock number is 017-001-00483-9.

Figure 2-1




Although some vaccinations require single dose administration, others require two or three doses given over a period of 2 weeks to 6 months. Without adequate planning, this may present a problem to merchant seamen. If no medical officer is available and qualified to administer vaccinations, it is recommended that seamen arrange for multi-dose vaccinations during layovers ashore. Seamen should consult medical authorities at least 6 weeks before departure to obtain current health information on the countries that will be visited. Information on requirements and recommendations for the international traveler is available via the Centers for Disease Control and Prevention (CDC) website at http://www.cdc.gov/.

### Reservoir Eradication

Exposure to infection can be prevented by eradicating the reservoir of infection, closing the portals of exit from the sources, and eliminating the modes of transmission. For example, outbreaks of bubonic plague have been controlled by destroying rats and other rodents that can carry the plague bacteria. Providing proper environmental controls of air, dust, and dirt (which may harbor infectious agents) aboard ship may decrease the risk of communicable diseases among crew. Similarly, insect control may eliminate reservoirs for certain vector-borne diseases.

### Interrupting Disease Transmission

Disease transmission can often be interrupted by the following:

- rapid diagnosis and treatment of infectious diseases; isolation of patients from other crew members (when appropriate);
- chemoprophylaxis before exposure (i.e. medication prophylaxis to prevent malaria);
- practicing good personal hygiene (i.e. using insect repellents and wearing appropriate clothing).

### Inactivating Infectious Agent

Infectious agents can be inactivated to reduce the spread of disease. Chemical methods include chlorinating water supplies and sewage effluents. Proper disinfection and maintenance of potable water systems can prevent waterborne diseases caused by bacteria and viruses. Disinfectants and fungicides are useful. Physical methods for inactivating infectious agents include use of heat (proper cooking of foods) and cold (refrigeration of foods). Proper food handling, preparation, and storage help to prevent outbreaks of food borne and diarrhea diseases. These simple yet essential practices should be carried out by staff and crew members of the ship.

### Personal Hygiene

Personal hygiene is necessary to prevent infectious diseases. Many diseases are transmitted by the oral fecal route. Hands are often contaminated when urinating or defecating. This contamination can spread disease to the individual and to the entire crew. REGULAR HANDWASHING BY EVERY CREW MEMBER is critical to the health of the entire crew. If crewmembers frequently develop diarrhea, the source of contamination should be aggressively sought and corrected. Each head must be kept clean, so that handwashing is effective.

Hands should also be washed before touching food and before meals. Cigarettes can become contaminated in the same way, and spread disease. Always wash your hands before touching anything that will go into your mouth.

Food service workers should be especially cautious. They should be free of infectious disease when preparing food. Routine health screening is important. Further, they must use the recommended sanitation procedures for food purchase, storage and preparation. Handwashing is critical. They should wear gloves when handling food.

### Safe Food Practices

The basics of food safety are the same on land and on sea. However, because so many people share the same environment, the same water, and the same meals on board a ship, a break in sanitation may allow diseases to spread quickly to many people or the entire crew. General principles include:

- Maintain the potability (safety) of the water;
- Use reliable food suppliers;
- Keep the room temperature preparation times short;
- Keep raw and cooked foods entirely separate; also separate meat and fish, and fruit and vegetable prep areas; (including equipment, wiping cloths, storage areas, etc.);
- Keep hot food items hot and cold food items cold;
- Rapidly chill cooked foods (to 41° F/5° C or less) if they are not to be eaten immediately;
- Persons with diarrhea, vomiting, or open sores on their hands should not prepare food until they have fully recovered;
- All food handlers should wash hands frequently, especially after handling raw meat and fish;
- Protect food from insects, rodents, and other animals.

The ship's management should assure all food service workers understand and implement safe food practices.

**Shellfish:** Items containing seafood accounted for more than half of shipboard food-borne disease outbreaks investigated by CDC. Shellfish, especially scallops, accounted for four of the six seafood-related outbreaks on cruise ships. The more recent outbreaks showed that neither blanching nor marinating alone will make contaminated raw shellfish safe to eat. Steaming for at least 15 minutes may reduce the risk, if the entire product reaches a uniformly high temperature.

Crustaceans, such as lobster, crab, and shrimp, should also be cooked thoroughly. The U.S. Food and Drug Administration (FDA) Food Code recommends cooking crustaceans such that the internal temperature reaches 145° Fahrenheit/63° Celsius for at least 15 seconds.

**Eggs:** Salmonella with raw eggs has long been recognized. It had been believed that the Salmonella was due to unclean eggs or eggs contaminated internally through cracks in the shells, and that the contents of an intact egg were sterile. However, research suggests that a worldwide epidemic of salmonella (Salmonella serotype enteritidis (SE)) is infecting the egg-forming organs of hens and is transmitted to the egg yolks as the eggs are formed inside the chickens. As a result, a perfectly normal-looking egg can harbor large numbers of SE organisms.

Each year, about 80 outbreaks of SE infections are reported in the U.S., with a few resulting in death. Eggs are implicated as the vehicle of infection in many of these outbreaks. Two outbreaks of SE infection have recently occurred on cruise ships which have been attributable to eggs. To prevent these outbreaks, the FDA and the CDC published the following guidelines:

- Shell eggs should be maintained at an internal product temperature of 41° F/5° C or below until used;
- Commercially pasteurized egg and egg products should be substituted for raw shell eggs in the preparation of uncooked, ready-to-eat menu items such as Caesar salad, uncooked hollandaise or bearnaise sauce, ice cream, etc.;
- Pasteurized egg product should be substituted for shell eggs in recipes calling for pooled eggs;
- Eggs should be cooked to heat all parts to at least 145° F/63° C for 15 seconds or more;
- Cooked eggs requiring holding before service should be held at an internal temperature of 140° F/60° C or above.

The third guideline is especially important. Large outbreaks have been related to the use of bulk pooled eggs held for periods of time before cooking, or held on a steam table or buffet bar after partial cooking. Any recipe that calls for a large pool of eggs that are cracked ahead of time and held in a large container before cooking is of particular concern. A single infected egg can contaminate the entire pool. No outbreaks have been caused by pasteurized egg products.

Ground beef: While no food borne disease outbreaks aboard cruise ships have yet implicated ground beef as the source, this item could serve as a source of infection with *Escherichia coli* O157:H7 if not cooked properly. The food borne bacterial organism E. coli O157:H7 is an emerging cause of food borne illness. Infection often leads to bloody diarrhea and occasionally to kidney failure and death. Most illness has been associated with eating undercooked, contaminated ground beef. E. coli O157:H7 lives in the intestines of some healthy cattle; meat can become contaminated during slaughter, and organisms can be thoroughly mixed into beef when it is ground. Infection can be prevented by thoroughly cooking ground beef to at least 155° F/68° C for at least 15 seconds, as recommended in the FDA Food Code (available through the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, 703-487-4650, or Internet address: http://www.ntis.gov/products/families/military.asp?loc=4-3-4.

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# CHAPTER 3

# SHIPS SANITATION


| | |
|---|---|
| Introduction | 3-1 |
| Food Sanitation | 3-1 |
| The Food Handler | 3-2 |
| Food Service Facilities, Equipment, and Utensils | 3-2 |
| Food Selection and Procurement | 3-3 |
| Food Storage | 3-3 |
| Food Preparation And Handling | 3-4 |
| Sanitation of Equipment, Utensils and Food Preparation Areas | 3-5 |
| Potable Water | 3-6 |
| Potable Water Tanks | 3-7 |
| Potable Water Hoses | 3-7 |
| Pest Management | 3-7 |
| Pesticides | 3-8 |
| Rodents | 3-8 |
| Flies | 3-9 |
| Mosquitoes | 3-9 |
| Roaches | 3-9 |
| Lice, bedbugs, and Fleas | 3-9 |
| Pest in Stored Products | 3-10 |
| Garbage | 3-10 |
| Laundry | 3-10 |
| Barbershops | 3-10 |
| Habitability | 3-11 |
| Thermal Stress | 3-11 |
| Hazardous Materials | 3-12 |
| Respiratory Protection | 3-12 |
| Confines/Enclosed Spaces | 3-12 |
| References | 3-13 |

CHAPTER

3

# SHIP SANITATION

## INTRODUCTION

Everyone aboard ship should expect and find sanitary facilities, supplies, and healthful conditions in his or her shipboard environment. All crewmembers have a responsibility for the state of that environment. Proper sanitation is impossible unless each member cooperates. The Master should ensure the good sanitary conditions of the vessel through periodic inspections.

Ensuring the health and safety of persons aboard a ship requires knowing and understanding the various factors on the ship that affect health. Preventing and controlling environmental health and safety problems will help to ensure the safety of the crew and the ship. This section will cover those factors, including food sanitation, potable water, pest management, laundry, barbershops, habitability, thermal stress, hazardous materials, respiratory protection, and confined spaces. By making the described practices an integral part of the ship's routine, the Master and crew can contribute to the health, safety, and success of each journey.

## FOOD SANITATION

Today, most foodborne illness is related to infectious disease. Most of the toxins of the past – such as the use of copper to color home canned green beans and lead solder to repair pots and pans – have been eliminated. Foodborne illness can be especially serious aboard ship, since nearly everyone eats from the same mess and contamination can infect an entire crew. There is much that can be done to prevent a foodborne illness from occurring. Proper food procurement, storage, and preparation, along with personal hygiene, and sanitary food preparation areas go along way to ensuring the safety of the food served in the galley. All personnel who are assigned to work in the galley, even for a short period of time, must be trained in food sanitation and personal hygiene.

The U.S. Food and Drug Administration (FDA) has developed a Food Code. It was developed primarily for shore-based facilities, but it also can assist the mariner in providing a system of safeguards to minimize foodborne illness aboard ship. The current Food Code is available in hard copy by calling the National Technical Information Service at 703-605-6000 or 1-800-553-NTIS (6847) or online at http://www.cfsan.fda.gov/~dms/foodcode.html.

When an outbreak of disease is occurring aboard ship, even if the source of the outbreak cannot be determined, interrupting the most likely route of transmission may prevent further spread to uninfected shipmates. The Center for Disease Control and Prevention (CDC) has guidelines on conducting a foodborne illness outbreak investigation, should one occur (http://www.cdc.gov/ncidod/dbmd/outbreak/). Information should be printed in advance should it be needed.

### The Food Handler

In addition to cross contamination (discussed later under "Food Preparation and Handling"), galley workers can inadvertently contaminate food if they do not follow proper personal hygiene. Frequent hand washing is the key to preventing contamination. A separate hand washing sink with hot and cold running water, a sanitary soap dispenser, and disposable towels should be provided in the galley. Personnel must wash their hands after each use of toilet facilities, after eating, drinking, or smoking, and after handling raw food. A sign to remind personnel to wash their hands should be placed in the head used by galley personnel. Personnel should wash hands periodically, even if one of these activities has not occurred.

Galley workers must bathe at least once a day. Clothing must be maintained in a clean and sanitary condition and soiled clothing must not be allowed in the galley. Aprons should only be used while working in the galley and be replaced each day, or more often if necessary. Disposable gloves should be worn when handling food. Gloves do not change the need for hand wahing.

Food handlers should have a thorough physical examination at least once a year. At all times, they should be free of any infectious disease. Respiratory diseases and those transmitted by the fecal-oral route are especially hazardous. Any galley worker who is sick must be removed from all galley duties and be evaluated prior to reassignment to the galley. Skin infections and open wounds also prevent personnel from working in the galley until the skin is completely healed.

### Food Service Facilities, Equipment, and Utensils

All food service facilities aboard ship should conform to the minimum requirements:

- surfaces of all decks and bulkheads in the food processing, serving, and storage areas should be corrosion-free, smooth, easy to clean, and maintained in a clean condition
- all surface materials, equipment and utensils coming into contact with foods should be corrosion-resistant, non-toxic, nonabsorbent, smooth, durable, easy to clean, and approved by the National Sanitation Foundation (NSF)
- equipment must be maintained in a good state of repair and condition.
- cutting and piercing parts of can openers must be kept sharp to minimixe the creation of metal fragments that can contaminate food when a container is opened

- surfaces used for cutting food must be able to be effectively cleaned and sanitized or must be discarded
- all galley areas, especially the cooking areas, should be fire-protected, and provided with adequate ventilation to readily remove smoke, steam, odors, and gases
- all galley equipment should be permanently mounted
- adequate space for cleaning should be available behind and under any permanently mounted equipment
- back-siphonage must be prevented
- all drains must be trapped and should have easily accessible "clean outs"
- waste, particularly food scraps, should be kept in tightly covered sturdy garbage cans
- all galley water must be potable
- maintain adequate lighting in the galley areas
- all cleaning supplies and chemicals should be stored away from food preparation areas

**Food Selection and Procurement**

To prevent unnecessary discarding of food, menus should be developed and food ordered according to shelf life and anticipated use. Care should be used in selecting food distributors, especially in overseas ports, to assure purchased products are not contaminated. Upon receipt, ensure the following:

- food containers are in good condition (no dents in cans, no holes in plastic or boxes)
- dry goods are inspected for indications of insect infestation
- frozen food is completely frozen and has no indications of being thawed and refrozen
- fresh seafood is properly labeled.
- all refrigerated items are delivered at or below $41^{o}$ F
- produce is in good condition with no rotting pieces.

**Food Storage**

Once procured, food should be appropriately stored in areas protected from contamination. Non-refrigerated dry and canned goods should be stored in a location that is clean and dry, free of exposure to splash, dust, or other contamination, at least 15 cm (6 inches) above the floor, and secured for sea. Corrugated cardboard is known for harboring cockroaches and should be removed from the ship as soon as stores are unloaded. Food should not be stored in areas such as living areas, mechanical rooms, near water or sewage lines, or where other sources of contamination are prevalent. Liquids should be stored on lower shelves so other foods will not be damaged if there is a leak. All food should be used “first-in-first-out” to prevent discarding of expired food. Once non-refrigerated foods are removed from the dry stores area and original protective packaging is removed, they must be protected by storage in easily-cleaned vermin-proof containers or bins.

Perishable food must be refrigerated or frozen. Reefers must be maintained at or below 41° F and freezers must be at or below 0° F. Reefers and freezers must have a highly accurate thermometer for temperature control. Temperatures of all reefers and freezers (including galley reefers) should be checked periodically and a log maintained. In reefers, raw animal products must be separated from cooked, ready-to-eat foods and fruits and vegetables. If space is limited, store raw foods on the lowest shelves to prevent them from dripping on other items. If not in the original container, all food must be wrapped or covered and labeled. There should be enough room around food in reefers and freezers to allow air to circulate and maintain all foods at the proper temperature. Once a food has been removed from the freezer and thawed, it must not be refrozen. All food in reefers and freezers must be stowed for sea.

**Food Preparation and Handling**

Safe food preparation relies on several principles. The three principles are (1) maintaining proper temperatures during thawing, cooking, and holding, (2) cleaning of utensils and surfaces to prevent cross contamination, and (3) proper personal hygiene of food service personnel. There are also some foods that require special attention.

Foods, especially animal products, must be properly thawed. Ideally, products should be thawed in a reefer. A microwave can be used for thawing if the product is going to be immediately cooked. Thawing as part of the cooking process is also acceptable if the required temperature is met. If running water is used, the water must be no warmer than 70ºF and the water must flow freely over the food and into a drain. Consider the ship's water stores before doing this as it can use a lot of water.

Raw animal products should be adequately cooked prior to eating. Specific food temperatures have been established so that the most common organisms are killed. Raw animal foods such as eggs, fish, beef, pork, and poultry must be cooked to these minimum internal temperatures to ensure the safety of served food. The table below provides safe internal temperatures for some common animal products. The temperatures are from the FDA Food Code. Temperatures for additional, less common, food types can be found in the Food Code.

| Minimum safe internal temperatures for various hot foods | |
|---|---|
| Product | Temperatures |
| Any food cooked in a microwave | 165ºF (74ºC) |
| All foods previously served and cooled that are reheated | 165ºF (74ºC) within two hrs |
| All poultry and game birds | 165ºF (74ºC) |
| Stuffed meats | 165ºF (73.9C) |
| Stuffing containing meats | 165ºF (73.9C) |
| Pork, ham, and bacon | 155ºF (68ºC) |

| | |
|---|---|
| Beef roasts (rare) | 130ºF (54.4ºC) for two hrs |
| Beef steaks (rare) | 130ºF (54.4ºC) or as per customer request |
| Commercially raised game animals | 145ºF (63ºC) |
| Fish | 145ºF (63ºC) |
| Unpasteurized shell eggs (not for immediate use) | 155ºF (68ºC) |
| Unpasteurized shell eggs for immediate service | 145ºF (63ºC) |
| Food held for serving (after cooking) | 140ºF (60ºC) |

Once a food is cooked, it must be maintained at 140ºF until serving. Cold food, such as salad bar items, must be maintained at or below 41ºF. Hot foods to be kept for leftovers must be placed in shallow pans to cool quickly. Leftovers should be 70ºF within two hours and below 41ºF in a total of four hours. Leftovers should not be stored for more than 24 hours and should be covered and labeled to indicate the date and time to discard. When leftovers are reheated, the internal temperature must reach 165ºF.

If possible, foods to be cooked should be prepared in a different area than those that are eaten raw or are ready-to-eat. This will avoid cross contamination. If this is not possible, utensils and cutting boards must be replaced or sanitized between each type of food contact. For example, lettuce for a salad cannot be cut on a cutting board or with a knife that was used to cut raw poultry. If preparation is not separated, salmonella from the poultry will be transferred to the lettuce, which is eaten raw. The crew will become sick.

Raw fruits and vegetables should be washed in potable water before serving to remove pesticides and other contaminants. If fruits and vegetables are procured from countries where human sewage is used for fertilizer, they should be carefully peeled and/or fully cooked before eating. Some difficult to clean foods, such as lettuce, may best be avoided in some foreign ports.

Eggs are often contaminated with salmonella. This organism is killed when eggs are cooked so that cooked egg products are safe to eat. However, pasteurized egg products should be substituted for raw shell eggs in the preparation of foods that do not require cooking such as Caesar salad, hollandaise or bernaise sauces, mayonnaise, eggnog, and ice cream.

**Sanitation of Equipment, Utensils and Food Preparation Areas**

Equipment, utensils and other food-contact surfaces shall be cleaned to sight and touch. The surfaces of cooking equipment and pans shall be kept free of encrusted grease deposits and other soil accumulations. Non-food-contact surfaces of

equipment shall be kept free of an accumulation of dust, food residue, and other debris.

Equipment food-contact surfaces and utensils shall be cleaned with the following frequency:

- before and after each use with a different type of raw animal food such as beef, fish, lamb, pork, or poultry
- each time there is a change from working with raw foods to working with ready-to-eat foods
- between uses with raw fruits or vegetables and with potentially hazardous food
- at any time during the operation when contamination may have occurred
- if used with potentially hazardous food, equipment food-contact surfaces and utensils should be cleaned throughout the day at least every 4 hours if not maintained below 41$^{o}$F or above 140$^{o}$F
- if equipment or utensil had not been used in the past 24 hours, it should be inspected and cleaned/sanitized prior to use if needed
- non-food contact surfaces of equipment and the galley itself should be cleaned at a frequency necessary to preclude accumulation of soil residues
- sponges must not be used in food service areas
- wiping cloths must be stored in a sanitizing solution when not in use and should be replaced frequently
- ice machines and food dispensing machines (such as milk, juice, and ice cream) should be properly maintained and regularly cleaned

To clean: tableware, utensils, and other food contact surfaces must be manually washed in a three-compartment sink or in a ware washing machine and then air dried in a clean area. For manual washing, the first sink is used for washing, the second for rinsing, and the third for sanitizing. For ware washing machines, all large particles of food must be removed prior to loading into the machine. The following sanitizing methods may be used:

- immersion for at least 10 seconds in a solution of 25 ppm chlorine (Cl) and a temperature of 120$^{o}$F or 50 ppm Cl and 100$^{o}$F or 100 ppm Cl and 55$^{o}$F
- immersion for at least 30 seconds in clean hot water at a temperature of at least 171$^{o}$F
- immersion for at least one minute in a clean solution containing 25 ppm iodine, pH of not higher then 5.0 and a temperature of at least 75$^{o}$F
- in a ware washing machine that provides a minimum utensil surface temperature of 160$^{o}$F
- for equipment that is too large for immersion or ware washing machines, treat with steam or rinse, spray, or swab with a chemical sanitizing solution of at least twice the recommended strength of Cl or iodine

# POTABLE WATER

Throughout history, safe drinking water has been an essential maritime requirement. Even today, many diarrheal disease outbreaks aboard ship have been traced to contaminated drinking water, often obtained in foreign ports. Care should be taken when procuring drinking water to make certain it is safe. If the ship has potable and non-potable water sources, they should be clearly separated and not interchanged.

Nonpotable water may be used for activities such as bathing, cooling and fire protection. Drinking water supplies should be tested daily for chlorine content and checked weekly for possible biological activity. Plumbing systems should be designed to prevent backflow. This is especially important in galley areas. Cross contamination between drinking water and sewage plumbing systems have lead to disease outbreaks and should be prevented. All sounding tubes and deck water connections should be capped and locked when not in use.

### Potable Water Tanks

Potable water tanks must have a suitable lining and should be cleaned and sanitized at least once a year. To sanitize the tanks, the system should be super-chlorinated with 100 milligrams/liter (mg/l) of chlorine for four hours. The system must be flushed with potable water prior to refilling. Any pipes, valves, pumps, etc. that have been dismantled, repaired or replaced must be sanitized in this same method. Tanks should be sanitized after any maintenance, cleaning, or entry for any other reason. If more than one tank requires sanitizing, the highly chlorinated water from the first tank may be used in subsequent tanks, but additional chlorine may need to be added to ensure the 100 mg/l chlorine level is maintained. All parts of the water system must be super-chlorinated after any positive biological testing.

### Potable Water Hoses

Potable water hoses should be labeled as such and not used for any other materials. When not in use, the hoses should be stored in a locked locker in a clean area to assure they are not used for other purposes. The ends must be capped or connected to each other to prevent contamination. Prior to first use or any time contamination is suspected, they should be sanitized as described for water tanks. Before connecting potable water hoses to shore connections, sanitize the shore connection with a solution of 100 mg/l chlorine.

# PEST MANAGEMENT

Throughout maritime history, ship's crews and inhabitants of ports have been incapacitated and decimated by vector-borne diseases. In extreme circumstances, quarantine of an infected or infested vessel has been known to have caused a loss to the company of a year's income, while acquiring new clearance papers. Common shipboard vectors include rats, mosquitoes, flies, bedbugs, lice, ticks, and cockroaches. Pest management is important to the health and well-being of shipboard personnel and is needed to protect property and resources.

Ideally, ships should seek to minimize reliance on chemical pest control procedures and the adverse health effects of pesticides. Integrated pest management (IPM) is a comprehensive approach to pest control and prevention that considers all available strategies, including mechanical, cultural, biological, and chemical techniques. Non-chemical pest controls, such as good sanitation practices and the elimination of pest harborages and access, should be implemented prior to use of any chemical control measures.

### Pesticides

Pesticide applicators should be trained and certified when Environmental Protection Agency (EPA) restricted-use pesticides are being applied. A log and/or file should be maintained to indicate the type, quantity, and location applied for any pesticides used onboard. Procedures should be consistent with the Federal Insecticide, Fungicide and Rodenticide Act, EPA and Occupational Safety and Health (OSHA) standards. Pesticides are hazardous materials and a Material Safety Data Sheet (MSDS) should be maintained on hand for any pesticides available for use. Follow all precautions and recommendations of the manufacturer as described in the MSDS. The container labeling will also provide important safety information. All chemicals that are used to control vectors should be kept in their original containers, properly labeled and securely stored away from food (stores and cargo).

### Rodents

Rats on a ship are a health menace and a nuisance. They cause extensive damage to cargo and food, and rat droppings contain organisms which produce diseases. Rats carry fleas which may transmit plague and murine typhus. Because of these dangers, ships heavily infested with rats must be fumigated, and fumigation is a laborious, expensive, and dangerous procedure. It can be avoided through adequate rat-control measures. A deratization exemption certificate provided after an inspection that demonstrated the ship was rodent-free is required for some ports. The ship's agent should be able to make arrangements for an inspection to receive this certificate.

Despite reasonable precautions by the ship's personnel and port authorities, some rats may get aboard. However, infestation can be avoided. The following are guidelines to prevent and control rodents onboard ship:

- when moored, use approved and properly installed rat guards on all ship-shore lines to prevent rodents from getting aboard via these lines
- frequently inspect for signs of rat life (trails or runs marked by dirt or droppings) and take quick action if evidence is found
- rat proofing the ship, thus "building out" the rats by elimination of their living places or harborages
- keeping all food protected and avoiding accumulation of food scraps and garbage, thus "starving out" the rodents

- killing them by trapping or expert fumigation by personnel from authorized agencies (general use of rodenticide is not recommended as rats will ingest poison and likely die in an inaccessible area and cause additional sanitation problems and odors)

### Flies

Domestics flies, some of which bite, can transmit enteric (intestinal) diseases to man. Their larvae and eggs may infest human intestines as well as stored food. The primary method of control is good sanitation and control of waste. All waste must be stored in cans with tight lids. If chemical controls are used, non-residual aerosols (space sprays), residual and microencapsulated insecticides, and baits are the most effective against flies. When there is a fire hazard or heat source, non-flammable propellants must be used. When spraying in food preparation and serving areas, conduct operations when the galley can be closed for several hours, remove all food, and clean all surfaces prior to returning food to the galley.

### Mosquitoes

Several species of mosquitoes may transmit encephalitis, malaria, yellow fever, filariasis, West Nile Virus and other diseases. The primary method of control is to remove all standing water so the larvae can not survive. Methods as noted above for fly control can be used if chemicals are deemed necessary.

### Roaches

Roaches produce unpleasant odors, transmit diarrhea and dysentery, and damage food stores. Primary controls are good sanitation practices, elimination of cracks, crevices and dead spaces, storing food and garbage properly, watching for, and destroying all cockroaches and their egg cases, and removing corrugated cardboard boxes and cartons from provision storerooms as soon as possible. Bait stations and glue traps should be the first chemical controls used for minor infestations. If a larger infestation is suspected, a certified pesticide applicator should spray cracks and crevices with an appropriate insecticide. Follow precautions noted above under fly control when applying pesticides in food handling areas.

### Lice, Bedbugs, and Fleas

These ectoparasites live on the outside of the body, cause discomfort, and may transmit disease. Good personal hygiene and frequent laundering of clothing and bedding are the primary methods of control. Additional control methods include keeping berthing areas clean by vacuuming floors, rugs, and upholstered furniture; watching for, and eliminating ectoparasites introduced with luggage and clothing; avoiding furniture with wood-to-wood joints; and avoiding pillows or mattresses with rolled seams; and elimination of rodents. For personal infestations, use insecticide powders prescribed by a physician. Over the counter treatments are available for bedding and clothing. Be extra careful with pesticide use on bedding and in berthing areas. Follow all product directions.

**Pests in Stored Products**

These pests (cockroaches, beetles, moths, ants, mites, silverfish, spring tails) damage clothing and rugs and ruin many millions of dollars worth of stored foods annually. They reproduce and transmit human diseases. The primary control method is good sanitation and thoroughly inspecting food products when they are delivered. Store foods and products in an orderly, sanitary manner in a cool, dry room on racks up above the floor, use old stocks first, inspect stocks regularly and dispose of any found to be infested. Be careful when using insecticides around food, even in storage areas. Vapors from pesticides can infiltrate packaging and contaminate food products.

# GARBAGE

Liquid and solid wastes are generated during regular ship operations. Wastes must be properly stored and discharged according to environmental regulations. Garbage and trash should be stored separately. Care should be taken so that other ship areas are not contaminated. Receptacles should be covered to prevent entry of flies and other insects. Geographic-specific ocean dumping regulations for liquid and solid wastes must be followed. When practical, paper, cans, bottles and other items should be recycled.

# LAUNDRY

Laundry facilities should be maintained in a clean and sanitary condition. Floors should be cleaned at least once daily by dustless methods. Lint must be removed as necessary from bulkheads, overheads, and supporting members to prevent a build-up and possible fire hazard. After each use remove lint from washers and dryers. Vehicles or containers used to hold unwashed laundry must be cleaned frequently. Unwashed clothes should not be handled in close proximity to clean clothes.

Plumbing fixtures should be properly installed and secured for sea, maintained in good repair, and kept in a sanitary condition. All fixtures and appliances must be provided with backflow prevention devices. Ensure there is no cross-connection between gray water and the potable water supply. Seawater must not be used for laundry facilities when the ship is in polluted waters. Maintain adequate illumination.

Members working in laundry areas shall be briefed on the hazards of their duties and on the importance of proper personal hygiene. Frequent hand washing is required, especially after using the toilet. Eating, drinking (other than water), cooking, smoking, and storage of food, drinks, or smoking materials should not be allowed in the laundry room. Heat stress conditions may be present in the laundry room. Provide personnel with adequate drinking water and ensure ventilation is operating properly to reduce humidity levels and provide fresh air.

# BARBERSHOPS

Ensure that personnel performing barbershop duties are free of any communicable disease. Personnel must maintain good personal hygiene and wear clean clothing when attending customers. Hands must be thoroughly washed with soap and hot water between customers. Personnel should not eat, drink, or smoke while attending customers. Do not provide services to persons with inflamed or infectious conditions of the scalp, face, or neck unless they have been evaluated by the medical department representative (MDR). Therapeutic practices such as treating pimples, ingrown hairs, etc. should not be performed. Only materials and procedures approved by the MDR should be used to stop the flow of blood in case of nicks.

Only use tonics, lotions, bleaches, dyes, etc. that have been approved by the Food and Drug Administration (FDA). All instruments that come into direct contact with customers must be cleaned and disinfected between uses. Only Environmental Protection Agency/FDA approved disinfectants and sanitizing agents should be used. Read product directions and follow them. Personnel should not use common brushes, dusters, etc. Shaving should not be allowed. Sanitary neck strips should be used for each customer and soiled capes should be laundered before reuse. Remove cut hair from the decks frequently by dustless methods.

# HABITABILITY

There should be a regular cleaning schedule for all berthing areas, heads, and showers aboard ship. These areas must be kept clean, operable, well ventilated and well illuminated at all times. Mops, brooms, and other cleaning gear should be cleaned and properly stowed away from the berthing area after use. To prevent pest problems, food items should not be allowed in berthing areas. The Master or his designee should perform regular inspections to ensure safety and cleanliness of berthing areas, heads, and showers.

# THERMAL STRESS

Heat stress conditions are a common problem onboard ship. Cold stress could be an issue while operating during the winter in cold climates.

All personnel should be trained in the symptoms and proper treatment of heat stress, heat exhaustion, and heat stroke. This will allow them to protect their own health and that of fellow shipmates. Thermometers should be placed in all areas that are potential heat stress locations such as the engine room, auxiliary machinery rooms, laundry, galley, and scullery. These thermometers should be checked periodically to determine if there is a potential for heat stress problems. The MDR should have a wet bulb globe temperature (WGBT) meter available to evaluate heat stress conditions.

Ensure cool drinking water is continuously available in areas where heat stress conditions or their potential exist. Good nutrition, three meals a day is equally

important, work schedules should facilitate adequate sleep. Salt added to meals is normally sufficient and salt tablets are not necessary unless recommended by the MDR.

Cold stress is primarily prevented by keeping dry and wearing plenty of clothing. Wind chill can dramatically decrease the perceived temperature. Personnel should be trained on the physiological effects and proper recognition and treatment of cold injuries.

## HAZARDOUS MATERIALS

Hazardous materials include a variety of materials onboard ship from oils to paints and cleaning supplies. Material Safety Data Sheets (MSDS) are available for all hazardous materials. Personnel who use the materials should be trained on the content of the MSDS. An inventory of hazardous materials should also be available. MSDS's should be provided when the material is purchased. Contact the manufacturer or distributor of the material if a MSDS is missing. The MSDS will provide information on content, exposure limits, health effects, actions to take in case of a spill, personal protective equipment to use, conditions and materials to avoid, proper storage methods, fire precautions, and more. It is important to ensure personnel have the personal protective equipment available to safely use any hazardous material. Provide adequate ventilation as possible in areas where hazardous materials are used. OSHA regulations, 29 CFR 1910.1200 and 1910.120 provide information and guidance on hazardous materials.

OSHA documents can be found at:
www.osha.gov or. www.access.gpo.gov/nara/cfr/index.html

## RESPIRATORY PROTECTION

The use of respirators is sometimes required. Any person who plans to use a respirator onboard must be properly trained and fit tested and medically evaluated prior to use. It is also important to select the appropriate respirator for the task. OSHA regulations, 29 CFR 1910.134, provides detailed information on the proper selection, training, fit testing, and medical evaluation of personnel.

## CONFINED/ENCLOSED SPACES

There are a variety of confined spaces aboard ship. A confined or enclosed space is any space that has limited escape routes, is not intended for human occupancy, has limited ventilation, or has a potential for atmospheric hazards. These spaces must be evaluated by a qualified person with calibrated equipment prior to entry by any personnel. Detailed guidance can be found in OSHA regulation 29 CFR Part 1915.

# RECOMMENDED REFERENCES

Environmental Engineering And Sanitation, Salvado, J.A., Wiley-Interscience, (most recent edition)

Control Of Communicable Diseases Manual, Edited By Chin, J., Apha, (most recent edition)

Threshold Limit Values For Chemical Substances And Physical Agents And Biological Exposure Indices, Acgih (Updated Annually)

Emergency Care For Hazardous Materials Exposure By Bronstein, A. C. And Currance, P. L., Mosby Lifeline Press, St. Louis, (most recent edition)

**Additional Guidance For The Subjects In This Chapter Can Be Found At The Following Web Links:**

Virtual Navy Hospital, Manual Of Naval Preventive Medicine: http://www.vnh.org/PreventiveMedicine/PreventiveMedicine.html

U.S. Navy Shipboard Pest Management Manual: Http://Www.Vnh.Org/Pestcontrol/

Occupational Safety And Health Administration: Www.Osha.Gov

National Institute Of Safety And Occupational Health: Www.Cdc.Gov/Niosh

Code Of Federal Regulations: Http://Www.Access.Gpo.Gov/Nara/Cfr/Index.Html

Environmental Protection Agency: Http://Www.Epa.Gov

Food And Drug Administration: Http://Www.Fda.Gov

Centers For Disease Control And Prevention: Http://Www.Cdc.Gov

# CHAPTER 4

# SUBSTANCE ABUSE


| | |
|---|---|
| Introduction | 4-1 |
| The Alcohols | 4-1 |
| Alcohol in the Body | 4-2 |
| Management of Patients with Alcohol-Induced Disorders | 4-3 |
| Alcohol Intoxication | 4-3 |
| Alcohol Withdrawal | 4-5 |
| Alcohol Dependence and Alcohol Abuse | 4-7 |
| Prevention | 4-8 |
| Drugs of Abuse | 4-8 |
| Introduction | 4-8 |
| Opioid-Related Drugs | 4-9 |
| Sedative-, Hypnotic- and Anxiolytic-Related Drugs | 4-10 |
| Amphetamine-Related Drugs | 4-11 |
| Hallucinogens | 4-12 |
| Cannabis | 4-13 |
| Cocaine | 4-14 |
| Inhalants | 4-14 |
| Summary | 4-15 |

CHAPTER

4

# Substance Abuse

## INTRODUCTION

Substance abuse is the use of drugs (including prescription medications) or alcohol in ways that interfere with one's life at work, school, and home. Substance abuse can lead to serious illness, dependency, and death. Death may be due to acute and chronic affects. Drugs of abuse may be swallowed, inhaled, snorted, injected, or even absorbed through the skin and mucous membranes. Alcohol is the most widely abused drug today. Alcohol use has been a factor in many drownings, tragic ship collisions and other mishaps at sea. It is the responsibility of the entire crew to promote and practice responsible attitudes toward alcohol use. Those in command of the vessel are ultimately responsible for reinforcing responsible alcohol use and not tolerating illegal drug use. Intoxication from alcohol or drugs can endanger the entire crew. It is important to recognize the signs and symptoms of substance use disorders and to seek appropriate treatment.

## THE ALCOHOLS

**THE ALCOHOL FAMILY** is made up of many chemical compounds. Ethyl alcohol, the best known member of the group, is a product of fermentation and is the intoxicating substance in beer, wine, and other liquors. Other alcohols commonly used are methyl alcohol, isopropyl alcohol and denatured alcohol.

**Methyl alcohol,** also known as wood alcohol or methanol, is a fuel and has industrial usage as a solvent. Wood alcohol is a poison that must never be consumed (including inhaled) because it causes liver toxicity, blindness, and death.

**Isopropyl alcohol** is "rubbing alcohol" and often used as a disinfectant. It is poisonous if taken internally.

**Denatured alcohol** is ethyl alcohol with other chemicals (denaturants) added to make it unfit for drinking. It has many industrial uses. If it is aboard ship, use extreme care to make certain that it is clearly labeled as a poison, and that any crew members with access to it fully understand that it is not safe to drink. Deaths occur each year in people drinking denatured alcohol who are unaware of its dangers.

**Ethyl alcohol** (also know as grain alcohol or ethanol) is given special attention in this chapter because it is the active intoxicant of alcoholic beverages. It is a colorless, flammable liquid that supplies calories, but has no nutritional value. It has been used

as an antiseptic, drying agent, sedative, anesthetic, and hypnotic agent. It is a pain-reliever that reduces pain by sedating the brain and central nervous system. Ethyl alcohol is considered a drug because of the profound depressant effects it has on the central nervous system. Like barbiturates and narcotics, it causes addiction and dependence.

**DEFINITIONS**

Note: Complete definitions and diagnostic criteria can be found in the current edition of the *Diagnostic and Statistical Manual* published by the American Psychiatric Association. Following are general descriptions.

**Alcohol Intoxication** is the presence of significant maladaptive behavioral or psychological changes (i.e. impaired judgment, impaired social functioning, and inappropriate behavior) that develop during or shortly after the ingestion of alcohol. These changes are normally accompanied by slurred speech, unsteady gait, and impairment in attention or memory. In high doses, stupor, coma and death can result. Intoxication impairs driving abilities and performance of duty, and can lead to marine and other accidents. While intoxicated, one is not fit for duty and should never operate tools or equipment.

**Alcohol Abuse** refers to the isolated or continued habit of drinking in ways that cause difficulties at work, school or home. It results in physically hazardous situations and leads to legal problems. A sign of alcohol abuse is that drinking continues in spite of the resulting problems.

**Alcohol Dependence** includes physical and psychological dependence, and is a pattern of use that continues in spite of various warning signs. Physical dependence occurs when the body requires alcohol to prevent withdrawal symptoms. Tolerance, or the need for more alcohol to produce the same effects, also develops. Psychological dependence involves psychological craving for the drug. A dependent person is distressed by alcohol's effects on his/her life and efforts to reduce consumption are often unsuccessful. Significant time is spent obtaining alcohol and its use interferes with other activities. The person often uses alcohol in larger amounts or over a longer period of time than intended.

# ALCOHOL IN THE BODY

Unlike other foods that require slow digestion, alcohol is absorbed directly into the bloodstream through the walls of the stomach and the small intestine. The blood carries it to all body tissues, including the brain, where it has an immediate depressant effect. The liver slowly metabolizes the alcohol. Lesser amounts are excreted through the lungs, skin, and kidneys. If alcohol is consumed faster than the body can dispose of it, the blood concentration increases. Alcohol is a central nervous system depressant and also an anesthetic.

Initially, alcohol seems to produce feelings of stimulation. Alcohol "numbing" of the judgment center of the brain, which controls inhibitions and restraints, makes one feel

buoyant and exhilarated. Continued drinking on a given occasion increases the concentration of alcohol in the bloodstream. This causes depression of various areas of the brain that affect judgment, emotions, behavior, and physical well-being. Reflex time is markedly reduced. Operating marine vessels under the influence of any amount of alcohol is unsafe.

Alcohol ingestion causes absorption and nutritional deficiencies. The combination of malnutrition and tissue injury may contribute to brain damage, heart disease, diabetes, ulcers, cirrhosis of the liver, and muscle weakness. The Wernicke-Korsakoff syndrome, with irreversible and potentially fatal brain and nervous system damage, is due to severe acute and chronic thiamine deficiency. Treatment of serious alcohol disorders should include injected and oral thiamine, as well as other vitamins and nutrients.

Alcohol can also act a a direct poison to body tissues. Liver damage, including irreversible cirrhosis, can result from chronic drinking. The brain and other tissues can also be irreversibly damaged.

Sudden death may occur: (1) when the individual has ingested so much alcohol that the brain center which controls breathing and heart action is fatally depressed; (2) when other depressant drugs (such as “sleeping pills”) are taken along with alcohol, magnifying the depressant effects; (3) during an accident (one-half of all fatal traffic accidents involve the use of alcohol); or (4) as a result of suicide or murder (many self-inflicted deaths as well as homicides involve the use of alcohol.)

# MANAGEMENT OF PATIENTS WITH ALCOHOL-INDUCED DISORDERS

The *Diagnostic and Statistical Manual – IV* by the American Psychiatric Association identifies a range of alcohol-induced disorders including dependence, abuse, intoxication, withdrawal, intoxication delirium, and withdrawal delirium. Alcohol can also induce dementia, amnesic, psychotic, mood, anxiety and sleep disorders as well as sexual dysfunctions.

Alcohol intoxication, alcohol withdrawal, and alcohol dependence and abuse are discussed below.

## ALCOHOL INTOXICATION

At lower blood alcohol levels, mild intoxication is self-limiting as long as the person stops drinking. However, reflexes are impaired, and activities such as driving and working with machinery are dangerous. As little as one drink impairs one’s abilities.

As alcohol levels increase with more drinking, there is poor control of muscles, poor coordination, double vision, flushing of the face, bloodshot eyes, and vomiting. Behavior varies greatly. It is hard to predict what an intoxicated person will do next.

He/she may cry bitterly, show unexplained happiness, change moods rapidly, or just pass out. NOTE: "Passing out" or "falling asleep" can be a warning sign that the person is actually in a dangerous alcohol coma. Shipmates may assume the person is safely asleep, when he/she may actually be in a life-threatening coma. Take care to monitor a shipmate's condition and make certain he is breathing and responsive. Get immediate help if you suspect alcoholic coma. This could save a life.

Alcohol is metabolized by the body at a constant rate regardless of activity. Black coffee or a cold shower may make an intoxicated person feel better but the reaction times are not changed – they remain slowed. It is impossible to "walk off" excess liquor or intoxication. Performance remains impaired. Alcohol is metabolized at about one drink per hour. (One drink is a 12-ounce beer, 4-ounce glass of wine, or 1 ounce of hard liquor.)

Serious intoxication results when a large amount of an alcoholic beverage is taken over a relatively short period of time (or for a longer period of time, when alcohol intake exceeds alcohol excretion). Memory is commonly lost for the events while intoxicated. Symptoms are drowsiness that can progress rapidly to coma; slow snoring breathing; blueness of the face, lips, and fingernail beds; involuntary passage of urine or feces; dilated pupils; and rapid weak pulse. .

**A suspected alcoholic stupor or coma represents a medical emergency. Obtain immediate help via radio.** Also, be aware that the signs and symptoms of drunken stupor are similar to other medical emergencies such as intoxication from prescription or illegal drugs, other poisonings, stroke, brain injury, insulin shock and diabetic coma. For example, a person may have an odor of alcohol on the breath and also be in a diabetic coma.

Stupor or coma always requires immediate treatment, no matter what the cause, though the specific treatment varies, dependent upon the cause. Remember that accidents, falls and fights are commonly associated with drunkenness, so the head should be checked for signs of injury, the pupils of the eyes for equality of size and moderate dilation (in serious head injury and stroke the pupils may be unequal and non-reactive to light) and the patient's temperature recorded. The individual's shipmates should be questioned on whether the patient might have taken drugs, been injured, or overexposed to fumes or poisons. Also try to determine how much alcohol the person may have consumed and over what time period. Personal effects should be checked for medications and other drugs if indicated. Accurately diagnosing the cause(s) of the stupor is key to successful treatment.

### Treatment

Immediate first aid for someone in a stupor or coma is the ABC's – airway, breathing, and circulation. **Obtain immediate consultation by radio.** The patient's airway should be kept clear by placing him on his side. The unconscious patient should be

placed on his side and not be allowed to sleep on his back, because a deepening of stupor or coma may cause choking on the tongue or vomitus. The patient should be continually observed and not left alone. Frequently monitor and record vital signs. A continual written record of the patient's condition, vital signs, and treatment provided should be maintained.

The specific treatment is dependent upon the cause(s) of the stupor or coma. For example, in addition to alcohol, the patient may have taken prescription or illegal drugs. The patient may have suffered a head injury or stroke. Other medical problems such as diabetes could be compounding the situation. Treatment must address all the interacting factors.

Alcohol disorders are usually chronic problems that are not resolved simply because the immediate crisis is over. Upon return to home port, the crew member should receive a formal drug/alcohol assessment screening by a qualified professional. Treatment often involves referral to a specialized alcohol treatment program.

## ALCOHOL WITHDRAWAL

Alcohol withdrawal occurs when a physiologically dependent person abruptly stops using alcohol. Physiologic dependence can develop after prolonged and heavy drinking. For example, consider a crew member who drinks alcohol regularly while in home port. When this crew member goes to sea and suddenly stops drinking, he/she may experience withdrawal within a day or two. Thus, withdrawal is most common early in a voyage. **Alcohol withdrawal can be a life-threatening emergency**.

The *Diagnostic and Statistical Manual – IV* identifies symptoms characteristic of withdrawal. These include increased sweating and pulse (greater than 100/min), hand tremor, insomnia, nausea or vomiting, hallucinations or illusions, agitation, anxiety, and grand mal seizures. The patient is distressed by the symptoms. Alcohol withdrawal is diagnosed when the symptoms are due to the cessation of alcohol and not due to another medical or psychiatric disorder.

Alcohol withdrawal can advance to withdrawal delirium, called delirium tremens or "DTs". DT's include a disturbance of consciousness and a change in cognition. DT's usually occur within 24 to 72 hours of stopping alcohol intake; however they may occur as much as a week after. **DT's are a life-threatening emergency requiring complex medical treatment. To prevent serious DT's, any alcohol withdrawal symptoms require early treatment and immediate medical consultation by radio.**

A delirious patient should never be left unattended. Even when the symptoms appear mild, constant observation is required. An accurate written record should be kept of the patient's condition, including vital signs and urinary output. Treatment should be symptomatic. The patient's recent history should be reviewed carefully to

determine the cause of the delirium. In addition to alcohol withdrawal, there may be a co-occurring head injury or another medical problem. Medical advice by radio should be obtained and followed.

**Treatment**

Alcohol withdrawal symptoms, as they increase, often signal impending DT's. Recognition of these symptoms as warnings, followed by prompt treatment, often will prevent deterioration and full-blown delirium tremens. **Alcohol withdrawal can be a life-threatening emergency. Early recognition and treatment are essential. Obtain medical consultation by radio.**

In treating impending (and actual DT's), medium-to-long acting benzodiazepines are used to "substitute" for the body's dependence on alcohol. When withdrawal symptoms are first observed, prompt treatment should begin with a drug such as oral chlordiazepoxide. This should control the minor symptoms and, if properly managed under medical direction, should prevent the severe withdrawal symptoms of delirium tremens, including seizures. When the patient is stable, the benzodiazepine dosage should be tapered over several days, while the patient's vital signs and condition are closely monitored. Tapering, rather than sudden stopping, is important to prevent further complications such as benzodiazepine-withdrawal seizures.

Efforts should be made to allay the patient's fears with reassurance and a careful explanation of procedures. Nightmares, illusions, and hallucinations often are reduced if the patient is placed in a well-lit room, and in the presence of others rather than in isolation and restraints. The patient's pulse, blood pressure, and temperature should be taken every four hours (or more often if the patient does not seem stable) and charted in a written medical record. Pay attention to any changes – they can be warning signs that the patient's condition is worsening.

If the patient has not stabilized after 24 hours of treatment with a benzodiazepine, one should assume that there are other medical complications and problems that require immediate medical intervention**. Continued radio consultation is critical for appropriate management.**

Seizures, historically called "rum fits", are another symptom of alcohol withdrawal. One of the primary objectives in treating an alcohol convulsion (seizure) is to prevent patient injury and injury to others. The patient should be placed on his/her side (to prevent aspiration), tight clothing loosened, and air passages kept open. General seizure precautions and management should be used. To interrupt a convulsion, diazepam (1-3 mg intravenously **under medical supervision**) may be adequate. Intravenous diazepam should be given carefully and slowly. If injected too quickly or given in too large a dose, it can cause respiratory arrest and death. If intravenous administration is not possible, diazepam can be administered intramuscularly. Continue treatment as for impending DTs. Further, seizures are often a signal of

other serious disease, and thus deserve a prompt and full medical work-up to rule out other causes such as brain tumors.

**Medical management of a patient in DT's is complex. Get medical consultation via radio.** Untreated, DT's have a 20% fatality rate; treated it is about 5%. Recognition and early treatment of alcohol withdrawal symptoms is key to prevention. However, should DT's occur, they require extensive medical care. When possible, hospitalization is advised.

Further, a patient in DT's is often agitated, confused and/or paranoid. One should talk with the patient in a calm voice and explain in simple terms what is going on. Effort should be made repeatedly to reassure. The patient should never be left alone, even for a moment. Precautions to prevent suicide should be observed. The room should be kept evenly lighted at all times because delirium usually is worse in the dark or in twilight. The source of light should be placed to avoid casting strange shadows.

Rarely, restraints may be needed to prevent the patient from hurting himself or others. These should be applied only with the permission of the ship's captain. Restraints should be applied carefully, and only if safe procedures are known and followed. Mechanical restraints can be dangerous, tend to antagonize or irritate the patient, and should be used only when absolutely necessary. Restraining appliances should not be placed within reach of the patient's fingers or teeth, or where they might cause pressure or discomfort. These devices must not interfere with the patient's breathing. Constant supervision of restrained patients must be maintained. The patient in restraints should be watched carefully to avoid injury. A complete written record explaining why restraints were needed, how they were applied, and the patients condition at regular intervals (about 15 minutes) is essential. The chart should be signed by each crew member providing one-on-one observation during their time "on watch". **Restraints should only be used if no other intervention will prevent danger to the patient or others; a patient in restraints requires close and continual one-on-one monitoring.**

## ALCOHOL DEPENDENCE AND ALCOHOL ABUSE

Alcohol dependence and alcohol abuse are disorders that are sometimes called "alcoholism". Alcohol dependence may include tolerance, withdrawal, and the inability to reduce use, even when it interferes with other parts of one's life. Alcohol abuse occurs when alcohol use interferes with work, school and home-life, and may also include alcohol-related legal problems.

Problem drinkers have varying degrees and patterns of alcohol use. Some alcohol abusers go on periodic sprees or binges, but between these they drink little or no alcohol. Others may drink regularly day after day for long periods. Alcohol causes various problems both aboard ship and when ashore on liberty. Alcohol is a common contributor to fights and arguments.

Chronic alcohol abuse causes many medical problems, and is especially damaging to the liver, brain and nervous system.

### Treatment

Alcohol dependence and abuse are difficult to manage and treat aboard ship. Chapters of Alcoholics Anonymous are found world-wide. For someone who has the determination to quit drinking, attending meetings in the various ports-of-call can be helpful. However, management of the crew member who does not want to change problem drinking behaviors is challenging. Referral for formal evaluation and treatment in the homeport are appropriate. Most importantly, alcohol use must be prevented from interfering with the safe operation and management of the ship.

### PREVENTION

Prevention of alcohol incidents requires senior leadership and education of the entire crew. It also requires effective management of any problems as they occur. The ship's culture should expect (and demand) responsible alcohol behavior.

## DRUGS OF ABUSE

### INTRODUCTION

A range of chemicals can be abused – illicit drugs, prescription drugs, and shipboard chemicals, especially those with an organic solvent base. They can be consumed as a solid or liquid; sniffed, snorted, or smoked; injected; inserted rectally; or applied to the skin. Symptoms of intoxication and withdrawal vary with different chemicals. When drug dependence occurs, both tolerance (more drug is needed for the same effect) and withdrawal symptoms can be present.

To identify drug abuse, look for changes in behavior. The behavior changes are dependent upon the drug taken. A person on hallucinogens may see and here things that aren't there. Other drugs are stimulants or depressants. Some behavioral changes may actually first appear to be positive. For example, with amphetamine use, a usually bored sleepy person may be more alert and even improve his/her performance. Conversely, a nervous, high-strung individual on barbiturates may be more cooperative and easier to manage.

Signs that suggest drug abuse include sudden and dramatic changes in discipline and job performance. Drug abusers may display unusual activity or inactivity, and sudden and irrational flare-ups involving strong emotion or temper. There may be an increase in arguments. Personal appearance may decline - often a drug abuser becomes indifferent to his appearance.

There are other, more specific signs that should arouse suspicions. Among them are furtive behavior about actions and possessions (fear or discovery), sunglasses worn

at inappropriate times and places (to hide dilated or constricted pupils), and long-sleeve garments worn constantly, even on hot days, to hide needle marks.

Seven main classes of drugs of abuse are discussed: opioid-related drugs, sedative-hypnotic and anxiolytic-related drugs, amphetamine-related drugs (stimulants), hallucinogens, cannabis, cocaine, and inhalants.

## OPIOID-RELATED DRUGS

Opioid-related drugs, commonly called narcotics, are available by prescription (such as morphine and oxycodone for pain) and are also illegal street drugs (such as heroin and opium). They are known for their "rush" and then a feeling of tranquility. This is followed by a feeling of dysphoria. They cause nausea, vomiting and constipation. An overdose is characterized by coma, depressed respiration and pinpoint pupils. Narcotic use quickly results in physical dependence with classic withdrawal or abstinence symptoms of muscle aches, yawning, increased perspiration, running nose, watery eyes, "goosebumps", diarrhea, dilated pupils, and increased pulse and temperature.

To achieve maximum effect, narcotics are injected directly into a vein ("main-lining"). Once physically addicted, to prevent the abstinence syndrome, most addicts inject two to four times per day. The most common site of injection is the inner surface of the arm at the elbow. After repeated injections, scar tissue (tracks) develops along the course of such veins. Because of the easy identification of these marks, narcotic abusers may wear long sleeves at odd times. Females sometimes use makeup to cover marks and some males get tattooed at injection sites. HIV/AIDS and hepatitis B and C are readily transmitted by sharing needles.

The narcotic abuser may be detected by noting the presence of the equipment ("works" or "outfit") used in injecting narcotics. Because anyone injecting drugs must keep the equipment handy, it may be found on his person, or hidden nearby in a locker, washroom, or any place where temporary privacy may be found.

All narcotics are not injected. Though narcotic pain medications can be injected, they can also be taken orally or as rectal suppositories. Impure opium was historically smoked in "opium dens". Heroin can be "snorted" in the nose, though this requires more drug for the same effect and thus is more expensive than injecting. Oral preparations which can be abused include codeine in cough medicines and narcotic anti-diarrhea drugs. When narcotics are taken orally the blood level rises slowly so the "rush" is not as great as when injected or snorted.

### Treatment of Opioid Intoxication and Dependence

Opioid intoxication can be unexpected and serious – if a bag of heroin contains a higher than expected concentration of active drug, a serious overdose can result. Since the opioids can cause respiratory depression, the ABC's (airway, breathing,

cardiac) are the first steps in management. Immediate medical advice by radio should be obtained.

With all opioid-related drugs such as opium, heroin, meperidine, morphine, oxycodone, methadone, and hydromorphone, overdose produces similar clinical states. Respiratory depression is the most dangerous and can be fatal. Depressed respiration requires close observation and may require manual or mechanical artificial respiration. Naloxone, a narcotic antagonist, may be indicated when a patient has signs of even mild respiratory depression.

Naloxone is used to treat acute narcotic intoxication or overdose. It is a pure narcotic antagonist. Naloxone binds to the opioid receptors, and thus displaces the opioid. Since naloxone does not cause respiratory depression, dosing can be repeated and it can reverse some opioid-induced respiratory depression. Naloxone has a relatively short duration of action, and must be re-administered frequently. The length of time it is needed depends upon many factors including the duration of action of the narcotic the patient took. Short-acting narcotics such as heroin and morphine are cleared faster (and thus require naloxone for a shorter time) than longer acting drugs, such as methadone.

Opioid-related drugs cause a physical dependence when used regularly and have a classic withdrawal or abstinence syndrome. A short-acting drug has a faster onset and shorter duration of withdrawal than a longer acting drug. Though opioid withdrawal is unpleasant, it is rarely life-threatening (unlike an overdose, which can be fatal.) Supportive care is helpful. Various drugs, such as clonidine, can be prescribed to minimize the withdrawal symptoms. Methadone and buprenorphine hydrochloride can be used for longer-term management of opioid dependence.

In addition to the physical dependence caused by opioid-related drugs, they also cause psychological dependence. This is characterized by craving, which may continue for life, even if the physical signs of withdrawal resolve. “Psychological” dependence and craving may have a biological basis in the receptor cells. They make opioid abuse difficult to treat.

## SEDATIVE-, HYPNOTIC- AND ANXIOLYTIC- RELATED DRUGS

The sedative-, hypnotic- and anxiolytic-related drugs include benzodiazepines (e.g. diazepam), carbamates (e.g. gluetethimide, meprobamate), barbiturates and related hypnotics (e.g. methaqualone). Intoxication resembles alcohol with slurred speech, incoordination, unsteady gate, and impairment of memory and concentration. These drugs are central nervous system depressants and an overdose can be fatal due to respiratory suppression. These effects are compounded when taken with alcohol, which makes them especially dangerous.

Benzodiazapines are sometimes used with cocaine and other stimulants to “take the edge off”. They are also used to self-medicate withdrawal from other addictive drugs.

### Management of Intoxication

The treatment of intoxication and overdose requires support of cardiovascular and respiratory functions – remember the ABC's. **Overdose is a medical emergency – obtain medical consultation via radio.** Maintenance of the airway is of crucial importance. Oxygen and intravenous fluids may be needed. Stimulant drugs generally are not effective in restoring normal respiration. If the patient is conscious, gastric lavage will be helpful in removing any unabsorbed drug from the stomach. Take care to avoid aspiration and choking.

### Management of Withdrawal

When a patient becomes physically dependent on a drug in this class, abruptly stopping the drug can result in a withdrawal syndrome. It is characterized by increased sweating, pulse, tremor, insomnia, nausea and vomiting, hallucinations, anxiety, and agitation. **Life-threatening seizures can also result. Immediate medical management is essential.** Close supervision is essential. Medical advice by radio should be obtained.

Aboard ship, it is often best to provide the drug, taper the dose and withdraw the drug gradually. Continued abstinence is difficult to obtain. Long-term treatment is best in a shore-based facility where medical support and behavioral counseling are available.

## AMPHETAMINE-RELATED DRUGS

Amphetamines and related substances, such as methylphenidate, are stimulants that are available as both prescription and street drugs. Methamphetamine ("meth" or "speed") has recently become a popular and dangerous drug of abuse. Another drug, methylenedioxymeth-amphetamine (MDMA, "ecstasy," "XTC," or "ADAM"), acts as both a mild hallucinogen and stimulant. It can cause heatstroke with high temperature and low heart rate and blood pressure. If untreated, coma and death can result.

As a group, amphetamine-related drugs are stimulants. Their intoxication is characterized by fast or slow heart rate or cardiac arrhythmias, high or low blood pressure, dilated pupils, perspiration or chills, nausea and vomiting and various movement disorders. Behavior is characterized by excessive activity. The stimulant abuser is irritable, argumentative, appears extremely nervous, and has difficulty sitting still. Other observable effects include incessant talking and chain-smoking. The person abusing stimulant drugs often goes for long periods of time without sleeping or eating, and may disturb others by their hyperactivity. Following the stimulant intoxication, the patient may experience a profound "crash" or hangover with depression.

### Treatment

The treatment of an overdose from an amphetamine-related drug is complex, so medical advice should always be sought by radio. It is important to determine whether the patient has taken any other drugs, such as barbiturates or alcohol. Drug combinations are dangerous and can be very difficult to treat.

Life-threatening toxic doses of stimulants cause tachycardia (fast heart rate) that can lead to a heart attack. They may also cause abnormally high body temperatures above 102$^{o}$F (39$^{o}$C). High temperatures should be treated like heatstroke. A fully conscious patient who has ingested an overdose *orally* should be forced to vomit or gastric lavage should be instituted to remove any unabsorbed drug, taking care to avoid aspiration.

Light sedation with diazepam may be required; *but this should be administered only upon medical advice by radio.* ***DO NOT SEDATE A VOMITING PATIENT.***

## HALLUCINOGENS

Although LSD is the most widely known hallucinogen, others seen frequently include mescaline (the active ingredient of the peyote cactus which originates in Mexico) and psilocybin (the active ingredient from a specific Mexican mushroom.) Two synthetic substances, DMT (dimethyiltryptamine) and DOM (dimethoxyamphetamine,) also known as STP (implying Serenity, Tranquility, and Peace) are abused frequently. When taken in sufficient dosage, any of these substances will produce illusions (incorrect perception of objects) and hallucinations (a sensory perception without objective stimulus, such as seeing, hearing, feeling, tasting, or smelling something that does not exist.) Other abnormal experiences with hallucinogens include a feeling of great excitement and insight. In high doses they also cause physical symptoms such as dilated pupils, sweating, increased heart rate, blurred vision, tremors and in-coordination.

Persons using hallucinogens may use them sporadically. Persons under the influence of hallucinogens often sit or recline quietly in a dream or trance-like state. Conversely, users can become fearful and experience a feeling of terror. This can cause them to try to escape from the group or engage in violent action. Hallucinogens can induce suicidal and homicidal tendencies.

Hallucinogenic drugs are usually taken orally as tablets, capsules, or liquids. Users put drops of the liquid into beverages, on sugar cubes, crackers, or a small paper wad or cloth. When buying drugs on the street, it is impossible to know the actual content of the product. Since hallucinogens are relatively cheap, other drugs may be “cut” with them. The customer is unaware the hallucinogen is in the drug, and its effects contribute to a “bad trip”.

It is important to remember that the effects of LSD (lysergic acid diethylamide) and other hallucinogens may recur days or even months after the drug has been taken.

### Treatment

Though hallucinogen use can result in a “bad trip”, most experienced drug users can generally control this unpleasant experience. However, skilled help may be required if the user, often inexperienced, suffers a loss of control and is overwhelmed with anxiety, terrifying sights and sounds, delusions of persecution, extreme depression and/or the belief that he is going out of his mind. The treatment for a bad trip is basically the talk-down technique. This involves non-moralizing comforting support from an experienced individual. Limiting external stimuli, such as having the patient lay down to relax in a quiet darkened area, can be helpful. **These patients should never be left unattended**. Also, monitor vital signs to assure the patient is medically stable.

If radio consultation is sought and diazepam is recommended, be certain of other drugs the patient may have taken to avoid dangerous, even fatal, interactions.

## CANNABIS

Cannabis is also called marijuana or “pot”, and is closely related to hashish. The drug can act as a stimulant; the user may be very animated and appear almost hysterical. Loud and rapid talking with bursts of laughter are common at this state. There may be an increase in appetite. At higher doses, the user may seem to be in a stupor or sleepy. The drug can also cause hallucinations and delusions.

Marijuana smokers may be identified by their possession of cigarettes or other smoking paraphernalia. The cigarettes, called sticks, reefers, or joints, are hand rolled in off-white cigarette papers. Smaller than a regular tobacco cigarette, with the paper twisted or tucked in on both ends, the marijuana cigarette often contains seeds and stems. Marijuana can be smoked in a tiny pipe or a water pipe (called a “bong”).

Another clue to the presence of marijuana is the way it is smoked - the smoke is inhaled deeply and held in the lungs as long as possible. Marijuana smoke has a characteristic odor similar to burnt rope. It is readily noticeable on the breath and clothing. Marijuana may also be eaten, especially when mixed in foods such as brownies. Marijuana is greener in color than regular tobacco.

Marijuana use affects reflexes, distorts sensory perceptions and impairs the user’s abilities. Driving and using tools and equipment are unsafe when under the drug’s influence.

Use and possession of small quantities of marijuana is legal in some countries. Each crew member must understand the ship’s policies regarding its purchase and use during port calls.

### Treatment

Acute serious adverse reactions to marijuana alone are rare. Unbeknownst to the user, marijuana is often "cut" with other drugs, such as phencyclidine (PCP) or LSD to increase the "high". The user is unaware of these other drugs at the time of purchase, and there is no way to determine what the drug combination actually is. This contributes to a "bad trip." Bad trips can be unpredictable and treatment can be difficult. If the person is physically and medically stable, the same talking-down techniques used for LSD and other stronger hallucinogens can be effective. Physical complications require direct medical interventions.

Some people use marijuana on a daily basis and become dependent on it. The marijuana affects their job performance and family relationships. A formal substance abuse evaluation for treatment may be indicated.

## COCAINE

Cocaine is the active ingredient in the coca plant, and is purified in many forms. It can be injected, snorted or smoked. As a fast-acting central nervous system stimulant, it results in a rapid "rush" and binge use is common. The "rush" is followed by a "crash" when the drug's effects wear off.

"Crack" cocaine, commonly used in the U.S., is formed into small "rocks" that are smoked in small pipes or added to tobacco or marijuana cigarettes. The active ingredients are easily vaporized and inhaled, resulting in a rapid onset of action with an immediate "high". "Free base" cocaine is made by heating with solvents and then smoked.

Cocaine use can result in a range of symptoms – paranoia, aggressive behavior, violence, anxiety, and depression. The drug quickly causes dependence and tolerance. Many researchers believe the drug changes the brain's chemistry, and results in drug craving. This makes cocaine abuse very difficult to treat. Death from cocaine use is generally due to cardiac arrhythmias. Criminal activity to acquire funds to purchase the drug is common. Cocaine disrupts the individual user's life, and also is a major public health problem.

### Treatment

Cocaine intoxication and overdose can be serious. Cardiac and other life threatening effects require specific immediate treatment. The underlying abuse and dependence are very difficult to treat.

## INHALANTS

Inhalants are potentially dangerous, volatile chemicals that are found in consumer, commercial, and industrial products intended for use in well-ventilated areas. The vapors they produce can be extremely dangerous when inhaled; many cause permanent brain damage. Examples are gasoline, glue, lighter fluids (butane), paint, wet markers, propellants in aerosol spray cans, and nitrous oxide. Some chemicals,

such as the nitrite inhalants (“snappers” and “poppers”), are produced as intoxicating drugs.

Inhalants can be abused by “sniffing” (inhaling through the nose directly over an open container), or “huffing” (pouring or spraying material on a cloth that is held over the mouth and inhaling through the mouth.) These methods usually use a bag or other container to concentrate and retain the propellant thereby producing a quick “high” for the abuser. Inhalants give a particularly rapid “high”, which encourages their use.

Persons who regularly abuse inhalants risk permanent and severe brain damage and even sudden death. The vapors from these volatile chemicals can react with the fatty tissues in the brain and literally dissolve them. Additionally, inhalants can reduce the availability and use of oxygen. Acute and chronic damage may also occur to the heart, kidneys, liver, peripheral nervous system, bone marrow, and other organs. Sudden death can occur from respiratory arrest or irregular heart rhythms that are often difficult to treat even if medical care is quickly available.

The acute signs and symptoms of inhalant abuse resemble a combination of alcohol and marijuana intoxication. The user may have a dreamy or blank expression. Acute symptoms are short-lived and usually resolve within a couple of hours. However, the serious brain damage may be permanent. Physical symptoms of withdrawal from inhalants include hallucinations, nausea, excessive sweating, hand tremors, muscle cramps, headaches, chills and delirium tremens. Thirty to forty days of detoxification is often required, and relapse is frequent.

### Treatment

During the acute episode, if physically stable but emotionally distraught, the patient can be treated by “talking-down,” recognizing the possibility of hostile outbursts. As with other substance abuse problems, a drug/alcohol assessment screening by a qualified screener as soon as the ship arrives in homeport may be indicated. The long term dangers of inhalant abuse should be emphasized to the patient.

## SUMMARY

The use and abuse of alcohol and other drugs is a significant health and safety issue aboard ship. Substances of abuse have both short- and long- term effects on the health of the individual crew member. Serious medical consequences, including death, can result from unintentional overdoses, especially if more than one drug is taken at a time. Substance abuse also affects overall mission safety. Reflex times, judgment, and sensory perception are impaired with intoxication. An intoxicated crew member can endanger the ship, its mission, and the entire crew. The Captain’s leadership is critical, and the responsible behavior of everyone aboard is essential.

# CHAPTER 5

# DENTAL CARE AND EMERGENCIES


| | |
|---|---|
| Introduction | 5-1 |
| Dental Diseases that may Present as Dental Emergencies | 5-2 |
| Acute Necrotizing Ulcerative Gingivitis | 5-2 |
| Alveolar Osteitis (“Dry Socket”) | 5-3 |
| Aphthous Ulcer | 5-3 |
| Avulsed Tooth | 5-4 |
| Displaced Tooth | 5-4 |
| Caries | 5-5 |
| Fractured Tooth or Crown | 5-6 |
| Gingivitis (Acute Painful) | 5-6 |
| Periapical Abscess | 5-7 |
| Pericoronitis | 5-7 |
| Periodontal Abscess | 5-8 |
| Pulpitis | 5-9 |
| Suggested Dental Materials to have Stocked in your Sickbay | 5-10 |
| Suggested Dental Medications to have Stocked in your Sickbay | 5-11 |
| References | 5-11 |

CHAPTER

5

# DENTAL CARE AND EMERGENCIES

## INTRODUCTION

A dental emergency can easily become a major crisis out at sea. Treatment of dental emergencies is challenging under austere conditions and/or in minimally dentally equipped sick bays. Dental health and continual prevention of disease should be a constant priority. Regular dental exams and treatment can help prevent potential dental emergencies. However, recent dental treatment, such as tooth extractions, can also contribute to dental emergencies when there are post-operative complications. Thus, allow adequate healing time between dental treatment and going to sea.

Many dental problems present as pain. The first step in evaluating oral pain is to determine its cause. A differential diagnosis is important to identify or rule out active infection that could be treated, or, if untreated, could become life threatening. Many oral diseases result in infection but prompt diagnosis and treatment can help to avoid serious complications. Also, pain arising from non-dental sources such as myofascial inflammation, temporomandibular dysfunction, sinusitis, neuralgias, and the ears must always be considered in the differential diagnosis.

An organized approach to find the cause of the pain will help to make the diagnosis and determine the treatment. The following should be considered:

Location: Quadrant – Upper Left, Lower Left, Upper Right, Lower Right
Duration: Onset and length of time
Type of Pain: Sensitivity to temperature, mastication, sweets, and/or spontaneous pain
Swelling: Diffuse vs. Localized
Bleeding: Yes/No
Vitals: Normal vs. elevated/lowered Temperature, Blood Pressure, Pulse

# DENTAL DISEASES THAT MAY PRESENT AS DENTAL EMERGENCIES

The following are dental diseases that may present as dental emergencies. It is always wise to consider a radio consult with a dentist or oral surgeon when treating a dental emergency. Additional dental information can be found at the American Dental Association website at: http://www.ada.org/

## ACUTE NECROTIZING ULCERATIVE GINGIVITIS

### Assessment:

The disease is characterized by bad breath and extremely painful, ulcerated gums that are covered by a grayish film that can be wiped off with gauze. The patient complains of not feeling well. The interproximal gums (the gums between the teeth) in the lower anterior region are most often affected.

### Treatment:

Manually remove as much plaque as possible with a toothbrush. (Xylocaine gel may be placed on the gingiva before brushing. Tissue will be very sensitive with or without xylocaine.).

Stress to the patient the need for good nutrition, oral hygiene and plenty of rest. Cigarette smokers should discontinue habit. This is important since the cigarette smoke irritates the ulcers.

The use of dental floss and thorough brushing several times a day is a must!
Have patient swish with 1 cap full of chlorhexidine (Peridex) for 30 sec and expectorate, b.i.d. X 7 days

Administer analgesics, PO, for pain prn.

### Options:

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets, q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.
- Acetaminophen with codeine (Tylenol # 3), 1 - 2 tablets q 4-6 hours for severe pain.

Notify dental clinic and arrange for patient to be seen as soon as possible.

## ALVEOLAR OSTEITIS ("DRY SOCKET")

### Assessment:

A “dry socket” can be a complication of a tooth extraction or when a tooth is just “knocked out”. This is a very painful condition. It results if the clot that forms after tooth extraction is lost too early (usually 2-3 days after surgery). The extraction site (socket) will have a grayish appearance and there is usually a bad odor.

### Treatment:

Use sterile water or saline to gently irrigate the socket and remove necrotic debris.

Apply a palliative medication: Nu-gauze slightly moistened with Eugenol placed in the socket for 24 hours This should relieve the intense ache within 30 - 40 minutes. Continue to change the dressing every 24 hours for 3 days, gently irrigating the extraction site with sterile saline before replacing dressing.

Administer analgesics, PO, for pain prn.

### Options:

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.
- Acetaminophen with codeine (Tylenol # 3), 1 - 2 tablets q 4-6 hours for severe pain.

Notify dental clinic of any persistent symptoms and arrange for patient to be seen as soon as possible.

## APHTHOUS ULCER

### Assessment:

These blister-like sores usually appear on the tongue, lining of the cheeks, the floor of the mouth, and the roof of the mouth. The exact cause of them is unknown.

### Treatment:

Administer topical anesthetic, lidocaine viscous (oral preparation), 1 tablespoon four times a day (before meals and at bedtime) to provide short-term relief and to facilitate eating if patient has multiple ulcers. Have patient swirl medication in mouth for one to two minutes and expectorate.

Apply a protective dental paste (Orabase) to individual ulcers 4 times a day (after meals and at bedtime) to prevent irritation by the teeth and oral fluids.

Notify dental clinic if condition worsens or does not resolve in 7-10 days.

## AVULSED TOOTH / DISPLACED TOOTH

### Avulsed Tooth

### Assessment:

An avulsed tooth is one that has been torn or knocked out of the socket.

### Treatment:

**Immediate Action:** Examine socket area and gums for any obvious bone fragment or deformity (remove any loose deformity).

Place tooth in Save A Tooth solution (Hanks Balanced Salt Solution) for 20 min.

Reimplant tooth in socket site (If unable to reimplant leave in solution).

Place a small amount of wax on the avulsed tooth and adjacent teeth to help stabilize tooth.

**Clinical Note:** Do not scrape tooth. If Save A Tooth solution is not available, other storage solution options include the following (in order of preference): milk, saline, saliva, or sterile water.

Administer analgesics, P.O. for pain as required.

### Options:

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.

### Administer appropriate antimicrobial therapy:

- If patient is **NOT** allergic to penicillin, administer Phenoxymethyl Penicillin (Pen VK), 500 mg P.O. q.i.d. x 7 days. OR
- If patient **IS** allergic to penicillin, administer Clindamycin (Cleocin), 300 mg P.O. q.i.d. x 7 days.
- Administer tetanus toxoid 0.5 ml or immunoglobulin as indicated.

Seek definitive care based on dental consultation.

## DISPLACED TOOTH

### Assessment:

A displaced tooth is one that is traumatically moved form its normal position in the jaw but is not completely knocked out of its socket.

**Treatment:**

**Immediate Action**: Attempt to reposition tooth in socket with finger pressure and stabilize with wax if tooth is very loose.

If unable to move tooth into original position, place gauze between posterior teeth as a jaw rest.

Contact dentist to determine evacuation priority and modality

Administer analgesic P.O. for pain as required.

**Options:**

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.
- Acetaminophen with codeine (Tylenol # 3), 1 - 2 tablets q 4-6 hours for severe pain.

Seek definitive care based on dental consult.

**CARIES**

**Assessment:**

Dental decay (caries) is a disease caused by bacterial plaque that forms on the teeth. It is also known as "cavities". The appearance will vary depending on the severity. Initial caries appears as a white spot on the tooth or a halo-like dark shadow in the enamel. Caries that produce pain are usually in the advanced stages, appearing as very large dark areas or even as a wide-open hole in the tooth.

**Treatment:**

Remove any gross debris if visible with saline irrigation or floss.

Administer analgesics, P.O., for pain as required.

**Options:**

- Ibuprofen (Motrin 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.

If symptoms are relieved, make a routine scheduled appointment.

If symptoms are not relieved with analgesics, notify dental clinic and arrange for patient to be seen as soon as possible.

## FRACTURED TOOTH OR CROWN

### Assessment:

A fractured tooth will show an obvious piece of missing tooth. The fracture can involve just the enamel or can be so severe as to involve the pulp, where the nerves and blood vessels are located.

### Treatment:

### Immediate Action:

- Mix glass ionomer restorative material (Vitrebond ).
- Cover exposed area with restorative material.
- Smooth surfaces of material applied.
- Have patient bite down gently to check occlusion of teeth.
- Remove any excess material.

Administer analgesics, P.O. for pain as required.

### Options:

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.
- Acetaminophen with codeine (Tylenol # 3), 1 - 2 tablets q 4-6 hours for severe pain.

**Clinical Note:** If symptomatic after treatment, notify dental clinic and arrange for patient to be seen as soon as possible (ASAP). If asymptomatic after treatment, make a routine scheduled appointment

## GINGIVITIS (ACUTE PAINFUL)

### Assessment:

Gingivitis is red swollen, painful gums.

### Treatment:

Advise patient to maintain good oral hygiene.

Have patient swish with 1 cap full of Peridex for 30 sec and expectorate, b.i.d.. x 7 days.

Administer analgesic, P.O. for pain as required.

### Options:

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.

- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.

Notify dental clinic and arrange for patient to make a routine scheduled appointment.

## PERIAPICAL ABSCESS

### Assessment:

A periapical abscess forms in the bone at the tip of the root as a result of a dying or infected tooth. As the abscess forms, pressure form the swelling and pus formation causes the tooth to be pushed up in its socket. If the built up pus has no where to drain, the jaw may swell and the patient will have much pain.

### Treatment:

**Immediate Action:** If obvious superficial fluctuant swelling is present, induce drainage with #11 Bard Parker.

### Contact Dentist

Administer analgesics P.O. for pain as required.

### Options:

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.
- Acetaminophen with Codeine (Tylenol# 3), 1 - 2 tablets q 4-6 hours for severe pain.

### Administer appropriate antimicrobial therapy:

- If patient is NOT allergic to Penicillin, administer Phenoxymethyl Penicillin (Pen VK), 500mg P.O. q.i.d. x 7 days. OR
- If patient IS allergic to Penicillin, administer Clindamycin (Cleocin), 300 mg, P.O. q.i.d. x 7 days.

Notify dental clinic and arrange for patient to be seen as soon as possible.

## PERICORONITIS

### Assessment:

This is inflammation of the flap of tissue formed over a partially erupted tooth. The most common site is around the second or third molar (wisdom tooth).

**Treatment:**

**Immediate Action:** If possible, remove obvious plaque buildup by irrigation of the area using large amounts of saline and an irrigation syringe. Care must be used, as this area will be very tender.

Stress to the patient the need for good oral hygiene to improve the condition of the gum in spite of the pain or bleeding.

Have patient swish with 1 cap full of Peridex for 30 sec and expectorate, b.i.d. x 7 days.

Dispense an irrigation syringe to patient and show them how to irrigate area four times a day with saline solution.

Administer analgesics, P.O. for pain as required.

**Options:**

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.
- Acetaminophen with codeine (Tylenol # 3), 1 - 2 tablets q 4-6 hours for severe pain.

**Contact Dentist**

**If relief is not evident in 4 to 8 hours, administer appropriate antimicrobial therapy and notify dental clinic of any persistent symptoms:**

- If patient is **NOT** allergic to Penicillin, administer Phenoxymethyl Penicillin (Pen VK), 500 mg, P.O. q.i.d. x 7 days. OR
- If patient **IS** allergic to Penicillin, administer Clindamycin (Cleocin), 300 mg P.O. q.i.d. x 7 days.
- Notify dental clinic and arrange for patient to be seen as soon as possible.

## PERIODONTAL ABSCESS

**Assessment:**

A periodontal abscess forms in the gum tissue. It is associated with toothache, mobility, and eventually loss of the tooth.

**Treatment:**

**Immediate Action:** If possible, remove obvious plaque buildup by irrigation of the area using large amounts of saline and an irrigation syringe. Care must be used, as this area will be very tender.

Stress to the patient the need for good oral hygiene to improve the condition of the gum in spite of the pain or bleeding.

Have patient swish with 1 cap full of Peridex for 30 sec and expectorate, b.i.d. x 7 days.

Administer analgesics, P.O. for pain as required.

**Options:**

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4-6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4-6 hours.
- Acetaminophen with codeine (Tylenol # 3), 1 - 2 tablets q 4-6 hours for severe pain.

**Contact Dentist**

**Administer appropriate antimicrobial therapy:**

- If patient is **NOT** allergic to penicillin, administer phenoxymethyl penicillin (Pen VK), 500 mg, P.O. q.i.d. x 7 days.
- If patient **IS** allergic to penicillin, administer Clindamycin (Cleocin), 300 mg, P.O. q.i.d x 7 days.
- Notify dental clinic and arrange for patient to be seen as soon as possible.

**PULPITIS**

**Assessment:**

Pulpitis is inflammation of the pulp. (Pulp is the living material inside the tooth.) Pulpitis occurs when bacteria from the mouth gets into the tooth's pulp from deep caries (cavities).

**Treatment:**

**Immediate Action:** Administer analgesics, P.O. for mild or moderate pain as required.

**Options:**

- Ibuprofen (Motrin), 400 mg, 1 - 2 tablets q 4-6 hours.
- Acetaminophen (Tylenol), 650 mg, q 4 - 6 hours.
- Acetylsalicylic acid (Aspirin), 650 mg, q 4 - 6 hours.
- Acetaminophen with codeine (Tylenol # 3), 1 - 2 tablets q 4-6 hours for severe pain.

**Clinical Note:** If symptoms do not improve in 24 hours, notify dental clinic and arrange for patient to make a routine scheduled appointment.

**Administer appropriate antimicrobial therapy:**

- If patient is **NOT** allergic to penicillin, administer phenoxymethyl penicillin (Pen VK), 500 mg P.O. q.i.d. x 7 days. OR
- If patient **IS** allergic to penicillin, administer Clindamycin (Cleocin), 300 mg P.O. q.i.d. x 7 days.

Notify dental clinic and arrange for patient to be seen as soon as possible.

## SUGGESTED DENTAL MATERIALS TO HAVE STOCKED IN YOUR SICKBAY

1. 2-tray cantilever style heavy-duty plastic utility box (1)
2. Dental rope utility wax used for stabilizing loose or subluxed teeth
3. Cotton gauze rolls 50 per pkg (4)
4. 3”x 3” mixing pads 100 sheets/pkg (2)
5. Stainless steel cement spatula for mixing medicaments, cements, dressings, etc. (1)
6. Stainless steel plastic filling instrument for application of cements, dressings, etc. (1)
7. Cotton tipped applicators for application of topical anesthetic (50)
8. Wooden tongue depressors for mixing of periodontal dressing (50)
9. Topical anesthetic 20% Benzocaine gel 30gm bottles (2) - used for topical mucosal anesthetic
10. Glass ionomer restorative material such as Vitrebond standard package (1) - used for covering fractured teeth.
11. Zinc oxide/eugenol temporary cement (powder and liquid) such as Temp Bond NE (1) - used to cement loose crowns or bridges.
12. Topical oral bactericidal solution such as Peridex 16oz. Multi-dose bottle (1) - used as a topical antibacterial agent in the mouth or buccal mucosa.
13. Dry socket medicament such as Nu-gauze 1 oz size. (1) – used for packing dry sockets (alveolar osteitis)
14. Save A Tooth solution (Hanks Balanced Salt Solution) kit (1)

Prompt treatment of dental emergencies can prevent potential life threatening complications. Recognition of disease states, accurate diagnoses, and appropriate treatment will contribute to successful outcomes.

# SUGGESTED MEDICATIONS TO HAVE STOCKED IN YOUR SICKBAY:

**Analgesics:**

- Ibuprofen (Motrin), 400mg
- Acetaminophen (Tylenol), 650 mg
- Acetylsalicylic acid (Aspirin), 650 mg
- Acetaminophen with codeine, (Tylenol# 3)

**Antibiotics**:

- Phenoxymethyl penicillin (Pen VK), 500 mg
- Clindamycin (Cleocin), 300 mg

**Adjunctives**:

- Chlorhexidine Rinse

Prompt treatment of dental emergencies can prevent potential life threatening complications. Recognition of disease states, accurate diagnoses, and appropriate treatment will contribute to successful outcomes

# REFERENCES:

Delmar's Dental Assisting, by Phinney and Halstead

Clinical Procedures for Medical Assistants, by Bonewit
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# CHAPTER 6

# PERSONAL PREVENTIVE PRACTICES


| | |
|---|---|
| Introduction | 6-1 |
| Habits for Health | 6-1 |
| Habit 1: Quit Smoking | 6-1 |
| Habit 2: Think Active | 6-6 |
| Habit 3: Eat for Nutrition | 6-6 |
| Habit 4: Maintain Mental Health and Minimize Chronic Stress | 6-15 |
| Habit 5: Maximize Personal Safety | 6-17 |
| Habit 6: Manage Sufficient, Restful Sleep | 6-19 |
| Habit 7: Get Professional Preventive Care When Ashore | 6-20 |
| Summary | 6-21 |

CHAPTER

6

# PERSONAL PREVENTIVE PRACTICES

## INTRODUCTION

Health, as defined by the World Health Organization, is a state of comprehensive physical, mental and social wellbeing, and not merely the absence of disease and infirmity. Wellness is a disciplined overall pattern of good lifestyle choices leading to optimal health and quality of life; a way of life aimed at heightened vigor, fitness, and outlook. You can do a lot for yourself that will prevent illness from striking and prepare you to better deal with problems should they occur:

- Take charge of your health. You are the person most responsible for your state of health.
- Learn as much as you can. It is never too late to make changes.
- Put together a master plan.

Health is pleasurable. Good habits have their own immediate reward. If changing your behavior for health is making you feel less well, you're doing something wrong. Exercise makes you feel better. Good nutrition makes you feel better. You will even feel better if you stop smoking.

This chapter describes seven habits that promote health. The key to success is to start out slowly. Start with the most important concern and work on it first. Make changes in achievable steps that reinforce your successes and keep you motivated to continue. One healthy change leads to another. Each positive change you make, regardless of how small, improves your overall health. (These recommendations are adapted from: http://www.wellnessletter.com/)

## HABITS FOR HEALTH

### HABIT 1: QUIT SMOKING

If you don't smoke, don't start. If you smoke, stop!

There is no safe cigarette, pipe, cigar, or chew—no safe level of consumption. Tobacco contains dangerous substances; among others, tar, nicotine and carbon monoxide. Tar is a mixture of several chemicals that condense into a sticky

substance in the lungs. Nicotine is an addictive drug that is absorbed from the lungs and acts mainly on the nervous and circulatory systems. Carbon monoxide lessens the ability of red blood cells to carry oxygen throughout the body. Smoke particulates are complex chemical mixtures that settle in the mouth, throat and lungs and can cause chronic lung disease and cancer. Some brands of tobacco contain less tar and nicotine than others, but there is no such thing as a safe brand. Switching to mild cigarettes does little to help: heavy smokers adapt their smoking habits by taking longer puffs and inhaling more deeply.

If you smoke you may be damaging the health of your children. Children whose parents smoke have more diseases of the respiratory tract, including life-threatening asthma, than do children of nonsmokers.

It is never too late to quit. Most people who quit smoking will enjoy major health benefits the rest of their lives. Also, you will notice that your environment will be friendlier when you are not a smoker. A lot of the daily hassles and high costs that impair the quality of your life as a smoker go away when you stop this habit.

Here are some tips for quitting:

- **Tip 1:** Decide firmly that you really want to stop. Believe that you can. Analyze your smoking habits. Make a log (small enough to carry with you) of every cigarette you usually smoke in a 24-hour period, along with the times when you automatically light up, such as: with every cup of coffee, after every meal, or as you begin work. Prepare a chart to display your consumption of tobacco and its cost. This increasing concern with the act of smoking is a good way to prepare for the task of giving up the habit. Set a date on which you will stop smoking. Announce the date to your friends. When the date comes, stop. This is often the most successful and in the long run the least painful way to break the smoking habit. It may help to choose a time when your usual routine is being changed for another reason.
- **Tip 2:** Feel free to choose devices you can use safely as a cigarette substitute during the early days. You can expect that the physical addiction to nicotine may produce withdrawal symptoms. You may become nervous and irritable. After several days, the physical addiction can be expected to drop noticeably, while the psychological craving can sometimes last a long time. Make up your mind that there can be no turning back. If your hand seems empty without a cigarette between your fingers, hold a pencil or pen. In addition, practice the relaxation exercises that are discussed later in this chapter. Nicotine chewing gum or nicotine patches can help many people quit, and a health care worker can give you advice on how best to use these medications. Nicotine therapy is not the only medical approach to smoking cessation. A medication called bupropion can mimic some of the central nervous system effects of nicotine and act as a substitute for nicotine in

people who are trying to quit cigarettes. A doctor can prescribe bupropion for you.

- **Tip 3:** Enjoy not smoking. Do not forget that you're saving a lot of money. You can reward yourself every week or so by enjoying something nice with some of the money that would have been spent on tobacco. Enjoy your increasing stamina, the food that tastes so much better, the friends who are happier, the clothes that last longer, the skin that looks better. Extend your log to track your savings and keep a journal of the improvements you notice.
- **Tip 4:** Combine your stop-smoking program with an increase in exercise. The two changes fit together naturally. Exercise may take your mind off the smoking change. In addition, the occasional (or frequent) tedium, boredom and the need to stay awake and alert shipboard may be eased or alleviated by an active exercise program. Possible weight gain and the temporary tendency to irritability are the main negative consequences of stopping smoking. Exercise will decrease the tendency to gain weight in the early weeks after you stop smoking and can improve your mood.

Smoking begins in adolescence and under peer pressure, when the possibilities of ill health appear to be too remote to be real. The progression from an occasional cigarette to heavy smoking usually occurs so gradually that young people never quite realize when they actually become addicted. If you are a smoker and have adolescent or preadolescent children, you can set them a good example by stopping now. Also tell them the facts: smoking is a very expensive habit, in terms of both money and health; tobacco contains poisonous substances.

Resources for additional help to stop smoking are available in the CDC Guide to Smoking Cessation at: http://www.cdc.gov/tobacco/how2quit.htm.

## HABIT 2: THINK ACTIVE!

Considerable benefit can be gained with just moderate activity. All activity counts toward health. Running or walking, work-related activity, stair climbing, and dancing all contribute to a healthier lifestyle.

Start out slowly and gradually build your activity level over a period of months. This will help avoid soreness and injury. Incorporate opportunities for physical activity into your day, walk up stairs every chance you get, walk or jog at lunchtime, and take advantage of any other shipboard activity opportunities. Make off-duty time active: walk, start an exercise group class, and join in sports activities.

Staying active supports three general goals:

- Improving aerobic capacity;
- Strengthening muscle groups; and
- Increasing flexibility.

Improved **aerobic capacity** is reflected in the sustained ability of the heart and blood vessels to carry oxygen to your body's cells. Of course, running, swimming, cycling, or rowing are great, but other excellent activities for building endurance include brisk walking, in-line skating, and aerobic dance. If you haven't been exercising at all, start with a walking program. To gain noticeable health benefits, only 30 minutes of moderate physical activity such as walking, and only over the course of most days of the week, is enough. Targeting a particular heart rate probably is not very critical. Aerobic exercise shouldn't be all consuming; if you cannot talk to a companion while you're exercising, you're probably working too hard. For greater cardiovascular benefits you need to perform moderate to high-intensity aerobic exercise three to five times a week, for 30 to 40 minutes, in addition to warm-up and cool-down activities.

**Muscular fitness** consists of strength (what a muscle produces in one effort) and endurance (the ability to perform repeated muscle contractions in quick succession over a period of time). Some ships have an area that could be made into a "mini-gym." Adjustable dumbbells to which you can add or remove metal disks are good on land but can be dangerous with a ship's rocking. Explore other equipment options. You can also use exercise bands of broad elastic or exercise tubes in various sizes, which are really handy when your shipboard space is so limited as to prohibit bringing bulkier equipment. The principle of elastic band exercises is that as you stretch the elastic during the exercise, it provides continuously increasing resistance. Women should start with a pair of two- or three- pound weights or elastic equivalents, men with five- or ten- pound weights. Most equipment comes with an illustrated set of instructions that shows you recommended exercises.

Perform moderate intensity resistance workouts twice a week lasting at least fifteen minutes per session (not counting your warm-up and cool-down). Do up to 10 separate exercises that train each of the major muscle groups; start with one set then progress to two sets of 8-12 repetitions each until the point of muscle fatigue.

Many trainers recommend alternating upper body strength training days with lower body strength training days. A simple upper body strength training session could consist of the bench/chest flys for the pectorals, lateral raises for the deltoids, upright rows for the trapezius, triceps extensions, curls for the biceps, and push-ups. The next day, a simple lower body strength training session could consist of squats for the buttocks, heel raises and dips for calf muscles, straight leg lifts for the quadriceps, inner thigh leg raises, and step-ups for the buttocks, quadriceps, hamstrings, and calves. Abdominal muscles can be strengthened using curls and curl downs (negative sit-ups).

You may feel that the biggest barriers to exercising when at sea are time and space limitations. Strive to at least maintain your fitness level. You can do this by working out at your usual intensity a few times per week and for shorter durations than your regular exercise; this is much better than not exercising at all.

**Flexibility** refers to the ability of the joints to move without discomfort through their full range of motion. This varies from person to person and from joint to joint. Good flexibility is thought to protect muscles against pulls and tears. Try to perform flexibility exercises three to four times a week, or even daily, only and always after a thorough warm-up. Stretching should always be preceded by a brief five to ten minute warm-up, such as jogging in place or energetic walking. Stretching muscles while they are cold may injure them. Gently stretching before you begin aerobic exercise is useful because it makes warmed-up muscles looser and decreases the chances of injury. Stretching again after aerobic exercise can help prevent stiffness. A basic stretching session would consist of stretches of the neck, the shoulders, the arms, the calves, the spine, the outer thighs, the hips, the lumbar area, as well as the butterfly stretch for muscles in the groin, and a crossover stretch for the lower back. Each static stretch should be held at least ten seconds, working up to 20 to 30 seconds, and usually repeated three to four times.

**Ten Good Tips for your Exercise Program:**

- **Tip 1**: Set realistic exercise goals. Also set goals that are very specific. Re-adjust your goals to your strength and energy level.
- **Tip 2**: Whatever activity you pursue, don't overdo it. In general, don't increase the length or frequency of workouts, the intensity, or the distance, by more than 10 percent a week.
- **Tip 3**: The oft-repeated motto “no pain, no gain” is a myth. Exercise should require some effort, but pain is a warning sign. It usually indicates that you're not warming up sufficiently or that you're exercising too long or strenuously and are causing small muscle tears.
- **Tip 4**: Control your movements. If you are not in control, slow down. Rapid, jerky, flailing movement sets the stage for injury.
- **Tip 5**: Pay close attention to your form and posture while exercising. Keep your back aligned, your abdominal muscles contracted, buttocks tucked in, and knees aligned over the feet. When you are starting a new program, have someone else watch you to make sure your position is correct throughout your workout.
- **Tip 6**: Don't bounce while stretching. Bouncing can increase the chance of muscle tears and soreness. Instead, perform static stretches. These call for gradual stretching throughout a muscle’s full range of movement until you feel resistance. This gradually loosens muscles without straining them.
- **Tip 7**: Use good footwear. Wearing improper or worn-out shoes places added stress on your hips, knees, ankles, and feet, where up to 90 percent of all sports injuries occur. Choose shoes suited to your activity and replace them before they wear out. Aboard ship, choose shoes with rubber soles to prevent falls.

- **Tip 8**: Avoid high impact aerobics. Aerobics instructors suffer injuries to their bodies because of the repetitive, jarring movements of some routines. Substitute the marching or gliding movements of low-impact aerobics for the jolting up-and-down motion of typical aerobics routines.
- **Tip 9**: Warm up and cool down. Slowly jog for five minutes, even in place if need be, before your workout to gradually increase your heart rate, and core and muscle temperatures. Cool down after exercising with five minutes of slower-pace movement. This helps to prevent potential muscle stiffness.
- **Tip 10**: Replace fluids lost through sweating and exhalation. This is particularly important in hot weather, when you can easily lose more than a quart of water in an hour. Even if you don't feel thirsty, it is important to drink at regular intervals when exercising. Water is fine; sports drinks add a lot of calories to your nutritional intake.

Beginning an exercise program can be challenging. You are asking your body to do something it has not done for a while. Even after you have a well-established exercise program, there will be interruptions. You may be ill, you may be in a setting where it is difficult to exercise, shipboard duties may take precedence over leisure activities, or you may sustain an injury. Deconditioning is a surprisingly rapid process. Setbacks should not change your overall plan. The general rule is that it will take as long to get back to your previous level of activity as you were out. If you cannot exercise for two weeks, gradually increase your activity over a two-week period to get back to your previous level.

After your exercise program is established, make sure that it becomes a habit you want to continue for a long time. Exercise should be fun. In fact, as you get older, exercise can become your body's best friend. Once you are fit, you can take advantage of your body's increased reserve to vary your activity more than you did during the early months.

## HABIT 3: EAT FOR NUTRITION

The focus of this section is to encourage healthy eating habits rather than specific foods for each disease entity. In 1980 the United States Department of Agriculture and the United States Department of Health and Human Services first issued Nutrition and Your Health: Dietary Guidelines for Americans to provide practical dietary advice based on current research. In addition, the Dietary Guidelines Advisory Committee was established to incorporate new scientific data, and to update the guidelines. The latest revision of the Dietary Guidelines for Americans provides the basis for all Federal nutrition information and education programs for healthy Americans. They are for healthy people two years of age and over, and are not for people who need special diets because of disease and conditions that interfere with normal nutrition. Generally, these guidelines can be followed for a short period of time by people with chronic diseases until more specific advice can be

obtained from a Registered Dietitian. Persons with diabetes and other diseases require close dietary surveillance.

A healthful diet provides variety and is moderate in fat, sugars, and sodium. But it doesn't mean no-fat, no-sugar, no-sodium, no-fun meals! If one occasionally eats foods that are higher in fat, sugars, or sodium, balance them during the day with other foods that are lower. It's the total diet that counts.

These Guidelines offer tips for helping to choose foods for a healthful diet:

- **Eat a variety of foods.** The body needs more than 40 nutrients for good health. The nutrients should come from a variety of foods, not from a few highly fortified foods or supplements. A varied diet is defined below by the Food Guide Pyramid with suggested numbers of servings from vegetables, fruits, grain products, dairy products and meat/meat substitutes.
- **Maintain healthy weight.** A "healthy" body weight depends on the percentage of body weight as fat, the location of fat deposition, and the existence of any weight-related medical problems. Currently, there are no precise ways to describe healthy weight. However, using tables with suggested weight-for-height-and-age is a popular method of estimating recommended body weight. Go easy on foods that supply mainly calories - sugars, sweets, fats and oils. A number of studies suggest a possible association between excess body weight and several cancers including breast, uterine, colon, gallbladder, and prostate.
- **Choose a diet low in fat, saturated fat, and cholesterol.** Choose lean meat, fish, poultry, and dry beans and peas as protein sources. Use skim or lowfat milk, and lowfat cheese and yogurt. Use egg yolks and organ meats in moderation. Of all the dietary factors thought to affect cancer, fat has been the subject of the most research. Substantial evidence suggests that excessive fat intake increases the risk of developing cancers of the breast, colon, and prostate. The National Cancer Institute and National Cholesterol Education Program recommend reducing total fat intake to 30% or less of total calorie intake. This level of fat intake can be achieved by a change in eating habits and is also an effective way to reduce total calories.
- **Choose a diet with plenty of vegetables, fruits, and grain products**. Consuming more vegetables, fruits, breads, cereals, potatoes, pasta, rice, and dry beans and peas are emphasized especially for their complex carbohydrates, dietary fiber, and other components linked to good health. Some of the benefits from a high fiber diet may be from the food that provides the fiber, not from fiber alone, so fiber from foods is recommended over fiber obtained from supplements.

- **Use sugars only in moderation.** Limit all sugars table sugar, brown sugar, corn sweeteners, syrups, honey, and molasses. Limit the foods high in sugars, such as prepared baked goods, candies, sweet desserts, soft drinks, and fruit-flavored punches. Eat fresh fruits, unsweetened frozen fruits, or canned fruits packed in water, juice, or light syrup. Reduce the amount of sugars used in recipes.
- **Use salt (sodium) only in moderation.** Cook with only small amounts of added salt. Flavor foods with herbs, spices, vinegar, or lemon juice. Limit use of high-sodium condiments (soy sauce, steak sauce, catsup), pickles and relishes, and salty snacks. Use only moderate amounts of cured or processed meats, most canned vegetables and soups. Try "no-salt-added" or "reduced-sodium" products. Most Americans consume much more salt (and sodium) than they actually need. A reduction in salt (and sodium) intake will benefit those people whose blood pressure rises with salt intake.
- **Use alcoholic beverages in moderation.** Drinking alcoholic beverages has few, if any, net health benefits and is linked to many health problems and accidents. Therefore, individuals who drink alcoholic beverages are advised to use moderation. Moderate drinking is defined as no more than one drink per day for women and two drinks per day for men. One drink may be 12 oz. of beer, 5 oz. of wine, or 1 oz. of distilled spirits (80 proof). Heavy drinkers are at increased risk for various cancers such as oral cavity, larynx, and esophagus. These risks are greatly magnified in cigarette smokers. Pregnant women should completely avoid alcoholic beverages throughout their pregnancy. Coordination and judgment are reduced by alcohol; this can lead to serious falls and on-the-job injuries. Alcohol use also increases arguments and fights.
- **Drink water.** Try to drink a minimum of six to eight glasses of water a day. Limit caffeinated beverages, alcohol, and other diuretics; however, some data indicate that drinking tea, especially green tea, may have health benefits due to antioxidant properties.
- **Consider dietary supplements.** A dietary supplement is any product intended for ingestion as a supplement to food intake. Such supplements are vitamins, minerals, herbs, botanicals and other plant-derived substances, amino acids, food concentrates and extracts. Vitamins are chemicals, usually complex ones. For anyone who eats a reasonably balanced diet that emphasizes fruits and vegetables, developing a vitamin deficiency is unlikely. The minerals needed in a healthy diet are mostly metals and salts, such as iron, phosphorus, and calcium.

  National trends have shown decreasing intake of calcium-containing milk, yogurt and cheese. Calcium intake for many has dropped below what is desirable. Sufficient calcium intake is particularly important for women, especially those who have relatives with osteoporosis (weakness and

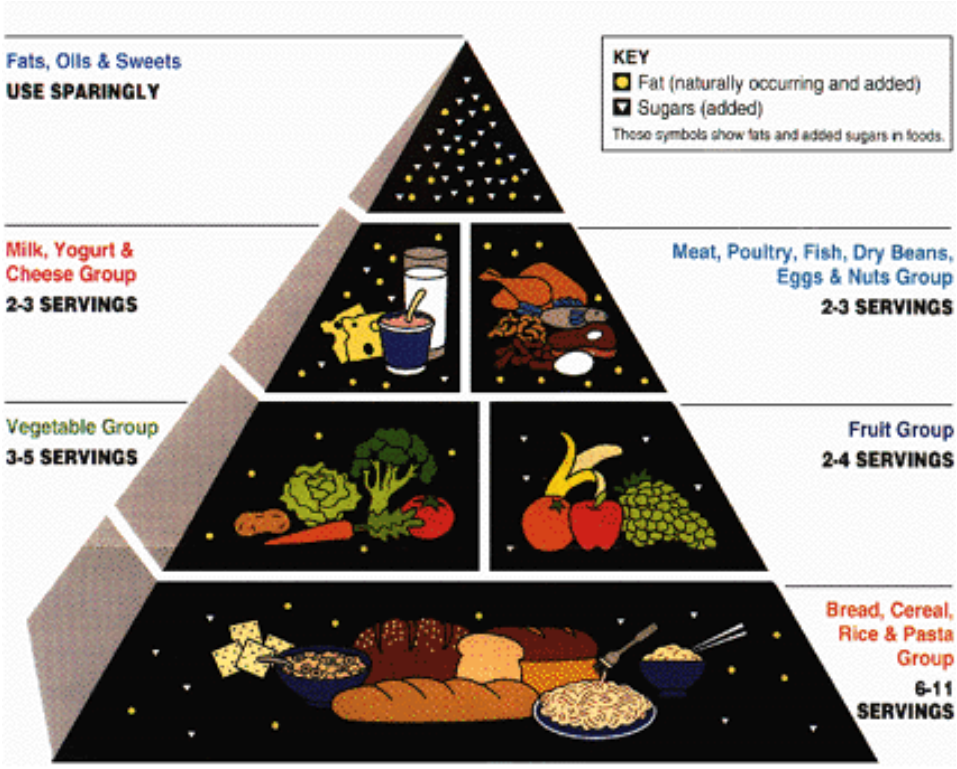
fractures of the spine and other bones). Women over age 50 should have at least 1500 mg of calcium each day. Two to three tablets of calcium supplements containing 500 mg each will usually be sufficient along with dietary sources, along with intake of vitamin D, 400 IU each day. Weight-bearing exercise is a strong stimulus for your body to absorb more calcium and to develop and maintain stronger bones.

Many other supplements, herbal preparations, and other dietary compounds are being heavily marketed to today's consumer for multiple effects including increasing strength and musculature. Serious side effects and even deaths have occurred in people taking unregulated products. Medical problems can result from the agent itself and from contaminants. (such as heart and liver complications). For example, there have been over 800 reported adverse reactions and at least 39 deaths associated with ephedra-containing substances. FDA has identified other supplements as dangerous: chaparral (liver disease), comfrey taken internally (liver disease, atropine poisoning), yohimbe (paralysis), lobelia taken internally (convulsions and death). Adverse reactions to dietary supplements are to be reported to the FDAs MedWatch system at 1-800-FDA-1088 or at: http://www.fda.gov/medwatch/.

These Guidelines don't suggest eliminating any food. Instead, they encourage wise choices from the vast and diverse supply of foods. They encourage eating an assortment of foods that will provide the nutrients needed without contributing too much fat, sugars, and sodium to the total diet. Food alone won't guarantee good health. But following these Guidelines helps people obtain nutrients needed and may reduce the risk of certain chronic diseases.

**The Food Pyramid**

The *Food Guide Pyramid* was designed to aid individuals in their selection of appropriate types and amounts of foods that could form the foundation of an adequate diet. The overall message from the Food Guide Pyramid is to select foods that together give all the essential nutrients one needs to maintain health without eating too many calories or too much fat. More information is available at: http://www.nal.usda.gov:8001/py/pmap.htm.




USDA and the US Department of Health and Human Services

The *Pyramid's* pieces represent both the basic five food groups (levels 1-3) and the fats, oils, and sweets commonly found in the diet (level 4). The size of the food group piece corresponds to the recommended number of daily servings from that food group. For example, the Bread group is the largest in size and it has the greatest number of recommended servings. The triangle (sugars) and circle (fats) shapes scattered throughout the Pyramid's pieces represent the added and naturally occurring fat and oil in certain foods, as well as the added sugars. Many triangles and/or circles in a food group piece mean that many of the foods in that category contain a large amount of naturally occurring or added fat and oil, and/or added sugars.

Starting at the bottom of the Pyramid and working up, selections from the food groups should be combined to form a healthful diet. It is recommended that daily choices consist of:

- Level 1: Choose plenty of grains. Bread, cereal, rice, and pasta form the broad base of the Pyramid and should make up the bulk of the daily diet. Whole grains are recommended.

- Level 2: Also important is an ample variety of fruits and vegetables. Fruits and vegetables are full of the vitamins, minerals, carbohydrates, and fiber needed to stay healthy.
- Level 3: Add a moderate amount of lower-fat/lean foods from the Milk-Group and the Meat-Group. Dairy products provide calcium that is important for a healthy skeleton in everyone. Foods from the Meat-Group provide needed protein, iron, and zinc.
- Level 4: Go easy on selections of food containing fats, oils, and sweets. In moderation, these foods can fit into a healthful diet. They should not, however, replace the nutrient-rich food choices found throughout levels 1, 2, and 3.

The Food Guide Pyramid lists a range for number of servings in each of the five food groups. The number of servings that are right depends on how many calories needed, which in turn depends on a person's age, sex, size and activities. Almost everyone should have at least the lowest number of servings in the ranges.

The table below tells how many servings of each major food group are needed for one's calorie level. It also describes the total grams of fat recommended for each calorie level; the Dietary Guidelines recommend that Americans limit fat in their diets to 30 percent of calories. This includes the fat in the foods selected as well as the fat used in cooking or added at the table

**How Many Servings Do You Need Each Day?**

| | Women and some older adults | Children, teen girls, active women, most men | Teen boys & active men |
|---|---|---|---|
| **CALORIE LEVEL*** | **About 1,600** | **About 2,200** | **About 2,800** |
| **Bread Group** | **6** | **9** | **11** |
| **Vegetable Group** | **3** | **4** | **5** |
| **Fruit Group** | **2** | **3** | **4** |
| **Milk Group** | **2-3**** | **2-3**** | **2-3**** |
| **Meat Group** | **2 for a total of 5 ozs.** | **2 for a total of 6 ozs.** | **3 for a total of 7 ozs.** |

* These are the calorie levels if low fat, lean foods from the 5 major food groups are chosen and foods from the fats, oils, and sweet group are used sparingly.

** Women who are pregnant or breast-feeding, teenagers and young adults to age 24, need 3 servings.

Note that the amount consumed at one time may be more than one serving. For example, a dinner portion of spaghetti, depending upon amount, could count as 2 or 3 servings.

**What Counts As 1 Serving?**

| **Bread, Cereal, Rice & Pasta Group** | **Vegetable Group** | **Fruit Group** |
|---|---|---|
| 1 slice of bread | ½ cup of chopped raw or cooked vegetables | 1 piece of fruit or melon wedge |
| ½ cup of cooked rice or pasta | 1 cup of leafy raw vegetables | 3/4 cups of juice |
| ½ cups of cooked cereal | | ½ cup of canned fruit |
| 1 oz of ready to eat cereal | | 1/4 cup of dried fruit |
| **Milk, Yogurt & Cheese Group** | **Milk, Poultry, Fish, Dry Beans, Eggs, & Nut Group** | **Fats, Oils & Sweets** |
| 1 cup of milk or yogurt | 2 ½ to 3 ozs of cooked lean meat, poultry or fish | *Limit calories from these*, especially if you need to lose weight |
| 1 ½ ozs of natural cheese | Count ½ cup of cooked beans, or 1 egg, or 2 tbsp. of peanut butter as 1 oz of lean meat | |
| 2 ozs of process cheese | | |

The following are "Pyramid Pointers," selection tips for a better diet. The most effective way to moderate the amount of fat and added sugars in the daily diet is to cut down on "extras" - foods in the sixth food group (fats, oils, and sweets). Also, choose lower fat and lower sugar foods from the other five food groups.

**Bread, Cereal, Rice, and Pasta Group - 6 to 11 servings**

- To get fiber, choose several servings a day of foods made from whole grains.
- Choose foods made with little fat or sugars, such as bread, English muffins, rice, and pasta. (Regular cake-like muffins are high in fat.)
- Go easy on the fat and sugars added as spreads, seasonings, or toppings.
- When preparing pasta, stuffing, and sauce from packaged mixes, omit or use only half the butter or margarine suggested; if milk or cream is called for, use skim or low fat milk.

**Vegetable Group - 3 to 5 servings**

- Different types of vegetables provide different nutrients. Eat a variety daily.
- Include dark-green leafy vegetables and legumes (beans) daily. They are very good sources of vitamins and minerals. Legumes provide protein and can be used in place of meat.
- Go easy on fat added to vegetables at the table or during cooking. Spreads or toppings, i.e. butter, mayonnaise, and salad dressing count as fat. Use low fat salad dressing.

**Fruit Group - 2 to 4 servings**

- Choose fresh fruits, fruit juices, and frozen, canned, or dried fruit. Go easy on fruits canned or frozen in heavy syrups and sweetened fruit juices.
- Eat whole fruits often. They are higher in fiber than fruit juices.
- Count only 100 percent fruit juices as fruit. Punches and most fruit "drinks" contain only a little juice and lots of added sugars.

**Milk, Yogurt, and Cheese Group - 2 to 3 servings**

- Choose skim milk and nonfat yogurt. They are lowest in fat.
- 1 ½ to 2 ounces of cheese and 8 ounces of yogurt count as a serving from this group because they supply the same amount of calcium as 1 cup of milk. However, they provide 2-3 times the number of calories as skim milk.
- Choose "part skim" or low fat cheeses when available and lower fat milk desserts, like ice milk or low fat frozen yogurt. Read labels.

**Meat, Poultry, Fish, Dry Beans, Eggs, & Nuts Group - 2 to 3 servings**

- Choose lean meat (lowest in fat); poultry without skin; fish, dry beans and peas.
- Prepare meats in low fat ways: trim away all the visible fat; remove skin from poultry; broil, roast, or boil these foods instead of frying them.
- Nuts and seeds are high in fat, so eat them in moderation.

**Fats, Oils, and Sweets - Use sparingly**

- Go easy on fats and sugars added to foods in cooking or at the table; butter, margarine, gravy, salad dressing, sugar, and jelly. Avoid candy, sweet desserts and soft drinks.

Food provides the energy needed daily; and, this energy is in the form of calories. There are three calorie sources that the body needs every day: carbohydrate, fat, and protein. They each play a different role in the body and people need different amounts of each. The calories not used will be converted into body fat whether from carbohydrate, fat, or protein. To maintain a constant weight eat the approximate number of calories used.

By improving the food choices made daily, improvements in health are possible by understanding calories and the forms they take. The following is essential to know:

**Carbohydrate (CHO):**

- Foods: Bread, cereal, rice, grains, pasta, vegetables, and fruits
- In the body: Carbohydrates are used as the main fuel source.

- Share of calories: 55-60%. (Current U.S. diet: 46%)
- Provides: 4 calories/gram.

**Fat:**

- Foods: Butter, margarine, salad dressing, fatty meats, oils, pastries, cookies, crackers, whole milk, hot dogs, french fries, chocolate, nuts, and ice cream.
- In the body: Fat provides energy and is easily converted to body fat if one eats too much.
- Share of calories: Not more than 30%. (Current U.S. diet: 38%)
- Provides: 9 calories/gram.

**Protein:**

- Foods: Meat, fish, poultry, eggs, milk, legumes, and beans.
- In the body: Protein is used mostly for structure.
- Share of calories: 10-12%. (Current U.S. diet: 15%)
- Provides: 4 calories/gram.

Notice that if one eats the same amounts (by weight) of carbohydrate, protein and fat, the fat will provide over twice as many calories. A low fat diet means essentially being able to eat more food and be more satisfied with fewer calories.

Foods provide a range of nutrients in addition to fats, carbohydrates and proteins. Fiber, the building block of fruits, vegetables and whole grains, aides digestion and other functions. Vitamins are substances needed in minute (but essential) quantities to facilitate all the body processes. For example, vitamin A, found in yellow and orange vegetables, is needed for vision, but too much can be toxic. Minerals, such as iron, zinc, and copper, are also needed in minute amounts – but are poisonous in large quantities. Too little vitamin C can cause scurvy, an illness that historically killed thousands of mariners when fresh fruits and vegetables were not available at sea. Learning this, sailors carried limes on long voyages; thus the term “limeys” for sailors evolved.

Nutrients are used for a variety of vital processes. These processes can be broadly classified as follows: 1) maintenance and repair of body tissues, 2) regulation of the thousands of complex chemical reactions that occur in cells, 3) provision of energy for muscle contraction, 4) conduction of nerve impulses, 5) secretion by glands, 6) synthesis of the various compounds that become part of the body's structures, 7) growth, and 8) reproduction. The sum of these processes in which the energy and nutrients from food are made available to and utilized by the body is referred to as metabolism.

### Special Diets

Persons with digestive disorders and other illnesses may need special diets. Some of these include:

- Clear Liquid: Clear fluids and foods that are liquid at body temperature, such as broth, gelatin, popsicles and juices. Avoid milk and milk products.
- Full Liquid: Foods that are liquid or liquefy at body temperature such as strained meat and vegetables, cream soups, ice cream, custards, and hot cereals.
- Soft Diet: Foods that are mildly flavored, non-gas forming and easily chewed, such as tender meat, cooked carrots, canned fruit, and pudding. Avoid hard foods, fried foods, most raw fruits and vegetables, and very coarse breads and cereals.

When there is injury in the mouth or oral cavity area or when the patient is nauseous and vomiting, give a clear liquid diet. When there is acute abdominal pain present, and until a diagnosis is established, it is always best to provide only clear liquids or give the patient nothing by mouth. Full liquids and soft diets can be given as the patient improves. Other special diets include bland diet (without spices or difficult to digest foods), low-sodium diet, and diabetic diet (carbohydrates are carefully measured).

## HABIT 4: MAINTAIN MENTAL HEALTH AND MINIMIZE CHRONIC STRESS

### Recognizing Stress

Any substantial change in your routine, including changes for the better as well as changes for the worse, will make demands on mental and emotional resources. Research has shown that as stresses accumulate, an individual becomes increasingly susceptible to physical illness, mental and emotional problems, and accidental injuries.

When threatened or stressed our bodies mount a chemical response, and this response affects our emotions and outlook. Stress mechanisms, it must be remembered, play a dual role. The rise in anxiety and hormone levels that accompanies stress is essential and protective. All organisms have to experience stress and adjust to it. But, when extreme, the physical effects of stress can stop protecting us and begin to damage us.

### Identify the Sources of Chronic Stress

Various versions of stress questionnaires are available that help you identify the most serious sources of stress in your life. Questionnaires provide a list of questions with points indicated for each YES answer. The higher your total score the more stressful your life.

The following questions are adapted from the American Medical Association Family Medical Guide, and from the Wisconsin Department of Workforce Development at: http://www.dwd.state.wi.us/dwd/publications/2242_28a.htm. This web site provides more information on this stress screen.

Questions related to stress during the past six months:

- Has your spouse/life partner died?
- Have you become divorced or separated from your partner?
- Has a close relative other than spouse/partner died?
- Have you been jailed?
- Have you been hospitalized because of injury or illness?
- Have you married, or reconciled with your spouse/partner after a separation?
- Have you been fired, or have you retired?
- Has your immediate family gained a new member?
- Has there been a major change in the health of a close member of your family?
- Have you found out you are soon to become a parent?
- Are you experiencing any sexual difficulties?
- Has a close friend died?
- Have your finances become markedly better or worse?
- Have you changed jobs?
- Is there anyone at home or at work you dislike strongly?
- Have any of your children moved out?
- Is trouble with in-laws causing tension within your family?
- Have you had an important personal success?
- Have you gone back to school?
- Has your spouse retired?
- Have you had jet lag at least twice?
- Have you moved, or done extensive remodeling of your house?
- Are you having serious trouble with your boss?
- Have you taken on a substantial debt?

### Practice Relaxation Techniques

When you are under stress, your muscles tighten, causing neck, back or chest pain and making breathing harder. Paying attention to breathing helps muscles relax. Lie or sit comfortably, close your eyes, visualize a “happy” scenario, and breathe in slowly, hold your breath for a few seconds, and exhale slowly through your nose. Continue this technique for five minutes or more at a time, as often as you need it. Long walks, warm baths, meditating, or just sitting quietly can also be soothing.

Discipline yourself to think positively and look to the future. Focus on one issue at a time. Create a plan to address problems. Break down tasks and problems into individual, easily accomplished steps, so that things do not seem overwhelming. Stress sometimes arises from frequent changes in routine; this may be a particular problem shipboard. Establishing and sticking to daily routines can help.

Medications are available to relieve anxiety, and antidepressants can help with low moods. However, these medications have side effects and can be overused or abused. Some are habit-forming and addictive. Follow your physician's advice. Remember, the drugs may temporarily relieve your symptoms, but the underlying cause of stress and anxiety still needs to be identified and addressed directly.

People who become addicted to alcohol often begin to drink to relieve stress and anxiety. Alcoholic beverages add many calories to your diet without supplying nutrients. Alcohol is a widely used and a widely abused psychoactive drug. If you drink alcohol, do so in moderation. (For women, this is defined as one drink a day. For men, two drinks a day. A drink is defined as 12 ounces of beer, four ounces of wine, or 1 oz. of spirits.) Be aware of the dangers of binge drinking (and getting drunk) when on liberty. Drunkenness can lead to serious falls and fights, and impaired judgment can lead to unsafe sexual practices and infectious disease such as HIV/AIDS.

Resources on where to find help, and answers to frequently asked questions about alcohol use, are given at: http://www.niaaa.nih.gov/faq/faq.htm

## HABIT 5: MAXIMIZE PERSONAL SAFETY

The sea can be a dangerous working environment. Make certain personal protective devices (“life jackets” and other safety equipment) are available. Hypothermia is a common cause of death at sea, especially if one is tossed to sea during an emergency. Always have appropriate cold weather gear easily accessible, and in adequate supply for the entire crew. Educate all crew members about its location and use. Have practice drills.

The shipboard setting poses some particular risks and is often a more demanding physical environment than being on land. Any kind of impairment of your mental and physical functioning can put one at higher risk overall on shipboard. Over-the-counter medications that make one drowsy or sleepy such as antihistamines for allergies,

sleeping pills, and cough medications can adversely affect judgment and physical functioning. Always maintain an ongoing awareness of physical and mental capabilities and take that into account when you plan work and non-work activities each day. The primary responsibility to yourself and those around you is not to take risks when under the influence of alcohol or other drugs or medications. Use common sense.

Avoid exposure to sunlight. Use sun block with sun protection formula (SFP) 15 or higher, more if you are fair-skinned. Wear hats and sunglasses to protect your eyes. These last points are particularly important on board ship where sun exposure can occur for many hours of the day and in relatively unprotected situations.

When on liberty, always wear seat belts: everyone in the moving vehicle, driver and passengers, front seat and back, should always wear seat belts.

### Personal Hygiene

Personal hygiene protects the health of each individual and the entire crew. The health of a seaman depends, in part, on his own efforts to maintain habits of cleanliness and neatness.

The importance of regular hand washing cannot be overemphasized. To prevent disease spread by fecal contamination, hands must always be washed immediately after urinating or defecating. Crewmembers should also wash their hands before eating.

In cold weather, hands are less likely to chap if the skin is dried thoroughly. A little petroleum jelly, cold cream, or hand lotion rubbed into the skin after washing may help to prevent chapping and resulting skin infections.

Personal cleanliness includes good care of the skin, hair, nails, mouth and teeth, and proper maintenance of clothing, towel, and other personal gear. A daily bath or shower, particularly in hot weather or after working in hot compartments, is conducive to good health and lessens the possibility for infection. Clean clothing also helps prevent disease.

Care of the mouth and teeth including toothbrushing after meals and daily use of dental floss, are essential to prevent gum disease, infection, and tooth decay. Before brushing natural teeth, any partial dentures should be removed and carefully cleaned with a brush and mild soap or special denture cleanser. Unclean removable dentures spread bacteria to remaining natural teeth. Full artificial dentures should be cleaned regularly after meals, and particularly at bedtime, to remove food residue, which can cause moth odor and encourage infection.

Hair should be shampooed frequently. Short hair can be easier to maintain and can be safer working around equipment with moving parts. Cleanliness aboard ship can

be encouraged by providing sufficient hot water in convenient wash places to facilitate cleansing. Installation of a laundry and drying room for washing clothes also contributes to cleanliness.

Each member of the crew should use their own towel and be responsible for their personal cleanliness. Wet towels should be dried and should not be folded and stowed. Dirty towels should be laundered as soon as possible and not allowed to accumulate. Single-use paper towels are satisfactory only if waste receptacles are provided and used.

**Sex**

Sexual contact with an infected person can result in a range of diseases – from treatable diseases like gonorrhea, syphilis, and chlamydia to life-threatening ones like HIV/AIDS. Many persons have these diseases and don't know it. Thus, they can unknowingly transmit them to you. You can have sex with someone who seems healthy and still get a disease – a disease as serious as HIV/AIDS.

The risk of acquiring and transmitting sexually transmitted diseases (including HIV) is higher among certain groups: those who have had homosexual sex, prostitutes, injection drug users who share needles, and individuals who have had sex with numerous partners or sex with anyone in a high-risk group.

The only sure way to prevent sexually transmitted diseases is not to have sexual contact. The risk can be reduced (but not eliminated) by having only one partner and using condoms. Be sure you know the proper way to use condoms – unprotected penetration and the exchange of any sexual fluids can transmit disease.

## HABIT 6: MANAGE SUFFICIENT, RESTFUL SLEEP

Sleep requirements differ widely. If you always wake up after only five or six hours and find it impossible to drop off again, do not worry; this is probably as much sleep as you need. There is generally no cause for concern if you usually wake up briefly once or twice during the night. However, seven to eight hours of sleep is the average needed to sustain maximal mental and physical performance indefinitely. Needing an alarm to awaken, morning sleepiness, and afternoon tiredness and drop in performance may be signs of insufficient sleep.

If you have trouble falling asleep, remember that coffee, tea, colas, chocolate, many cold medicines and pain relievers, and diet aids contain caffeine or related stimulants, which can keep you awake and prevent restful sleep. Switch to decaffeinated beverages. Avoid caffeine in the afternoon and evening. Reduce your consumption of alcohol. Many people drink alcohol at night to help them sleep though this may not be a restful sleep. Practice a good sleep routine. Lie down to sleep at the same time every night and rise at the same time in the morning. Try to schedule work hours so you can be on a regular schedule.

### Watch Standing

Standing watch can have a severe impact on sleep and wake cycles. Most of us appear to do better if we stay on a consistent cycle. Studies have shown that people who work variously changing shifts are not as well rested as those on regular daily schedules.

People who stand watch at night must use extra care to stay rested. Sleep during daytime hours is often disrupted by noise, light or by natural circadian (day-night) cycles. This results in more of the less useful stage 1 sleep. If you stand watch at night, uninterrupted daytime sleep is critical. Avoid the temptation to stay awake during the day, too.

When standing watch at night, be aware that in more risky situations or undertaking more difficult physical activities, extra concentration is needed. Working in darkness adds to the challenge. An individual is more likely to fall asleep in a boring or non–stimulating environment and while performing a monotonous task. If an emergency suddenly develops at sea, immediately gaining peak performance can be difficult. Tasks that are likely to be very sensitive to sleep impairment include monitoring data displays for critical levels, monitoring for quality control purposes, and sentry or patrol duties. It can be difficult for the individual to accurately assess his/her limitations when sleep impaired and may be unable to do the complex task of objectively judging one's own performance.

## HABIT 7: GET PROFESSIONAL PREVENTIVE CARE WHEN ASHORE

Most prevention is personal, but to take good care of yourself you will sometimes require professional help. Increasingly, the periodic checkup is being used not so much for the detection of disease as for the opportunity to counsel about health habits, so that we can do a better job of personal disease prevention. The periodic screening tests in several specific areas are important, as recommended by the U.S. Preventive Services Task Force.

More information is available at: http://www.ahrq.gov/clinic/prevnew.htm

Try to arrange to take these tests when you are ashore:

- Blood pressure checked at least every other year or so.
- Women over age 20, have a cervical Pap smear taken every year or two; after three normal tests, have a Pap smear every 3 years from then on.
- Get annual breast exams done by a medical professional.
- Mammography is a yearly screening procedure recommended for women after age 40 (with high risk) or age 50.
- Skin should be examined annually for any suspicious moles or other lesions.

- Prostate cancer screening with a digital rectal exam is recommended for men annually starting at age 50. Some groups recommend the blood test, prostate specific antigen (PSA).
- After age 50, tests for colorectal cancer (digital rectal exam and occult blood test) are advisable on an annual basis. In addition, sigmoidoscopy every 5 years or colonoscopy every 10 years is recommended.
- Serum cholesterol and triglycerides should be measured at intervals of five years, and more frequently if total cholesterol is elevated.
- Fasting blood glucose (diabetes screening) should be checked every 3 years; earlier in those with a strong family history.
- A dental checkup should be done every 6 to 12 months.
- Vision and hearing should be checked annually.

Immunizations have had far greater impact on health than all other health services put together. Follow immunization recommendations and maintain a written record.

Techniques for estimating your future health risk, termed health risk appraisal or health assessment, have been developed. A questionnaire is completed about lifestyle and health habits. Responses are entered into a computer to estimate the likelihood of developing medical problems such as heart disease and cancer. These estimates can help you shape your own personal health program. Remember that the results are estimates and the predictions are only averages: some people will do better than the estimates predict, and others worse. Your actual risks will depend upon any changes you make in your health habits. The health risk assessment itself provides no health benefits unless it results in positive changes in your behavior. If you participate in such an assessment it should be part of a program that not only identifies risk but also helps you to make positive changes.

## SUMMARY

Make a lifetime habit of health and wellness!

# CHAPTER 7

# WOMEN'S HEALTH


| | |
|---|---|
| Introduction | 7-1 |
| Heart Health | 7-1 |
| Cancer Screening | 7-2 |
| Breast Self-Examination | 7-2 |
| Information on Diseases, Symptoms and Conditions | 7-3 |
| Vaginal Discharge and/or itching | 7-3 |
| Tampon Safety | 7-4 |
| Bleeding Between menstrual Periods | 7-4 |
| Missed Periods | 7-5 |
| Difficult Menstrual Periods | 7-5 |
| Menopause | 7-5 |
| Osteoporosis | 7-6 |
| Management of Recurrent Urinary Tract Infection | 7-7 |
| Sexual Contact | 7-8 |
| Violence Against Women | 7-8 |
| Nutrition and Women's Special Needs | 7-9 |
| Calcium | 7-9 |
| Iron | 7-9 |
| Calories and Weight Control | 7-10 |
| Eating Disorders | 7-10 |
| Preventive Health Care: Your Role | 7-11 |

CHAPTER

7

# WOMEN'S HEALTH

## INTRODUCTION

Prevention is important for everyone, especially if at sea and distant from sophisticated medical care. Further, while at sea, knowing self-care techniques for for common symptoms and ailments becomes particularly valuable. This chapter deals with issues that primarily affect women.

### Heart Health

A woman's risk of heart disease begins to rise around the time of menopause, over time approaching the risk faced by a man. The risk of heart disease may be minimized through the following life-style recommendations made by the American Heart Association:

- Stop smoking.
- Make sure resting blood pressure is controlled to less than 140/90.
- Lower cholesterol to less than 200, with weight loss, dietary modification, physical activity and medication if necessary.
- Lower LDL cholesterol to less than 100.
- Lower fasting blood sugar to les than 126, with weight loss, dietary modification, physical activity and medication if necessary.
- Lower body weight to within 10% of appropriate body weight for height.
- Get appropriate amounts of aerobic physical activity.

For post-menopausal women, talk to your doctor about the potential risks and benefits of taking estrogen supplements, and taking supplements of vitamin E, vitamin C, and folate.

For additional resources see the American Heart Association and National Heart, Lung and Blood Institute sites:

http://www.americanheart.org/

http://www.nhlbi.nih.gov/health/hearttruth/

## Cancer Screening

As recommended by the American Cancer Society, if you're a woman over age 20, you should have a Pap smear taken every year or two; after three normal tests, have a Pap smear every 3 years from then on. You should practice breast self-examination monthly. Any suspicious change should be checked out with a doctor. Mammography is a yearly screening procedure recommended for women after age 40 (with high risk) or age 50. After age 50, tests for colorectal cancer (digital rectal exam and occult blood test) are advisable on an annual basis. In addition, sigmoidoscopy every 5 years or colonoscopy every 10 years is recommended. Your skin should be examined annually for any suspicious moles or other lesions.

## Breast Self-Examination

Most women will have lumps in their breasts at some time during their lives. Regular self-examination of your breasts improves your chances of avoiding serious consequences. Self-examination should be done monthly, just after the menstrual period, when the breasts have fewer hormone-related lumps. Self-examination is an absolute necessity for a woman with naturally lumpy breasts. If there is a new lump or change in an existing lump, seek immediate medical care.

To do a self-exam, examine your breasts in the mirror, first with your arms at your sides and then with both arms over your head. The breasts should look the same. Watch for any change in shape or size, or for dimpling of the skin. Occasionally a lump that is difficult to feel will be quite obvious just by looking.

Next, while lying flat, examine the left breast using the inner fingertips of the right hand and pressing the breast tissue against chest wall. Don't pinch the tissue. Your left arm should be behind your head when you examine the inner half of the left breast and down by your side when you examine the outer half. Don't neglect the part of the breast underneath the nipple, plus the part that extends away from the breast toward the underarm. A small pillow under the left shoulder may help. Repeat this process on the opposite side. Many doctors recommend repeating the self-examination in the shower, where smooth, slightly soapy skin can make lumps easier to detect.

Breast self-examination is a supplement to other screening techniques for breast cancer. Mammography is strongly recommended yearly after age 50, or after age 40 for women with a history of breast cancer in their family. An annual examination by a health care worker is also of benefit. These guidelines are based upon current technology. It is very likely that the diagnostic value of these and newer tests will continue to improve, while the associated cost, risk, and discomfort will diminish.

# INFORMATION ON DISEASES, SYMPTOMS AND CONDITIONS

## Vaginal Discharge and/or Itching

**Normal vaginal secretions** are thin, clear, and painless. Abnormal vaginal discharge is common, however, and could have many causes. Bacteria, common viruses, and other microbes can infect the vagina and cause discharge. These infections are rarely serious, but they are bothersome. Usually the body will fight off the infection by itself. Make an appointment with the doctor if the discharge lasts more than a few weeks. Laboratory tests allowing microscopic evaluation of vaginal fluid are required for a correct diagnosis. A variety of effective drugs are available for treating vaginal infections.

**Bacterial vaginosis** is the most common cause of vaginal symptoms among women of childbearing age. Bacterial vaginosis is due to a change in the balance among different types of bacteria in the vagina. The primary symptom is an abnormal vaginal discharge with a fishy odor. Treatments are available from a medical practitioner if the condition does not correct itself.

**Trichomoniasis** is a very common vaginal infection caused by a single-celled protozoan parasite. The symptoms in women include a heavy, yellow-greenish vaginal discharge, discomfort during intercourse, and painful urination. Irritation of the female genital area, and on rare occasions, lower abdominal pain, also can be present. A woman and her partner both need to be treated to eliminate this infection.

**Vulvovaginal candidiasis**, sometimes referred to as candidal vaginitis, monilial infection, or vaginal yeast infection, is a common cause of vaginal itching, burning and irritation. Candidiasis is caused by an overabundance or overgrowth of yeast cells (primarily *Candida albicans*) that normally colonize in the vagina. Several factors are associated with symptomatic candidiasis in women, including pregnancy, diabetes mellitus, and the use of oral contraceptives or antibiotics. The discharge is typically described as cottage-cheese-like in nature, although it may vary from watery to thick in consistency.

See your doctor the first time you have symptoms of candidiasis, to make sure of the diagnosis. Treating yourself for candidiasis when the problem may be caused by other types of microorganisms may make the symptoms worse.

If you have recurring candidiasis, talk to your doctor about treating yourself with a non-prescription medication like miconazole or clotrimazole that is available over-the-counter.

**Non-infectious irritation or allergic symptoms** can be caused by spermicides, vaginal hygiene products, detergents, and fabric softeners. In some healthy

women, vaginal discharge may be present during ovulation and may become so heavy that it raises concern.

**Tampon Safety**

The U.S. Food and Drug Administration tracks all medical devices, including tampons, for safety issues. Tampons enjoyed a quiet history until about 1980. That is when a sharp rise was reported in the number of cases of toxic shock syndrome, a serious and sometimes fatal disease caused by toxin producing strains of *Staphylococcus aureus*. Tampons containing super-absorbent materials were withdrawn from the market, and the epidemic subsided.

The following tips help avoid tampon problems: follow package directions for insertion, choose the lowest absorbency for your flow, change tampons at least every six to eight hours, and know the warning signs of toxic shock syndrome.

Symptoms of toxic shock syndrome can be hard to recognize because they mimic the flu. If you experience sudden high fever, vomiting, diarrhea, dizziness, fainting, or a rash that looks like sunburn during your menstrual period or a few days after, seek medical attention right away. Also, if you are wearing a tampon, remove it immediately. With proper treatment, patients usually get well in two or three weeks.

**Bleeding Between Menstrual Periods**

The interval between two menstrual periods is usually free of bleeding or spotting. Many women sometimes experience some bleeding, however, even though no serious conditions are present. If the bleeding is frequent, even if only spotting, you should seek medical evaluation as it could be an early sign of a potentially serious problem. If the bleeding is severe, or if you may be pregnant, seek immediate medical care.

Women using an intrauterine birth control device are particularly likely to have occasional spotting. Taking birth control pills may also cause spotting between periods. Such spotting is probably not a cause for concern.

If you are pregnant and have bleeding along with abdominal pain, consult a physician immediately. This may be a sign of a pregnancy developing outside the uterus (ectopic pregnancy), which requires immediate surgery. It may also be a sign of a uterine miscarriage. However, some women may have some bleeding throughout a normal pregnancy.

## Missed Periods

Pregnancy is often the first thought when a menstrual period is late or missed, but there are many other possible reasons. Obesity, excessive dieting, strenuous exercise, and stress may cause missed or irregular periods. Diseases such as those of the thyroid gland, which upset the hormonal balance of the body, may also be the cause of missed periods, but this is only infrequently the case. As women approach menopause it is also normal for periods to be irregular before they stop completely. Emotional as well as physical stress may result in irregular periods. Indeed, anxiety over possible pregnancy may cause a missed period, thereby increasing the anxiety even further.

Testing for pregnancy has become faster, easier and more sensitive in the last decade. Home test kits that provide a reasonable degree of accuracy are now available and may show a positive result as early as two weeks after the missed period. Because a positive test result is less likely to be incorrect than a negative one, the rule is to believe the positive test, but not to trust a negative test without confirmation from a second test with a negative result.

## Difficult Menstrual Periods

Adverse mood changes with fluid retention and bloating are very common in the days just prior to a menstrual period. Such problems are difficult to treat and are a result of normal hormonal variations during the menstrual cycle. Only if problems are severe, or recur for several months, is medical attention required. Salt tends to hold fluid in tissues. If you can reduce the salt in your diet and increase your water intake (to “wash” out the salt), you may have less swelling and less fluid retention. For menstrual cramps use ibuprofen or naproxen. Most products designed for menstrual cramps now have ibuprofen as the main ingredient.

## Menopause

During menopause, the ovarian production of female hormones decreases. Most women can tell if they are approaching menopause because their menstrual periods start changing. Menstrual periods usually become lighter and irregular, then stop altogether. Some menopausal symptoms mentioned below can start long before menstrual periods become irregular. Some women report the symptoms as early as their mid-30s.

Hot flashes, sudden feelings of intense heat lasting two or three minutes, are an annoying symptom of menopause. They can happen anytime during the day but are most common in the evening or at night. For most women, hot flashes gradually decrease over about two years and eventually disappear altogether. Staying cool is the key to treating hot flashes. Keep the home or office cool,

dress lightly and in layers, and drink plenty of water. Reduce your consumption of alcohol and caffeine, and maintain a regular exercise program.

Sleep is often affected by menopause, whether it is interrupted by hot flashes or there is difficulty falling asleep. You may feel sleepless in the middle of the night, but not uncomfortable. Strategies for coping with insomnia include regular exercise, keeping a regular routine and time for going to sleep, not drinking alcohol before going to sleep, eliminating caffeine and practicing relaxation techniques.

Many women also have mood swings during menopause. Irritability may be triggered by sleep deprivation. Again, make physical activity part of your schedule; exercise can improve mood and make you feel better about yourself.

Vaginal dryness and frequent urinary tract infections may occur after menopause. Urine leakage may become a problem as muscle support for the bladder and urethra weakens. Consider using vaginal creams to help with vaginal dryness; discuss this with your doctor if non-prescription creams are not helping.

After menopause, a few women are aggravated to find they have trouble remembering things or concentrating. These symptoms may be caused by changes in estrogen levels. Not getting enough sleep or having sleep disrupted may also contribute to memory and concentration problems.

Hormone replacement therapy (HRT) has been prescribed for menopause-related changes and to reduce the risk of osteoporosis that may develop in the years following menopause because of estrogen depletion. HRT also has some risks. Any woman considering HRT needs to discuss the potential risks and benefits of this therapy with her physician.

There are at least two major health conditions that can develop in the years after menopause because of the decrease in hormone production that occurs: coronary artery disease and osteoporosis. Not all women develop heart disease or osteoporosis. Many more things affect your heart and your bones than estrogen alone. For example, exercise improves both your cardiovascular system and bone strength.

### Osteoporosis

Osteoporosis is a condition in which the density of bone is diminished. To understand this abnormal condition requires some knowledge of normal bone structure and physiology. Bone is living tissue, and is in a constant state of flux. Microscopically, bone consists of a mixture of connective tissue, blood vessels, specialized cells, and the crystals of calcium salts, which give hardness and strength. At about the age of 30 or 35 we will possess all the bone-mass we shall ever have, and from then on, there is a slow overall loss, because bone

formation does not keep pace with bone loss. When bone is being absorbed faster than it is being deposited, the skeleton is weakened. Spontaneous fractures may occur. Pain, particularly spinal pain, may become severe. The fractures may lead to deformity. This is the disease called "osteoporosis."

However, a number of research projects involving experimental preventive measures have been reported in the current medical literature. Some of this research may prove to be helpful in reducing the risk of osteoporosis, or perhaps preventing it altogether: (1) in women, administering estrogen before bone loss becomes severe to prevent the progress of the disease; (2) exercising to prevent bone loss; (3) taking calcium supplements and vitamin D, in order to limit excessive bone loss; and (4) for both men and women, giving up smoking and alcohol.

Regular exercise and adequate dietary calcium are important to prevent osteoporosis. Physical activity will help keep bones strong. Menopausal women should take in about 1500 mg of calcium per day, about as much as in a quart of skim milk, with 400 IU of vitamin D. You can use a calcium supplement if you cannot get enough from dairy products.

**Management of Recurrent Urinary Tract Infection**

The best-known symptoms of bladder infection are pain or burning on urination, frequent and urgent urination, and blood in the urine. Bladder infection is far more common in women than it is in men. The female urethra, the tube leading from the bladder to the outside of the body, is only about one-half inch long in women, a short distance that makes it easy for bacteria to travel upward to reach the bladder. Most bacteria that cause bladder infections come from the rectal area, and sometimes bladder infection is related to sexual activity.

Many bacterial bladder infections will respond to self-care. Treat as soon as you note symptoms. Drink a lot of fluid (up to a gallon or more of fluid in the first 24 hours). Drink acidic fruit juices, since putting more acid into the urine may help bring relief. Cranberry juice is the most effective.

If relief is not substantial within 24 hours and complete in 48 hours, seek medical attention. If you are experiencing vomiting, back pain, or chills, this is not typical of bladder infection but more likely indicates kidney infection. This requires immediate evaluation and more vigorous treatment by a medical professional.

# SEXUAL CONTACT

Sexual contact can be a fulfilling part of an intimate relationship. It can also lead to life-threatening diseases such as HIV/AIDS. The following increase risks of sexually transmitted disease:

- Multiple sexual partners

- Sexual partner(s) you do not know well
- Bisexual partner
- IV drug use in partner
- Use of alcohol or drugs that decrease judgment on when to say “No.”
- Prostitution
- Partner with HIV/AIDS
- Sex without condom or “female condom” (remember any exchange of sexual fluids can transmit disease)
- Partner with history of sexually transmitted diseases

Sexual contact can also result in unanticipated pregnancy. Contraception must be obtained and used before contact. Many female contraceptives are available including birth control pills and patches, intrauterine devices and vaginal diaphragms. These require a physician’s prescription so they must be obtained (and used) before they are needed. Also, remember that contraceptives prevent pregnancy. They are not designed to prevent sexually transmitted diseases. Take additional precautions to prevent sexually transmitted diseases.

## VIOLENCE AGAINST WOMEN

Violence against women does not discriminate: it spans all races, ages, and economic boundaries. One in four women report that they have been victims of family violence or stalking. These acts of violence take several forms, including child abuse, intimate partner violence, sexual assault and abuse, rape, incest, and elder abuse. It is a leading cause of injury for American women between the ages of 15 and 54.

Women who have been assaulted or who are victims of abuse often feel too ashamed and afraid to report the incident. Violence against women in any form is a crime, regardless of who committed the violent act. It is always wrong, whether the perpetrator is a family member, colleague, acquaintance, or stranger.

If you or someone you know has been sexually, physically, or emotionally abused, seek help from other family members and friends or the employee assistance program. Reach out for support for counseling. Learn how to minimize your risk of becoming a victim of sexual assault or sexual abuse before you find yourself in an uncomfortable or threatening situation.

Violence among crew requires involvement of the chain of command, and should be reported to legal authorities when appropriate.

Resources for help:
U.S. Department of Justice

http://www.ojp.usdoj.gov/vawo/

World Health Organization
http://www.who.int/violence_injury_prevention/vaw/infopack.htm

National Advisory Council on Violence Against Women
http://toolkit.ncjrs.org/

If you need immediate help call the national domestic violence hotline at

1-800-799-7233.

# NUTRITION AND WOMEN'S SPECIAL NEEDS

Several components of the diet have special importance for women: calcium, iron, calorie-energy balance, and weight control.

**Calcium**

Both women and men need enough calcium to build maximum bone mass during their early years of life. Low calcium intake appears to be one important factor in the development of osteoporosis. Women are at greater risk than men of developing osteoporosis. Osteoporosis is a condition in which progressive loss of bone occurs with aging, leaving the bones susceptible to fracture. The most important time to get a sufficient amount of calcium is when bone growth and consolidation are occurring. That continues until approximately age 30-35. The foods that top the calcium charts including milk, cheese, and ice cream are not lightweights in calories and fat, so choose the low-fat or fat-free versions. Other good sources of calcium include salmon, tofu, certain vegetables including broccoli, legumes such as peas and beans, seeds, and nuts. Supplementation may also be advisable.

**Iron**

For pre-menopausal women, the recommended daily allowance for iron is 15 to 18 mg per day, more than the recommended daily allowance of 0-10 mg for men. Pre-menopausal women need more of this mineral because they lose iron during menstruation. Without enough iron, deficiency anemia can develop. Animal products such as red meat are sources of iron. Dietary iron from plant sources is found in peas and beans, spinach and other green leafy vegetables, and iron fortified cereal products. The addition of even relatively small amounts of foods containing Vitamin C substantially increases the total amount of iron absorbed from a meal. After menopause, a woman's need for iron is lower and unlikely to require supplementation.

**Calories and Weight Control**

Cutting back on calories is not always the answer to losing weight. You cannot cut back on calories and eat all the necessary nutrients if you are taking in fewer than 1500 calories per day. The fewer the calories you eat, a harder it is to meet

your daily nutritional requirements. Look to eliminate any sources of “empty” calories from your diet, such as sodas and other sweetened beverages, sugary snack foods, added fats, and alcohol. If you find you are gaining weight, you need to think of not only cutting calories, but also about increasing physical activity. Physical activity burns calories, increases the proportion of lean to fat body mass, and raises your metabolism.

**Eating Disorders**

Two common types of eating disorders are anorexia nervosa and bulimia. Some behaviors associated with these conditions are starvation, self-induced vomiting, excessive exercise, and the misuse of laxatives or diuretics. Symptoms of eating disorders are fear of gaining weight, food obsessions, avoidance of meals, rigid dieting and fasting, rigorous exercise, weight loss, unusual mood states (such as confusion, lethargy, and depression), swollen salivary glands, erosion of dental enamel (from stomach acid dissolving teeth during vomiting), dark circles under the eyes, low self-esteem, declining performance, and lack of menstrual periods. Eating disorders are extremely damaging to the mind and body, and can be fatal if untreated. Long-term consequences include damage to the heart, liver, kidneys and bone.

The female athlete triad is found among female athletes trying to balance the pressures of body image and peak physical performance. The triad is marked by inadequate food intake, menstrual abnormalities (irregular or absent cycles), and bone loss (weak bones at increased risk for fractures). In well-nourished women, heavy physical training may not result in amenorrhea (three or more missed menstrual cycles), which may reflect malnutrition. This triad can even be fatal if left untreated. It is key to establish a healthy relationship between food, body image and performance.

Seek medical help if you suspect you have an eating disorder of any type. Resources to help with eating disorders are found at:

National Institute of Mental Health

http://www.nimh.nih.gov/publicat/eatingdisordersmenu.cfm

# PREVENTIVE HEALTH CARE: YOUR ROLE

Guidelines for nutrition, exercise for optimal health and performance, and preventive care are largely the same for women and men. Special issues for women have been addressed in this chapter. You are responsible, in large part, for managing your own preventive care. Your medical practitioner should be your partner in wellness and prevention. Ask about screening tests based on your individual risk factors. Maintain a healthy weight. Get regular exercise. Choose a diet low in animal fat and sodium, and rich in fruits, vegetables, whole grains, and

low-fat or nonfat dairy products. Keep alcohol consumption moderate: no more than one drink daily for a woman. If you are a smoker or heavy drinker, seek counseling, and cut back or quit. Take care of your teeth. Do self-exams of your breasts as well as your skin. Be aware that sexual activity can transmit disease, and modify behavior accordingly.

Medical experts agree that good health depends on use of preventive services and good personal lifestyle habits.

# CHAPTER 8

## RESPONDING TO POTENTIAL BIOLOGICAL, CHEMICAL AND NUCLEAR/RADIOLOGICAL TERRORISM AGENTS


| | |
|---|---|
| Introduction | 8-1 |
| History of Biological Agents | 8-1 |
| Biological Agents | 8-2 |
| Distinguishing Between Natural and Intentional Disease Outbreaks | 8-2 |
| Bacterial Agents | 8-6 |
| Anthrax | 8-6 |
| Brucellosis | 8-6 |
| Glanders and Melioidosis | 8-7 |
| Plague | 8-7 |
| Q Fever | 8-8 |
| Tularemia | 8-9 |
| Viral Agents | 8-9 |
| Smallpox | 8-9 |
| Venezuelan Equine Encephalitis (VEE) | 8-10 |
| Viral Hemorrhagic Fevers (VHF) | 8-10 |
| Biological Toxins | 8-11 |
| Botulinum | 8-11 |
| Ricin | 8-12 |
| Staphylococcal Enterotoxin B (SEB) | 8-12 |
| T-2 Mycotoxins | 8-13 |
| Chemical Agents | 8-14 |
| Mustard | 8-14 |
| Nerve Agents | 8-14 |
| Cyanide | 8-15 |
| Detection | 8-16 |
| Decontamination | 8-16 |
| Patient Isolation Precautions | 8-18 |
| Standard Precautions | 8-18 |
| Airborne Precautions | 8-18 |
| Droplet Precautions | 8-18 |
| Contact Precautions | 8-19 |
| Nuclear Radiation | 8-19 |
| Types Of Radiation | 8-19 |
| Limiting Exposure | 8-21 |
| Medical Treatment | 8-21 |
| Personal Protective Equipment (PPE) and Radiation | 8-22 |
| Effects Of Exposure | 8-25 |
| Glossary Of Medical Terms | 8-26 |
| Summary | 8-27 |

CHAPTER 8

# RESPONDING TO POTENTIAL BIOLOGICAL, CHEMICAL AND NUCLEAR/RADIOLOGICAL TERRORISM AGENTS

## INTRODUCTION

Chemical and biological agents differ in several important ways. Chemical agents are typically manmade through the use of industrial chemical processes. Biological agents are either replicating agents (bacteria or viruses) or nonreplicating materials (toxins or physiologically active proteins or peptides) that can be produced by living organisms. Nuclear/radiological threats primarily derive from the release of ionizing radiation from a deliberate attack with a nuclear or radiological bomb. The first section of this chapter will focus on biological agents, the second part on chemical agents. The chapter ends with a discussion of potential nuclear and radiological exposures.

Note that there is significant overlap in the symptoms caused by and initial responses to biological and chemical agents. Wherever appropriate, discussion will describe approaches to both biological and chemical agents.

## HISTORY OF BIOLOGICAL AGENTS

The use of biological agents and efforts to make them more useful as a weapon affecting humans has been recorded numerous times throughout history. In the early 6th century BC, Assyrians were documented to have poisoned their enemies' wells with rye ergot. In 1346, plague broke out within the Tarter Army during their siege of Kaffa. They hurled the plague stricken corpses over the city walls and introduced an epidemic among the defenders. Some historians feel this to be the initiation of the Black Death pandemic that spread throughout Europe.

It is felt that the English provided smallpox-laden blankets to Indians loyal to the French during the French and Indian War from 1754 to 1767. The Japanese started an ambitious biological warfare program in 1937. A plague epidemic in China and Manchuria in 1940 followed reported over-flights by Japanese airplanes releasing plague-infested fleas.

In 1978, a Bulgarian exile named Georgi Markov was attacked in London by an umbrella device that injected a ricin laden pellet into his leg. He died several days later. Over many years, various countries have been documented to have some type of offensive biological development program. It is therefore prudent that we be aware of the most likely agents to be used and what we can do to counter and treat these agents.

## BIOLOGICAL AGENTS

Bioterrorism is a threat in the marine environment, as it is on land. Thus, it is important for persons afloat to be familiar with potential threats, and especially critical for those responsible for health care underway to have an understanding of the medical aspects of bioterrorism.

Medical defense against and treatment for biological terrorism is an unfamiliar area to most providers of health care during peacetime. However, effective medical countermeasures are available against many of the bacteria, viruses, and toxins that might be used as biological weapons against people. The goal of this section is to serve as a reference and to help the reader develop an understanding of the biological threats and the medical supplies useful in defending against these threats.

The global biological terrorism threat is serious, and the potential for devastating casualties is high for certain biological agents. However, with appropriate use of medical countermeasures either already developed or under development, the illness and death can be greatly reduced.

## DISTINGUISHING BETWEEN NATURAL AND INTENTIONAL DISEASE OUTBREAKS

The potential mechanisms of release of a biologic agent are many. Contaminated food or water sources are certainly a possibility. As much as possible, food and water should be obtained from reputable and secure sources. Biologic agent exposure could come in the form of an aerial release from an aircraft, from an exploded munition or from an aerosolizing device. Crewmembers should be wary of suspicious persons in or around the ship and of suspicious packages, parcels, etc. However, in spite of precautions taken, it is likely that the initial exposure to the biological agent will be undetected.

Therefore, a covert biological agent attack may first be apparent if many patients become sick with similar symptoms due to the released disease agent. However, many diseases caused by weaponized biological agents present with nonspecific clinical features that could seem like other, more common diseases. Table 1 identifies factors that may suggest there has been a biologic attack. While a helpful guide, these features can also be present in a naturally occurring disease outbreak. Conversely, a bioterrorist attack may have none of these features.

- The presence of an unexpected or unusual disease
- The presence of a large epidemic with a similar disease or syndrome
- More severe disease than is usually expected for a specific biologic agent or failure to respond to standard therapy
- Unusual routes of exposure for a biologic agent, such as the inhalational route for diseases that normally occur through other exposures
- A disease that is unusual for a given geographic area or transmission season
- Disease normally transmitted by a vector that is not present in the local area
- Multiple simultaneous or serial epidemics of different diseases in the same population
- A single case of disease by an uncommon agent (smallpox, some viral hemorrhagic fevers)
- A disease that is unusual for an age group
- Unusual strains or variants of organisms
- Higher attack rates in those exposed in certain areas, such as inside a building if released indoors, or lower rates in those inside a sealed building if released outside
- Disease outbreaks of the same illness occurring in noncontiguous areas
- A disease outbreak with an impact on animals as well as humans
- Intelligence of a potential attack, claims by a terrorist or aggressor of a release, and/or discovery of munitions or tampering

**Table 1. Features that may be Present with a Biologic Warfare or Terrorist Attack**

The following guiding principles should be followed whether a biological or chemical attack is suspected.

**I. Maintain an index of suspicion**. The shipboard health-care provider must always suspect that a disease may be due to biological weapons. An early suspicion is needed for a rapid diagnosis that is essential for the early treatment needed to save the patient's life.

**II. Protect Thyself**. Before you approach a potential biological casualty, you must first take steps to protect yourself - using physical, pharmacological, and/or immunologic tools. Physical protection is often a protective mask such as a HEPA-filter or simple surgical mask. These provide adequate protection against most biological (although not against chemical) threats. Pharmacological protection includes the pre- and/or post-exposure administration of antibiotics and/or antidotes. Immunological protection involves vaccines, which are generally not available for most bio-terrorism diseases. Deliberate physical protection against chemical agents

involves more sophisticated Personnel Protective Equipment (PPE). PPE is more fully described in the section on Nuclear Radiation.

**III. Assess the Patient**. First use the "ABC's" – airway, breathing and circulation. The initial "ABC's" assessment begins before decontamination and should be brief. A patient history may include questions about illnesses in other personnel, the presence of unusual food and water sources, vector exposure, immunization history, travel history, occupational duties, and personal protection status. Physical exam should focus on the pulmonary (lung) and neuromuscular (nerve and muscle) systems, as well as any unusual dermatologic (skin) and vascular (blood vessel/heart) findings

**IV. Decontaminate as Appropriate**. The incubation period of biological agents makes it unlikely that victims of a bio-terrorism attack will present for medical care until days after an attack, when the need for decontamination is past. If decontamination is needed, simple soap and water bathing will usually suffice. Certainly, standard decontamination solutions (such as hypochlorite), typically employed in cases of chemical agent contamination, would be effective against all biological agents (more information is provided in the decontamination section of this chapter). In fact, even 0.5% bleach can kill anthrax spores, the hardiest of biological agents. Exercise caution when using caustic substances, especially on human skin.

**V. Establish a Diagnosis**. Following decontamination (where warranted), the focus is making a diagnosis. Diagnostic specimens should be obtained from representative patients and these should be sent to the clinical laboratory. Nasal swabs (important for culture and PCR (a test for exposure to certain biologic agents), even if you are unsure which organisms to test for), blood cultures, serum, sputum cultures, blood and urine for toxin analysis, throat swabs, and environmental samples should be considered and obtained, if possible.

Without laboratory confirmation, a presumptive diagnosis must be made on clinical grounds. Chemical and biological terrorism diseases can be generally divided into those that present "immediately" with little or no incubation period (principally the chemical agents) and those with a longer incubation period (principally the biological agents). Moreover, bio-terrorism diseases are likely to present as one of a limited number of clinical syndromes. Plague, tularemia, and Staphylococcal Enterotoxin B (SEB) disease all may present as pneumonia. Botulism and Venezuelan Equine Encephalitis (VEE) may present with peripheral and central neuromuscular findings, respectively. Table 2 provides additional information.

| RESPIRATORY | |
|---|---|
| **Rapid-Onset** | **Delayed-Onset** |
| ▪ Nerve Agents<br>▪ Cyanide<br>▪ Mustard<br>▪ SEB Inhalation (biologic) | ▪ Inhalational Anthrax<br>▪ Pneumonic Plague<br>▪ Pneumonic Tularemia<br>▪ Q Fever<br>▪ SEB Inhalation<br>▪ Ricin Inhalation<br>▪ Mustard (chemical) |
| **NEUROLOGICAL** | |
| **Rapid-Onset** | **Delayed-Onset** |
| ▪ Nerve Agents<br>▪ Cyanide | ▪ Botulism-peripheral symptoms<br>▪ VEE-CNS symptoms |

**Table 2. Diagnostic Matrix: Chemical & Biological Casualties.**

**VI. Render Prompt Treatment**. Treatment is usually most effective during the incubation period, before the patient is sick. Treatment of the suspected diagnosis, even if not "proven" by the laboratory, is often indicated. Table 3 lists diseases requiring prompt therapy. Persons with respiratory disease, such as patients with undifferentiated febrile illnesses who might have early anthrax, plague, or tularemia, may also be treated immediately. Doxycycline (an antibiotic), for example, is effective against most strains of *B. anthracis* (anthrax), *Y. pestis* (plague), and *F. tularensis* (tularemia) as well as against *C. burnetii* (Q fever) and the Brucellae (brucellosis). The antibiotics ciprofloxacin, and tetracyclines and fluoroquinolones might also be considered. Beginning such therapy just "buys time" for a definitive diagnosis, it is not a substitute for a precise diagnosis.

| RESPIRATORY | |
|---|---|
| **Rapid-Onset** | **Delayed-Onset** |
| ▪ Cyanide | ▪ Inhalational Anthrax<br>▪ Pneumonic Plague<br>▪ Pneumonic Tularemia |
| **NEUROLOGICAL** | |
| **Rapid-Onset** | **Delayed-Onset** |
| ▪ Nerve Agents | ▪ Botulism-peripheral symptoms |

**Table 3. Chemical and Bio-Terrorism Diseases Potentially Requiring Prompt Empiric Therapy.**

**VII. Practice Good Infection Control**. Standard precautions provide adequate protection against most infectious diseases, including potential bio-terrorist agents. Anthrax, tularemia, brucellosis, glanders, Q-Fever, VEE, and the toxin-mediated diseases are not generally contagious (transmitted person to person), and victims can be safely managed using standard precautions. Under certain circumstances, however, transmission-based precautions would be warranted. For example,

smallpox victims should, wherever possible, be managed using airborne precautions. Pneumonic Plague warrants the use of droplet precautions, and certain Viral Hemorrhagic Fevers (VHFs) require contact precautions. (see section on "Patient Isolation Precautions")

**Note: Hypochlorite solution (household bleach), and other disinfectants, are toxic. Keep away from eyes and sensitive tissues.**

**VIII. Alert the Proper Authorities**. The ship's captain should immediately be notified of any suspected terrorist-related illnesses and/or injuries. In addition, the port authorities, law enforcement and public health officials at the next port of entry must be notified.

# BACTERIAL AGENTS

Bacteria generally cause disease in human beings and animals by invading host tissues or by producing toxins (poisons). Many disease-causing bacteria utilize both mechanisms. Bacterial diseases usually respond antibiotic therapy. Under special circumstances some types of bacteria can transform into spores. The spore of the bacterial cell is more resistant to cold, heat, drying, chemicals and radiation than the bacterium itself. Spores are a dormant form of the bacterium and like the seeds of plants, they can germinate (grow) when conditions are favorable.

### ANTHRAX (INHALLATION)

**Signs and Symptoms**: Incubation period is generally 1-6 days, although longer periods have been noted. Fever, malaise, fatigue, cough and mild chest discomfort progresses to severe respiratory distress with shortness of breath, sweating, stridor, bluish-tinged skin, and shock. Death typically occurs within 24-36 hours after onset of severe symptoms.

**Diagnosis**: Physical findings are non-specific. A widened mediastinum may be seen on Chest X-ray (CXR) in later stages of illness. The organism is detectable by Gram's stain of the blood and by blood culture late in the course of illness.

**Treatment**: Although effectiveness may be limited after symptoms are present, high dose (often intravenous) antibiotic treatment with ciprofloxacin, doxycycline or penicillin should be undertaken. Supportive therapy may be necessary.

**Prophylaxis**: Oral ciprofloxacin or doxycycline for known or imminent exposure. An FDA-licensed vaccine is only available for military personnel at the present time.

**Isolation and Decontamination**: Standard precautions for healthcare workers. This disease is not transmissible person-to-person. Environmental decontamination can be accomplished with a 0.5% hypochlorite solution.

### BRUCELLOSIS

**Signs and Symptoms**: Illness typically presents with fever, headache, muscle pain, joint pain, back pain, sweats, chills, and generalized malaise. Other manifestations

include depression, mental status changes, and vertebral osteomyelitis. Fatalities are uncommon.

**Diagnosis**: Diagnosis requires a high index of suspicion, since many infections present as non-specific febrile illnesses or are asymptomatic.

**Treatment**: Antibiotic therapy with doxycycline and rifampin or doxycycline in combination with other medications (such as an aminoglycoside) for six weeks is usually sufficient in most cases.

**Prophylaxis**: No human vaccine is available against brucellosis. Antibiotic prophylaxis should be considered for high-risk exposure to a confirmed biological terrorism exposure.

**Isolation and Decontamination**: Standard precautions are appropriate for providers of healthcare. Person-to-person transmission has been reported via tissue transplantation and sexual contact. Environmental decontamination can be accomplished with a 0.5% hypochlorite solution.

## GLANDERS AND MELIOIDOSIS

**Signs and Symptoms**: Incubation period ranges from 10-14 days after inhalation. Onset of symptoms may be abrupt or gradual. Inhalational exposure produces fever (common in excess of 102$^{o}$F.), shaking chills, sweats, muscle pain, headache, chest pain with respirations, enlarged cervical lymph nodes, enlarged liver and/or spleen, and generalized papular/pustular eruptions. Acute pulmonary disease can progress and result in bacteria in the blood and acute blood poisoning. Both diseases are almost always fatal without treatment.

**Diagnosis**: Chest x-ray may show seed-like lesions, small multiple lung abscesses, or infiltrates involving upper lungs, with solidification and cavitation.

**Treatment**: Therapy will vary with the type and severity of the clinical presentation but may include sulfonamides, tetracyclines and chloramphenicol. Patients with localized disease may be managed with oral antibiotics for a duration of 60-150 days. More severe illness may require intravenous therapy and more prolonged treatment.

**Prophylaxis**: Currently, no pre-exposure or post-exposure prophylaxis is available.

**Isolation and Decontamination**: Standard Precautions for healthcare workers. Person-to-person airborne transmission is unlikely, although secondary cases may occur through improper handling of infected secretions. Contact precautions are indicated while caring for patients with skin involvement. Environmental decontamination using a 0.5% hypochlorite solution is effective.

## PLAGUE

**Signs and Symptoms**: Pneumonic plague begins after an incubation period of 1-6 days, with high fever, chills, headache, malaise, followed by cough (often with blood),

progressing rapidly to shortness of breath, stridor, bluish-tinged skin, and death. Gastrointestinal symptoms are often present. Death results from respiratory failure, circulatory collapse, and a bleeding abnormality. Bubonic plague, featuring high fever, malaise, and painful lymph nodes (buboes) may progress spontaneously to the septicemic form (septic shock, thrombosis, DIC) or to the pneumonic (lung) form.

**Diagnosis**: Suspect plague if large numbers of previously healthy individuals develop severe pneumonia, especially if coughing of blood is present. Definitive diagnosis requires culture of the organism.

**Treatment**: Early administration of antibiotics is critical, as pneumonic plague is invariably fatal if antibiotic therapy is delayed more than 1 day after the onset of symptoms. Choose one of the following: streptomycin, gentamicin, ciprofloxacin, or doxycycline for 10-14 days. Chloramphenicol is the drug of choice for plague meningitis.

**Prophylaxis**: For asymptomatic persons exposed to a plague aerosol or to a patient with suspected pneumonic plague, give doxycycline 100 mg orally twice daily for seven days or the duration of risk of exposure plus one week. Alternative antibiotics include ciprofloxacin, tetracycline, or chloramphenicol. No vaccine is currently available for plague prophylaxis. The previously available licensed, killed vaccine was effective against bubonic plague, but not against aerosol exposure.

**Isolation and Decontamination**: Use Standard Precautions for bubonic plague, and Respiratory Droplet Precautions for suspected pneumonic plague. *Y. pestis* can survive in the environment for varying periods, but is susceptible to heat, disinfectants, and exposure to sunlight. Soap and water is effective if decontamination is needed. Take measures to prevent local disease cycles if vectors (fleas) and reservoirs (rodents) are present.

### Q FEVER

**Signs and Symptoms**: Fever, cough, and chest pain with respirations may occur as early as ten days after exposure. Patients are not generally critically ill, and the illness lasts from 2 days to 2 weeks.

**Diagnosis**: Q fever is not a clinically distinct illness and may resemble a viral illness or other types of atypical pneumonia. The diagnosis is confirmed by a blood test.

**Treatment**: Q fever is generally a self-limited illness even without treatment, but tetracycline or doxycycline should be given orally for 5 to 7 days to prevent complications of the disease. Q fever endocarditis (rare) is much more difficult to treat.

**Prophylaxis**: Antibiotic prophylaxis begun too early during the incubation period may delay but not prevent the onset of symptoms. Therefore, tetracycline or

doxycycline should be started 8-12 days post exposure and continued for 5 days. This regimen has been shown to prevent clinical disease.

**Isolation and Decontamination**: Standard Precautions are recommended for healthcare workers. Person-to-person transmission is rare. Patients exposed to Q fever by aerosol do not present a risk for secondary contamination or re-aerosolization of the organism. Decontamination is accomplished with soap and water or a 0.5% chlorine solution.

### TULAREMIA

**Signs and Symptoms**: Ulceroglandular tularemia presents with a local ulcer and regionally enlarged lymph nodes, fever, chills, headache and malaise. Typhoidal tularemia presents with fever, headache, malaise, substernal discomfort, prostration, weight loss and a non-productive cough.

**Diagnosis**: Clinical diagnosis. Physical findings are usually non-specific. Chest x-ray may reveal a pneumonic (lung) process, enlarged mediastinal lymph nodes or pleural effusion (fluid in the lung spaces). Routine culture is possible but difficult. The diagnosis can be established retrospectively by a blood test.

**Treatment**: Administration of antibiotics (streptomycin or gentamicin) with early treatment is very effective.

**Prophylaxis**: A two-week course of tetracycline is effective as prophylaxis when given after exposure.

**Isolation and Decontamination**: Standard Precautions for healthcare workers. Organisms are relatively easy to render harmless by mild heat (55° C for 10 minutes) and standard disinfectants.

## VIRAL AGENTS

Viruses are the simplest microorganisms and consist of a nucleocapsid protein coat containing genetic material, either RNA or DNA. Antibiotics do not have an effect on viruses. This chapter covers three types of viruses that could potentially be employed as bio-terrorism agents: smallpox, alphaviruses (e.g., VEE), and viral hemorrhagic fever (VHF) viruses.

### SMALLPOX

**Signs and Symptoms:** Clinical manifestations begin acutely with malaise, fever, shaking chills, vomiting, headache, and backache. 2-3 days later lesions appear which quickly progress from macules to papules, and eventually to pustular vesicles. They are more abundant on the extremities and face, and develop synchronously.

**Diagnosis:** Clinical suspicion is based on the presentation of the above symptoms.

**Treatment:** At present there is no effective medication therapy, and treatment of a clinical case remains supportive.

**Prophylaxis:** Immediate vaccination or revaccination should be undertaken for all personnel exposed.

**Isolation and Decontamination:** Droplet and Airborne Precautions for a minimum of 17 days following exposure for all contacts. Patients should be considered infectious until all scabs separate and quarantined during this period. Strict quarantine of asymptomatic contacts should be done. If quarantine is not possible, require contacts to check their temperatures daily. Any fever above 38° C (101° F) during the 17-day period following exposure to a confirmed case would suggest the development of smallpox. The contact should then be isolated immediately until smallpox is either confirmed or ruled out and remain in isolation until all scabs separate.

## VENEZUELAN EQUINE ENCEPHALITIS (VEE)

**Signs and Symptoms:** Incubation period 1-6 days. Acute systemic febrile illness with encephalitis develops in a small percentage (4% children; < 1% adults). Generalized malaise, spiking fevers, shaking chills, severe headache, pain in the eyes with exposure to light, and muscle pain for 24-72 hours may be seen. Nausea, vomiting, cough, sore throat, and diarrhea may follow. Full recovery from malaise and fatigue takes 1-2 weeks. The incidence of CNS disease and associated morbidity and mortality would be much higher after a bio-terrorism attack.

**Diagnosis:** Clinical diagnosis. Physical findings are non-specific.

**Therapy:** Treatment is supportive only. Treat uncomplicated VEE infections with analgesics to relieve headache and myalgia. Patients who develop encephalitis may require anticonvulsants and intensive supportive care to maintain fluid and electrolyte balance, ensure adequate ventilation, and avoid complicating secondary bacterial infections.

**Prophylaxis:** There is no post-exposure prophylaxis.

**Isolation and Decontamination:** Patient isolation and quarantine is not required. Standard Precautions augmented with vector control while the patient is febrile. There is no evidence of direct human-to-human or horse-to-human transmission. The virus can be destroyed by heat (80oC for 30 min) and standard disinfectants.

## VIRAL HEMORRHAGIC FEVERS (VHF)

**Signs and Symptoms:** VHFs are febrile illnesses that can feature flushing of the face and chest, petechiae, bleeding, edema, abnormally low blood pressure, and

shock. Malaise, muscle pain, headache, vomiting, and diarrhea may occur in any of the hemorrhagic fevers.

**Diagnosis:** Definitive diagnosis rests on specific viral lab tests. Significant numbers of personnel with a hemorrhagic fever syndrome should suggest the diagnosis of a viral hemorrhagic fever.

**Treatment:** Intensive supportive care may be required. Antiviral therapy with ribavirin may be useful in several of these infections (available only as Investigational New Drug under protocol).

**Prophylaxis**: The only licensed VHF vaccine is yellow fever vaccine. Prophylactic ribavirin may be effective for Lassa fever, Rift Valley fever, and Crimean-Congo Hemorrhagic Fever (CCHF) (available only as IND under protocol).

**Isolation and Decontamination:** Contact isolation, with the addition of a surgical mask and eye protection for those coming within three feet of the patient, is indicated for suspected or proven Lassa fever, CCHF, or filovirus (Ebola, Marburg) infections. Respiratory protection should be upgraded to airborne isolation, including the use of a fit-tested HEPA-filtered respirator, a battery powered air-purifying respirator, or a positive pressure supplied air respirator, if patients with the above conditions have prominent cough, vomiting, diarrhea, or hemorrhage. Decontamination is accomplished with hypochlorite or phenolic disinfectants.

## BIOLOGICAL TOXINS

Toxins are harmful substances produced by living organisms (animals, plants, microbes). Features that distinguish them from chemical agents, such as VX, cyanide, or mustard, include being not man-made, non-volatile (no vapor hazard), usually not dermally (skin) active (mycotoxins are the exception), and generally much more toxic per weight than chemical agents.

This chapter will cover four toxins considered to be among the most likely to be used against U.S. military and civilian targets: botulinum toxins, ricin, staphylococcal enterotoxin B (SEB), and T-2 mycotoxins.

## BOTULINUM

**Signs and Symptoms**: Usually begins with cranial nerve palsies, including ptosis, blurred vision, double vision, dry mouth and throat, difficulty swallowing, and altered voice. This is followed by symmetrical descending flaccid (weak, soft) paralysis, with generalized weakness and progression to respiratory failure. Symptoms begin as early as 12-36 hours after inhalation, but may take several days after exposure to low doses of toxin.

**Diagnosis**: Diagnosis is primarily a clinical one. A bioterrorism attack should be suspected if multiple casualties simultaneously present with progressive descending flaccid paralysis.

**Treatment**: Early administration of trivalent licensed antitoxin or heptavalent antitoxin (IND product) may prevent or decrease progression to respiratory failure and hasten recovery. Intubation and ventilatory assistance may be needed for respiratory failure. Tracheostomy may be required.

**Prophylaxis**: Vaccine is generally not available.

**Isolation and Decontamination**: Standard Precautions for healthcare workers. Toxin is not dermally (skin) active and secondary aerosols are not a hazard from patients. Decon with soap and water. Botulinum toxin is inactivated by sunlight within 1-3 hours. Heat ($80^{O}$C for 30 min., $100^{O}$C for several minutes) and chlorine also destroy the toxin.

**RICIN**

**Signs and Symptoms**: Acute onset of fever, chest tightness, cough, shortness of breath, nausea, and joint pain occurs 4 to 8 hours after inhalational exposure. Airway necrosis and pulmonary capillary leak resulting in pulmonary edema would likely occur within 18-24 hours, followed by severe respiratory distress and death from hypoxemia (low blood oxygen) in 36-72 hours.

**Diagnosis**: Acute lung injury in large numbers of geographically clustered patients suggests exposure to aerosolized ricin. The rapid time course to severe symptoms and death would be unusual for infectious agents.

**Treatment**: Management is supportive and should include treatment for pulmonary edema. Gastric lavage and cathartics (emetics) are indicated for ingestion, but charcoal is of little value for large molecules such as ricin.

**Prophylaxis**: There is currently no vaccine or prophylactic antitoxin available for human use. Use of the protective mask is currently the best protection against inhalation.

**Isolation and Decontamination**: Standard Precautions for healthcare workers. Ricin is non-volatile, and secondary aerosols are not expected to be a danger to health care providers. Decontaminate with soap and water. Hypochlorite solutions (0.1% sodium hypochlorite) can inactivate ricin.

**STAPHYLOCOCCAL ENTEROTOXIN B (SEB)**

**Signs and Symptoms**: Latent period of 3-12 hours after aerosol exposure is followed by sudden onset of fever, chills, headache, muscle pain, and nonproductive cough. Some patients may develop shortness of breath and mid-chest pain.

Patients tend to plateau rapidly to a fairly stable clinical state. Fever may last 2 to 5 days, and cough may persist for up to 4 weeks. Patients may also present with nausea, vomiting, and diarrhea if they swallow the toxin. Presumably, higher exposure can lead to septic shock and death.

**Diagnosis**: Diagnosis is clinical. Patients will present with a febrile respiratory syndrome without CXR abnormalities. Large numbers of patients presenting in a short period of time with typical symptoms and signs of SEB pulmonary exposure would suggest an intentional attack with this toxin.

**Treatment**: Treatment is limited to supportive care. Artificial ventilation might be needed for very severe cases, and attention to fluid management is important.

**Prophylaxis**: Use of protective mask. There is currently no human vaccine available to prevent SEB intoxication.

**Isolation and Decontamination**: Standard Precautions for healthcare workers. SEB is not dermally active and secondary aerosols are not a hazard from patients. Decon with soap and water. Destroy any food that may have been contaminated.

### T-2 MYCOTOXINS

**Signs and symptoms**: Exposure causes skin pain, itching, redness, vesicles, necrosis and shedding of the skin. Effects on the airway include nose and throat pain, nasal discharge, itching and sneezing, cough, shortness of breath, wheezing, chest pain and bloody sputum. Toxin also produces effects after ingestion or eye contact. Severe intoxication results in prostration, weakness, ataxia, collapse, shock, and death.

**Diagnosis**: Should be suspected if an aerosol attack occurs in the form of "yellow rain" with droplets of variously pigmented oily fluids contaminating clothes and the environment. Confirmation requires testing of blood, tissue and environmental samples.

**Treatment**: There is no specific antidote. Treatment is supportive. Soap and water washing, even 4-6 hours after exposure can significantly reduce dermal toxicity; washing within 1 hour may prevent toxicity entirely. Superactivated charcoal should be given orally if the toxin is swallowed.

**Prophylaxis**: The only defense is to prevent exposure by wearing a protective mask and clothing (or topical skin protectant) during an attack. No specific immunotherapy or chemotherapy is available for use in the field.

**Isolation and Decontamination**: Outer clothing should be removed and exposed skin decontaminated with soap and water. Eye exposure should be treated with copious saline irrigation. Secondary aerosols are not a hazard; however, contact with contaminated skin and clothing can produce secondary dermal exposures. Contact

Precautions are warranted until decontamination is accomplished. Then, Standard Precautions are recommended for healthcare workers. Environmental decontamination requires the use of a hypochlorite solution under alkaline conditions such as 1% sodium hypochlorite and 0.1M NaOH with 1-hour contact time.

# CHEMICAL AGENTS

For the purposes of this section, a chemical agent is one that is intended for use in intentional operations to kill, seriously injure, or incapacitate humans (or animals) through its toxicological effects. Toxic Industrial Compounds/Materials (TICS/TIMS) are certainly threats but are beyond the scope of this text. However, the general principles outlined within this chapter hold true regardless of the agent used. Refer to the guidelines in the bioagent section above for a generic approach to assessment. Additionally, decontamination procedures for chemical agents are analogous to the procedures followed for a suspected biological agent. This section will focus on Mustard, Nerve agents and Cyanide.

## MUSTARD

Signs and symptoms: Symptoms may be delayed for 2-48 hours after exposure with 4-8 hours being the average time from exposure to onset of symptoms. Exposure may cause skin burns and necrosis, eye burns with ulceration and possible perforation, airway disease with shortness of breath, wheezing, and chest pain and suppression of the immune system. Severe intoxication results in prostration, weakness, seizures, collapse, shock, and death.

Diagnosis: Should be suspected if an aerosol attack occurs in the form of a vapor with symptoms as outlined above or contact with an oily yellow to brownish liquid is encountered.

Treatment: Skin: Soothing creams to burns, analgesics, antibiotics to treat/prevent infection. Eyes: Soothing eye drops, topical mydriatics, topical antibiotics, and sunglasses. Airways: Steam, oxygen, bronchodilators, cough suppressants, ventilatory support. GI: antiemetics, fluid support, electrolyte replacement.

Prophylaxis: The only defense is to prevent exposure by wearing a protective mask and clothing (or topical skin protectant) during an attack.

Isolation and Decontamination: Outer clothing should be removed and exposed skin decontaminated with soap and water. Eye exposure should be treated with copious saline irrigation. Grossly contaminated skin surfaces should be washed with a 0.5% sodium hypochlorite solution, if available, with a contact time of 10 to 15 minutes. Environmental decontamination requires the use of a hypochlorite solution under alkaline conditions such as 5% sodium hypochlorite or 0.1M NaOH with 1-hour contact time.

## NERVE AGENTS

Nerve agents can function as both a liquid and vapor hazard. The primary effect is to disrupt the normal function of nerve endings creating a number of symptoms that can lead to death. These agents operate on the same mechanisms as many commercially available insecticides and are often referred to as pesticides for humans.

**Signs and symptoms**: Exposure causes shortness of breath, wheezing, chest pain and increased secretions from the lungs, nose, eyes, mouth and GI system, including nausea, vomiting and diarrhea. Pupils become very small. Severe intoxication results in prostration, weakness, seizures, collapse, shock, and death.

**Diagnosis**: Should be suspected if an aerosol attack occurs in the form of a vapor with symptoms as outlined above.

**Treatment**: Atropine 2-6 mg IM depending on severity. Continue using atropine at 2 mg every 5-10 minutes until secretions are drying up and respiratory symptoms have improved. Use Diazepam, 10 mg IM, for seizures.

**Prophylaxis**: The only defense is to prevent exposure by wearing a protective mask and clothing (or topical skin protectant) during an attack.

**Isolation and Decontamination**: Outer clothing should be removed and exposed skin decontaminated with soap and water. Eye exposure should be treated with copious saline irrigation. Grossly contaminated skin surfaces should be washed with a 0.5% sodium hypochlorite solution, if available, with a contact time of 10 to 15 minutes. Environmental decontamination requires the use of a hypochlorite solution under alkaline conditions such as 5% sodium hypochlorite or 0.1M NaOH with 1-hour contact time.

## CYANIDE

Cyanide agents function as a vapor hazard. The primary effect is to disrupt the normal function of the cells ability to utilize oxygen that can lead to death.

**Signs and symptoms**: Exposure causes a brief increase in respirations followed by respiratory distress. Severe intoxication results in prostration, weakness, seizures, collapse, shock, and death.

**Diagnosis**: Should be suspected if an aerosol attack occurs in the form of a vapor with symptoms as outlined above.

**Treatment**: 100% oxygen. Sodium Nitrite, 10 mL IV of a 3% soln (30 mg / mL) = 300 mg, administered over at least a 3-minute period followed by Sodium Thiosulfate, 50 mL IV of a 25% soln (250 mg / mL) = 12.5 g, administered over a 10-minute period beginning immediately after nitrite administration.

**Prophylaxis**: The only defense is to prevent exposure by wearing a protective mask and clothing (or topical skin protectant) during an attack.

**Isolation and Decontamination**: Outer clothing should be removed and exposed skin decontaminated with soap and water. Eye exposure should be treated with copious saline irrigation. Grossly contaminated skin surfaces should be washed with a 0.5% sodium hypochlorite solution, if available, with a contact time of 10 to 15 minutes. Environmental decontamination requires the use of a hypochlorite solution under alkaline conditions such as 5% sodium hypochlorite or 0.1M NaOH with 1-hour contact time.

# DETECTION

Detector systems are evolving, and represent an area of intense interest with the highest priorities within the research and development community. However, until reliable detectors are available in sufficient numbers, usually the first indicator of a biological or chemical attack in unprotected people will be those who become ill.

# DECONTAMINATION

Contamination is the introduction of an infectious or chemical agent on a body surface, food or water, or other inanimate objects. Decontamination involves either disinfection, sterilization or removal to reduce microorganisms or chemical agents to an acceptable level on contaminated articles, thus rendering them suitable for use. Disinfection is the selective reduction of undesirable microbes to a level below that required for transmission. Sterilization is the killing of all organisms.

Decontamination methods have always played an important role in the control of infectious diseases. However, we are often unable to use the most efficient means of rendering microbes or chemicals harmless (e.g., toxic chemical sterilization), as these methods may injure people and damage materials that are to be decontaminated. Though some sophisticated methods of decontamination may not be available underway, some fairly simple tools are available. Biological and chemical terrorism agents can be decontaminated by mechanical, chemical and physical methods:

- Mechanical decontamination involves measures to remove but not necessarily neutralize an agent. An example is the filtering of drinking water to remove certain water-borne biologic agents (e.g. *Dracunculus medinensis*), or in a bioterrorism context, the use of an air filter to remove aerosolized anthrax spores, or water to wash an agent from the skin.
- Chemical decontamination renders biological and chemical terrorism agents harmless by the use of disinfectants or decontaminants that are usually in the form of a liquid, gas or aerosol. Some of these products are harmful to humans, animals, the environment, and materials.

- Physical means (heat, radiation) are other methods that can be employed for decontamination of objects.

Dermal (skin) exposure to a suspected biological or chemical terrorism aerosol should be immediately treated by soap and water decontamination. Careful washing with soap and water removes nearly all of the agent from the skin surface. Hypochlorite solution or other disinfectants are reserved for gross biological contamination (i.e. following the spill of solid or liquid agent from a munition directly onto the skin). In the absence of chemical or gross biological contamination, these will confer no additional benefit, may be caustic, and may predispose to colonization and resistant superinfection by reducing the normal skin flora. Chemically or grossly biologically contaminated skin surfaces should be washed with a 0.5% sodium hypochlorite solution, if available, with a contact time of 10 to 15 minutes. **(Protect the eyes from <u>all</u> sodium hypochlorite solutions.)**

The 0.5% solution can be made by adding one 6-ounce container of calcium hypochlorite to five gallons of water. The 5% solution can be made by adding eight 6-ounce ampules of calcium hypochlorite to five gallons of water. These solutions evaporate quickly at high temperatures so if they are made in advance they should be stored in closed containers. Also the chlorine solutions should be placed in distinctly marked containers because it is very difficult to tell the difference between the 5% chlorine solution and the 0.5% solution.

To mix a 0.5% sodium hypochlorite solution, take one part Clorox and nine parts water (1:9) since standard stock Clorox is a 5.25% sodium hypochlorite solution. The solution is then applied with a cloth or swab. The solution should be made fresh daily with the pH in the alkaline range.

Chlorine solution must NOT be used in (1) open body cavity wounds, as it may lead to the formation of adhesions, or (2) brain and spinal cord injuries (3) eyes. However, this solution may be instilled into non-cavity wounds and then removed by suction to an appropriate disposal container. Within about 5 minutes, this contaminated solution will be neutralized and nonhazardous. Subsequent irrigation with saline or other surgical solutions should be performed. **(Prevent the chlorine solution from being sprayed into the eyes, as corneal opacities may result.)**

For decontamination of fabric clothing or equipment, a 5% hypochlorite solution should be used. For decontamination of equipment, a contact time of 30 minutes prior to normal cleaning is required. This is corrosive to most metals and injurious to most fabrics, so rinse thoroughly and oil metal surfaces after completion.

Bioterrorism agents can be rendered harmless through such physical means as heat and radiation. To render agents completely harmless, sterilize with dry heat for two hours at 160 degrees centigrade. If autoclaving with steam at 121 degrees centigrade and 1 atmosphere of overpressure (15 pounds per square inch), the time may be reduced to 20 minutes, depending on volume. Solar ultraviolet (UV) radiation

has a disinfectant effect, often in combination with drying. This is effective in certain environmental conditions but hard to standardize for practical usage for decontamination purposes.

# PATIENT ISOLATION PRECAUTIONS

These precautions are most suitable when dealing with personnel with suspected/known biological infection.

### Standard Precautions

- Wash hands after patient contact.
- Wear gloves when touching blood, body fluids, secretions, excretions and contaminated items.
- Wear a mask and eye protection, or a face shield during procedures likely to generate splashes or sprays of blood, body fluids, secretions or excretions
- Handle used patient-care equipment and linen in a manner that prevents the transfer of microorganisms to people or equipment.
- Use care when handling sharps and use a mouthpiece or other ventilation device as an alternative to mouth-to-mouth resuscitation when practical.

Standard precautions are employed in the care of ALL patients.

### Airborne Precautions

Standard Precautions plus:

- Place the patient in a private room that has monitored negative air pressure, a minimum of six air changes/hour, and appropriate filtration of air before it is discharged from the room.
- Wear respiratory protection when entering the room.
- Limit movement and transport of the patient. Place a mask on the patient if they need to be moved.

Biothreat Diseases requiring Airborne Precautions: Smallpox.

### Droplet Precautions

Standard Precaution plus:

- Place the patient in a private room or cohort them with someone with the same infection. If not feasible, maintain at least 3 feet between patients.
- Wear a mask when working within 3 feet of the patient.
- Limit movement and transport of the patient. Place a mask on the patient if they need to be moved.

Biothreat Diseases requiring Droplet precautions: Pneumonic Plague.

**Contact Precautions**

Standard Precautions plus:

- Place the patient in a private room or cohort them with someone with the same infection if possible.
- Wear gloves when entering the room. Change gloves after contact with infective material.
- Wear a gown when entering the room if contact with patient is anticipated or if the patient has diarrhea, a colostomy or wound drainage not covered by a dressing.
- Limit the movement or transport of the patient from the room.
- Ensure that patient-care items, bedside equipment, and frequently touched surfaces receive daily cleaning.
- Dedicate use of non-critical patient-care equipment (such as stethoscopes) to a single patient, or group of patients with the same disease. If not feasible, adequate disinfection between patients is necessary.

Biothreat Diseases requiring Contact Precautions: Viral Hemorrhagic Fevers.

# NUCLEAR RADIATION

Ionizing radiation is a concern in the event of a nuclear explosion in the vicinity of a vessel. The effects of partial body exposure to radiation depend on the dose and site of the exposure. Other organs frequently affected by local exposure include the skin and reproductive organs. Effects on bone marrow and the gastrointestinal system occur when these organs are the targets of the exposure. Signs and symptoms of exposure, such as nausea and decreased white blood cells and platelets, are also seen when radiation is used in the treatment of cancer.

Cancer is a major long-term health effect of ionizing radiation. The reasons for this effect are not yet fully understood, but are likely to be related to changes produced in the DNA, the genetic material of cells. These changes may involve several steps that take years to progress to the onset of cancer. In an emergency situation, you may know only that a material is radioactive without knowing which type of radiation is being emitted.

## TYPES OF RADIATION

There are several types of radiation present in nature and manmade sources:

- Alpha particles
- Beta particles

- Gamma rays
- X-rays
- Neutrons

### Alpha Particles

Alpha particles are the slowest of the types of radiation. They can travel only a few inches in the air, losing their energy almost as soon as they collide with anything. They can easily be shielded by a sheet of paper or the outer layer of a person's skin. An alpha particle has a large mass and two protons, two neutrons, and no electrons. Because it has two protons and no electrons, it is positively charged. When emitted from the nucleus, the positive charge causes the alpha particle to strip electrons from nearby atoms as it passes.

Alpha particles are extremely hazardous to fire fighters and other exposed personnel because they can be inhaled and deposited in body tissues, where they can cause severe long-term health effects. Positive pressure Self-Contained Breathing Apparatus (SCBA) is effective protection against inhaling alpha particles. These agents can affect the cells of the body in various ways, and each is capable of destroying cells.

### Beta Particles

Beta particles are more energetic than alpha particles. They travel in the air for a distance of a few feet. Beta particles can pass through a sheet of paper but may be stopped by a sheet of aluminum foil or glass. A beta particle has a small mass and is usually negatively charged. It is emitted from the nucleus of an atom with a charge of minus one. Beta radiation causes ionization by interfering with electrons in their orbits. Both have a negative charge, so the electrons are repelled when the beta particle passes. Beta particles can damage the skin or tissues of the eye. Internally, they can be extremely damaging if they concentrate in specific tissues.

### Gamma Rays

Gamma rays (unlike alpha or beta particles) are waves of pure energy; they have no mass. They are emitted from the nucleus of an atom and travel at the speed of light (186,000 miles per second). Gamma radiation can be very penetrating and requires concrete, lead or steel to stop it.

### X-Rays

X-rays are essentially the same as gamma rays except that they are emitted from the electrons that orbit the atom's nucleus, rather than from the nucleus itself. Gamma rays and X-rays are also called photons. Because they have very high energy and penetrate deeply, gammas and X-rays can affect not only specific organs, but the surrounding tissues as well.

### Neutron Particles

Neutrons are particles normally contained in the nucleus of an atom. They can be released through certain manufacturing processes, such as nuclear fission (splitting an atomic nucleus). Neutrons are considerably larger than beta particles but have only one-fourth the mass of alpha particles. Because they can penetrate even thick lead shields, they can be extremely damaging to humans. However, neutron radiation is very rare since it is generally emitted only when atomic weapons are detonated.

## LIMITING EXPOSURE

You can minimize your exposure to any type of radiation by:

1. Limiting the time that you are near the source of radiation
2. Increasing the distance between yourself and the source
3. Shielding yourself with appropriate protective clothing

### Time

The shorter the time you are exposed to radiation, the less your exposure. Work quickly and efficiently; rotate teams to keep individual exposures to a minimum.

### Distance

The farther you are from a source of radiation, the lower the dose you receive. If you must approach low level radioactive materials, do not touch them; use shovels or brooms and avoid physical contact.

### Shielding

SCBA and bunker gear shields you from most alpha and beta radiation. Several inches of lead are necessary to shield you from gamma radiation. If possible, use clothing, vehicles, equipment, containers or natural barriers like hills, trees, and rocks to protect yourself from radiation exposure. However, be aware that your apparatus, depending on its profile and construction material, may not provide adequate shielding. Shielding also includes covering the source itself. For example, you may be able to prevent exposure to alpha and some beta radiation if you cover the source with a drum or heavy material, such as a tarp.

Like other exposures, if your clothing or skin is contaminated with a radioactive substance, exposure will continue until you are decontaminated.

## MEDICAL TREATMENT

Potassium iodide (KI), if taken in time, blocks the thyroid gland's uptake of radioactive iodine and thus could help prevent thyroid cancers and other diseases that might otherwise be caused by exposure to airborne radioactive iodine that could be dispersed in a nuclear accident. KI provides protection only for the thyroid from

radioiodines. It has no impact on the uptake by the body of other radioactive materials and provides no protection against external irradiation of any kind. FDA emphasizes that the use of KI should be as an adjunct to evacuation (itself not always feasible), sheltering, and control of foodstuffs. Dosage: One (1) 130 mg tablet once a day. Take for 10 days unless directed otherwise by State or local public health authorities.

## PERSONAL PROTECTIVE EQUIPMENT (PPE) AND RADIATION

Clothing that covers skin also offers protection from some forms of radiation. (Note: the PPE level A description below also offers excellent protection from biological and chemical agents) However, it will not keep you from becoming exposed. A person dressed in level A clothing (see below) (hood, SCBA, coat, pants, boots and gloves) is well protected from surface contamination. If you should become contaminated by a liquid or solid (not airborne) hazardous material, taking off your outer clothing should remove most of the contamination. Airborne contamination is more dangerous. If a radioactive contaminant enters your body through a cut in your skin, or if you inhale radioactive particles, the material will remain inside your body and continue to expose the surrounding tissue. The best protection against internal contamination is SCBA. Always wear your SCBA when airborne radiation (or any other airborne hazard, for that matter) is suspected. Remember that alpha particles will not penetrate the skin, so your regular protective clothing will offer sufficient skin protection.

However, alpha radiation can cause very serious problems if it is inhaled. Although beta radiation can be stopped by a thin piece of metal, regular PPE offers little protection. Furthermore, inhalation of particles can cause extensive damage. Gamma rays can penetrate lead, so PPE gear will not keep you from exposure to this type of radiation.

The following are guidelines which an employer can use to begin the selection of the appropriate PPE. As noted above, the site information may suggest the use of combinations of PPE selected from the different protection levels (i.e., A, B, C, or D) as being more suitable to the hazards of the work. It should be cautioned that the listing below does not fully address the performance of the specific PPE material in relation to the specific hazards at the job site, and that PPE selection, evaluation and re-selection is an ongoing process until sufficient information about the hazards and PPE performance is obtained.

**Part A**. Personal protective equipment is divided into four categories based on the degree of protection afforded. (See Part B for further explanation of Levels A, B, C, and D hazards.)

**I. Level A** - To be selected when the greatest level of skin, respiratory, and eye protection is required.

The following constitute Level A equipment; it may be used as appropriate;

1. Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).

2. Totally-encapsulating chemical-protective suit.

3. Coveralls.(1)

4. Long underwear.(1)

5. Gloves, outer, chemical-resistant.

6. Gloves, inner, chemical-resistant.

7. Boots, chemical-resistant, steel toe and shank.

8. Hard hat (under suit).(1)

9. Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit).

Footnote: (1) Optional, as applicable.

**II. Level B** - The highest level of respiratory protection is necessary but a lesser level of skin protection is needed.

The following constitute Level B equipment; it may be used as appropriate.

1. Positive pressure, full-face piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).

2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).

3. Coveralls.(1)

4. Gloves, outer, chemical-resistant.

5. Gloves, inner, chemical-resistant.

6. Boots, outer, chemical-resistant steel toe and shank.

7. Boot-covers, outer, chemical-resistant (disposable).(1)

8. Hard hat.(1)

9. Face shield.(1)

Footnote (1) Optional, as applicable.

**III. Level C** - The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air-purifying respirators are met.

The following constitute Level C equipment; it may be used as appropriate.

1. Full-face or half-mask, air-purifying respirators (NIOSH approved).

2. Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).

3. Coveralls.(1)

4. Gloves, outer, chemical-resistant.

5. Gloves, inner, chemical-resistant.

6. Boots (outer), chemical-resistant steel toe and shank.(1)

7. Boot-covers, outer, chemical-resistant (disposable).(1)

8. Hard hat.(1)

9. Escape mask.(1)

10. Face shield.(1)

Footnote(1) Optional, as applicable.

**IV. Level D** - A work uniform affording minimal protection: used for nuisance contamination only.

The following constitute Level D equipment; it may be used as appropriate:

1. Coveralls.

2. Gloves.(1)

3. Boots/shoes, chemical-resistant steel toe and shank.

4. Boots, outer, chemical-resistant (disposable).(1)

5. Safety glasses or chemical splash goggles.(1)

6. Hard hat.(1)

7. Escape mask.(1)

8. Face shield.(1)

Footnote (1) Optional, as applicable.

**Part B**. The types of hazards for which levels A, B, C, and D protection are appropriate are described below:

**I. Level A** - Level A protection should be used when:

1. The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or the site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the skin,

2. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible; or

3. Operations must be conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A have not yet been determined.

**II. Level B** – Level B protection should be used when:

1. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection.

2. The atmosphere contains less than 19.5 percent oxygen; or

3. The presence of incompletely identified vapors or gases is indicated by a direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the skin.

Note: This involves atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards and that do not represent a severe skin hazard; or that do not meet the criteria for use of air-purifying respirators.

**III. Level C** - Level C protection should be used when:

1. The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;

2. The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove the contaminants; and

3. All criteria for the use of air-purifying respirators are met.

**IV. Level D** - Level D protection should be used when:

1. The atmosphere contains no known hazard; and

2. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Note: As stated before, combinations of personal protective equipment other than those described for Levels A, B, C, and D protection may be more appropriate and may be used to provide the proper level of protection

## EFFECTS OF EXPOSURE

The effects of radiological exposures can be characterized two ways: as a result of whole body exposure or as a result of local exposure. Rem (R) (roentgen equivalent man) measures a quantity called “dose equivalent,” which relates the absorbed dose in human tissue to the resulting biological damage. This measurement is necessary because not all radiation has the same biological effect. These terms are discussed below.

**Whole Body Exposure**

Exposure of the entire body to a dose of 100 R or greater in a short time period (24 hours or less), results in signs and symptoms known as acute radiation syndrome. The radiation source in such cases is usually gamma or X-rays. Actual cases of unintentional whole-body radiation exposure have occurred only very rarely. Few symptoms are noted at doses under 100 R, but damage can be detected in white blood cells. Doses greater than 100 R result in progressively more threatening consequences that tend to follow a predictable time course. Doses of 100 to 200 R usually cause nausea and vomiting within hours of the exposure. Typical results of laboratory tests include a decrease in certain blood components, especially white blood cells, within two days. This effect is important because white blood cells play a major role in the immune system.

At doses from 200 to 600 R, the most critical problem is maintaining sufficient levels of circulating blood cells. This dose range is life threatening, especially if no treatment is received. White blood cells are most severely affected. At doses of 300 R or more, hair loss occurs after about two weeks.

With exposures between 600 and 1,000 R, chances for survival are decreased. Death may result from infection, hemorrhage, and other results of decreased bone marrow functioning, but may take months to occur. At doses greater than 1,000 R, cells of the small intestine lining are damaged and do not recover, resulting in infections and loss of fluid and electrolytes through the wall of the intestine. Death occurs within days.

**Local Exposure**

The effects of partial body exposure to radiation depend on the dose and site of the exposure. Other organs frequently affected by local exposure include the skin and reproductive organs. Effects on bone marrow and the gastrointestinal system occur when these organs are the targets of the exposure. Signs and symptoms of exposure, such as nausea and decreased white blood cells and platelets, are also seen when radiation is used in the treatment of cancer. Improper handling of gamma or beta sources or heavy exposure to X-ray, neutron, or other particle beams can result in radiation burns to the skin. These are classified like thermal burns – first, second, or third degree, depending on the extent of the injury. However, unlike thermal burns, they develop much more slowly, often taking days to become evident. Because of this, the cause of the burn is not always recognized.

# GLOSSARY OF MEDICAL TERMS

Ataxia - An inability to coordinate muscle activity during voluntary movement, so that uncoordinated movements occur. May involve the limbs, head, or trunk.

Edema - An accumulation of an excessive amount of watery fluid in cells, tissues, or body cavities.

Endotracheal intubation - Passage of a tube through the nose or mouth into the trachea for maintenance of the airway during anesthesia or for maintenance of an imperiled airway.

HEPA - HEPA is an acronym for "high efficiency particulate arresting". These air purifiers effectively remove 99.97% of all pollen, mold spores, animal hair and dander, dust mites, bacteria, smoke particles and dust that pass though the air purifier.

Incubation period - The time period from exposure to biologic agent and the onset of symptoms.

Macula, pl. maculae - 1. A small spot, different in color from the surrounding tissue. 2. A small, discolored patch or spot on the skin, neither elevated above nor depressed below the skin's surface.

Malaise - Generalized body discomfort

Mediastinum - The middle partition of the thoracic cavity, containing all the chest organs and structures except the lungs.

Necrosis - Pathologic death of one or more cells, or of a portion of tissue or organ, resulting from irreversible damage.

Osteomyelitis - Inflammation of the bone marrow and adjacent bone.

Papule - A small, circumscribed, solid elevation on the skin.

Petechia, pl. petechiae - Minute hemorrhagic (blood) spots, of pinpoint to pinhead size, in the skin, which are not blanched by pressure.

Stridor - A high-pitched, noisy respiration, like the blowing of the wind; a sign of respiratory obstruction, especially in the trachea or larynx.

Vector - The carrier, usually an animal (e.g. mosquito), that transfers the biologic agent from one host to another.

# SUMMARY

Though overall the risks of a specific terrorist event to any specific vessel may be low, the potential danger is great enough to warrant pre-planning and preparation. For providers of medical care, the key is to suspect a terrorist event if a patient's illness or injury seems strange or unusual, and then to have a plan to address the situation. This chapter has provided a basic introduction to this process. The medical aspects must be considered in the context of a larger emergency preparedness plan.

# FIGURE 1. SOURCES OF INFORMATION ON NATURAL AND MANMADE DISASTERS

| | |
|---|---|
| Federal Emergency Management Agency (FEMA) | www.fema.gov |
| U.S. Fire Administration | www.usfa.fema.gov |
| Department of Health and Human Services | www.hhs.gov |
| Department of Energy | www.energy.gov |
| U.S. Department of Agriculture | www.usda.gov |
| U.S. Department of Justice | www.justice.gov |
| National Weather Service | www.nws.noaa.gov |
| Centers for Disease Control and Prevention | www.cdc.gov |
| | www.bt.cdc.gov |
| U.S. Food and Drug Administration | www.fda.gov |
| Nuclear Regulatory Commission | www.nrc.gov |
| American Red Cross | www.redcross.org |
| Humane Society of the United States | www.hsus.org/disaster |
| Armed Forces Radiobiology Research Institute | www.afrri.usuhs.mil |
| Army Medical Research Institute of Chemical Defense | http://ccc.apgea.army.mil |
| NBC-Medical | www.nbc-med.org |
| Hazardous Materials Information (*Emergency Response Guidebook*) | http://hazmat.dot.gov<br>http://dot.gov/gydebook.htm |

# CHAPTER 9

# LEGAL ISSUES OF SHIPBOARD MEDICINE


| | |
|---|---|
| Introduction | 9-1 |
| Duties of the Owner of the Vessel | 9-2 |
| Duties of the Master of the Ship | 9-5 |

CHAPTER

9

# LEGAL ISSUES OF SHIPBOARD MEDICINE

## INTRODUCTION

The delivery of medical care to an injured patient, whether crew member, passenger, or visitor, invites consideration of legal issues which the mariner should think about prior to the urgent need of providing medical care. As in all aspects of maritime safety, planning is necessary. Planning for medical emergencies should include establishing protocols for proper and competent medical treatment of the injured that is consistent with the standards of medical practice. Protecting the rights of the patient, and the interests of the ship, the owner, and the provider of care should also be considered.

The purpose of this chapter is to alert the mariner to some of the legal issues of common concern, and to serve as a guide in developing a plan to address these medically, in concert with sound legal advice.

An injured crewmember should receive the best available care, within the reasonable limits and training by the available providers, without any interruption for consideration of whether the provider might be sued for attempting to do so. A medically sound plan, realistic in context, and protective of the interests of all parties, should be established.

General maritime law, or Admiralty law, developed historically in response to maritime legal disputes that arose from three principle sources:

- Common law: customary law among maritime nations that has evolved and is well recognized in the ways of ships and seafaring. This law evolved from ancient sea codes to more recent written decisions issued by Admiralty judges, based on historical precepts, or previous written decisions. This is the general maritime law.

- Statutes: domestic laws of any nation's legislative process, specific to that nation, which carry the force of law for all vessels carrying the flag of that country.

- International agreement: articles such as treaties or conventions that have been developed, and a country may have signed, thereby binding vessels under its flag, and its mariners, to obey as law the terms and conditions of that agreement.

The requirements for operator licensing, vessel equipment, personnel training, and operation are generally found as products of statutory law or, to a lesser extent, international agreement. The general maritime law, however, is less apparent, since it is not typically codified, and the mariner should rely upon an experienced attorney to assist in navigating the waters of maritime case law.

## DUTIES OF THE OWNER OF THE VESSEL

The owner of a vessel inherits specific duties or responsibilities that are established as law, either by statute, or within the general maritime law. Some of these duties are provided to seamen and crew, for whom the law has generated an exceptionally protective regime in recognition of the difficult and rigorous working conditions, and the historical difficulties endured. For other classes of persons, the law is less protective, and more similar to land based expectations.

It should be stressed that a certain reasonableness of care is weighed into decisions while onboard a vessel. Safety and well being of other crewmembers and passengers as well as cargo, weather conditions, location of nearest port plus the resources available at a given port, factor into the decision making process. The following are some basic areas of responsibility most commonly belonging to the vessel owner and some examples of liability issues pertaining to particular incidents that may arise.

Seaworthiness of the vessel: The owner and operator of a vessel is held to warranty the condition of a vessel as reasonably fit for the intended purpose of that vessel. Since 1903, when a case concerning a ship named the OSCEOLA was decided by the Supreme Court, [1] an absolute nondelegatable duty was found to rest upon the vessel [2] and owner to furnish a seaworthy vessel. Any failure of the vessel or her crew to perform, that results in an injury to a seaman, is an apparent breach of this duty and gives rise to the seaman's claim of unseaworthiness under the general maritime law. This absolute duty of seaworthiness arises under the presumption and

[1] 189 U.S. 159 (1903).

[2] The vessel retains a separate legal identity and can be sued directly by parties having a claim against it.

reasoning that the seaman is subject to a very demanding job, and does not have the opportunity to inspect the vessel for deficiencies in equipment or other aspects.

Seaworthiness of the crew: The crew must be suitably seaworthy as well in respect to ability, experience, and number.[3] A crew's conduct, i.e. violence, may also render it unseaworthy. The availability and quality of medical care rendered by the ship is also a measure of seaworthiness.[4] This duty is apparent so long as the vessel remains "in navigation" which would not include dry dock.

**Maintenance and cure of the crew**: Admittedly this could be considered part of keeping a vessel seaworthy, as it arose traditionally out of maritime culture as an incentive to encourage seamen to defend their vessel from piracy.[5]This principle requires the owner to pay to maintain the mariner by way of accommodation and food, and to cure the sickness or disability to the maximum point of recovery, if the illness or injury was acquired in performance of the ship's business.

**The Jones Act**: The Jones Act, 46 U.S.C. § 698, was passed in 1920 to provide injured seamen with a right to sue a vessel owner for negligence via a jury trial. This is distinguished from, and does not preclude an Admiralty action for unseaworthiness, which does not provide for trial by jury. The Jones Act states in part, that the shipowner owes to a sick or injured seaman the duty to furnish (1) reasonable care, and (2) nursing and hospitalization. For the purposes of the Jones Act the Master is charged with fulfilling the owner's duty. The ship will not be held responsible for error of judgement on the part of the officers, if their judgement is conscientiously exercised with reference to existing conditions [6].

In one case, [7] the Master of the vessel knew of a seaman's illness, placed him in a small, poorly ventilated, hot room, in spite of the fact that the ship's hospital room was available. **The court held that** the seaman was entitled to recover **under** the Jones Act. **The** court found that **under the circumstances**, he should have been placed in **other** quarters such as the ship's hospital. Not doing so **imposed** civil liability on the ship owner.

Certain sections of the Jones Act provide for the liability upon the Master and the owner, such as a $500 penalty for failure to keep proper medicines aboard the vessel.[8]

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[3] Comeaux v. T.J. Jones & Co., 666 F.2d 294 (5th Cir. 1982). See also, Crew Size and Maritime Safety, National Research Council, National Academy Press (1990).
[4] Annot., Ship's Liability: Medical Care, 16 A.L.R. Fed. 87.
[5] See John W. Sims, the American Law of Maritime Personal Injury and Death: An Historical Review, 55 TUL. L. REV. 973, 975 (1981).
[6] MacQueen v. C.G., 40527, U.S. Coast Guard, 287 F. Supp. 778 (D.C. Mich. 1968).
[7] Ugolini v. States Marine Lines, 71 Wash. 2d 404, 429 P.2d 213 (1967).
[8] Jones Act 46 U.S.C. § 11102

To require a seaman who is sick or injured to perform work substantially detrimental to his or her condition, is failure to provide medical care and attention to which he or she is entitled, unless his or her service is required in the face of danger or emergency.[9]

In another case, a Master was aware from his complaints of chest pains that a seaman was having heart trouble. The ship owner was found negligent in failing to provide the seaman with proper medical treatment at the time of his first heart attack and subsequent heart attacks. The seaman was allowed to climb stairs, leave the ship, and make his way to the hospital, all without any assistance.[10] In another case, a Master failed to administer penicillin to a burned seaman, although it was available, and to render first aid treatment although the ship passed within a mile of a first aid station. This was found to constitute negligence on the part of the ship owner.[11] On the other hand, a slight injury to a seaman's finger did not require landing at some port before the ship reached its destination, since it could not be fairly inferred that neither the seaman or the engineer who extracted the steel from the injured finger anticipated that the slight wound would amount to anything serious. In this case, the finger eventually required amputation due to complications secondary to infection.[12]

Once it is determined that medical care is needed and the Master determines that the seaman should see a doctor, the ship owner's responsibility does not end. Since medical services are provided under both contract and statute, negligence of the doctor can be imputed to the ship owner-employee, even if the ship's Master took due care in selecting a reputable physician to treat the seaman. If the physician is found negligent, the ship owner is still liable.[13]

These cases involving physicians demonstrate two ways that the ship owner may be found negligent. One is improperly providing for seaman care, including the negligent selection of a doctor; the other is in the negligence of the doctor as a practitioner. In determining negligence, the jury or the judge must take into account such factors as whether the ship was at sea or in port; if in port, what medical facilities were available, were such facilities obviously limited or inadequate; and what means were reasonably obtainable to transfer the seaman to the nearest adequate facility.

No U.S. law exists requiring a physician to be on board a passenger vessel. When a carrier does employ a doctor for the convenience of the passengers, the carrier has a duty to employ one who is qualified and competent. If the carrier breaches this duty, liability for negligence may exist. But, if the doctor is negligent in treating a passenger, that negligence will not be imputed to the

[9] Point Fermen, 70 F.2d 602 (5th Cir. 1934).
[10] Fair v. Mississippi Valley Barge Line Co., 239 F. Supp. 158 (D.C. Tex., 1965).
[11] Carr v. Standard Oil Company, 181 F.2d (2d Cir.).
[12] Mohamed v. United Fruit Company, 12 F. Supp. 1000 (D.C. Mass., 1935).
[13] Fritzgerald v. A.L. Burbank & Company, 451 F.2d 670 (2d Cir. 1971).

carrier or ship owner.[14] The reason for this position is that the ship owner cannot interfere with the passenger-doctor relationship, and the ship owner cannot supervise the doctor, since the ship owner is not qualified to do so. This position is extended to physicians providing medical advice offshore by radio.[15]

Delay of treatment can also result in medical liability. In one case, a physician was not called for a sick seaman until 15 hours after the arrival of the ship into port. The seaman was delirious and his leg was badly swollen. Negligence in providing reasonable medical care was shown.[16]

In another case, a hospital discharged a seaman on the basis that a hospital in another port, seven sailing hours away, could better handle the case of a perforated ulcer. The ship's departure was delayed for several hours, and the Master on arrival in the second port failed to call a doctor for another several hours. The seaman died from peritonitis and the Master was held to be negligent.[17]

In yet another case, a seaman fell and broke his leg on board a ship while intoxicated. He objected to his superior's attempts to get him to a hospital. He was not shown to have suffered any ill effects from the delay in hospitalization and was not entitled to recover.[18]

Similarly, a ship owner was held not liable under the Jones Act where the Master informed his first mate that he had been struck by a steering wheel. The Master retired to his cabin and was later found dead. Since the first mate had repeatedly asked the Master whether he desired medical assistance and on each occasion the Master declined, the ship owner was found not to be liable.

In another case where a seaman who was being treated in a hospital left before he was cured, no negligence was found when the seaman further injured himself.

The above cases are mentioned only as examples of what is required of the crew in order to meet their obligation to provide adequate medical care at sea. Unlike the situation on land, where one voluntarily renders aid to a stranger, at sea there is legal duty to provide reasonable medical care under the relevant circumstances.

## DUTIES OF THE MASTER OF THE SHIP

The ship's Master is responsible to provide a safe and healthy environment for the crew. The actions of the Master may, in certain situations, bind the vessel's

[14] Barbetta v. S/S Bermuda Star, 848 F.2d 1364 (5th Cir. 1988).
[15] Ibid.
[16] Holiday v. Pacific Atlantic S.S. Company, 99 F. Supp. 173 (D. Del. 1951).
[17] Poindexter v. Groves, 197 F.2d 915 (2d Cir. 1952).
[18] Bloomquist v. T.J. MacCarthy S.S. Company, 263 F.2d 590 (7th Cir. 1959).

owners or create personal liability regarding the to health and safety of passengers or crew members even those that may arise unexpectedly aboard a vessel. The Master stands in loco parentis and has the duty of looking out for those aboard the vessel. This duty applies to situations that may be potentially hazardous, cases of actual injury or illness, discovery of a crew member missing at sea, and death of a crew member.

Congress enacted specific statutes regarding provisions and accommodations for crew members, and these statutes provide for the personal liability of the vessel's Master in the event the statutes' dictates are not followed. 46 U.S.C. § 10902 provides that three or more of the members of a merchant vessel's crew may complain to any Captain of a U.S. Naval vessel, to Coast Guard officials, to American Consuls abroad, or to customs officials regarding inadequate or poor provisions aboard merchant vessels. Upon investigation, the authorities will notify the merchant vessel's Master in writing if they find that the crew members' charges are valid. If no action is taken by the Master to remedy this potential health problem, the Master is personally liable to a fine of $100. Further, 46 U.S.C. § 10907 provides that failure of the Master to grant crew members permission to see such governmental authorities to make such a complaint, will result in the Master being liable for a fine of $500. On the other hand, should investigations by the government officials prove that the provisions aboard the vessels are adequate, then the complaining crew members will be fined in the amount of such investigation costs.[19]

When a seaman becomes injured or ill at sea, the Master is responsible for providing reasonable medical care aboard the vessel. This includes first aid, and such treatment in medicine as the competency of the Master or ship's Doctor, if one is aboard, is able to provide. The Master must also decide whether or not to proceed to the next scheduled port of call or to deviate to some closer port in order to obtain medical attention.

The availability of medical facilities should always be considered when determining the best course of action in treating a medical emergency. The reasonableness of the Master's decision will likely be the conduct measured in the event that his or her deeds are later called into question. Considerations should be given to such means as: the accessibility of radio contact with a physician, the distance from medical evacuation by air, distance to the nearest port, the likelihood of securing competent medical care at the nearest port, the nature and severity of the injuries sustained by the crew member, and any advice offered by medical professionals during remote consultations.

The many advances in electronic communications from scheduled Morse code to satellite conversations on demand have brought the patient at sea closer to

[19] Jones Act, 46 U.S.C. § 10903

shore, at least for the availability of medical advice. Even with a physician on a satellite communications device, the decision of when to treat aboard and when to evacuate a medical casualty is a case by case decision.

The historical root of an obligation to evacuate a medical casualty when adequate care is not apparent aboard the ship is rooted in a 1900 case[20] involving a seaman who fell from the yards of a vessel while rounding Cape Horn, sustaining injuries including a broken leg. The ship's Master and the carpenter set the leg, and the vessel arrived in San Francisco months later. The mariner recovered from his other injuries but his leg did not heal and ultimately led to the amputation of the limb. The disabled crew member sued the Master for failing to put into port for proper medical attention. The Supreme Court concluded then that the circumstances dictate the necessary decision, and that in this case, the Master should have sought medical attention beyond that which was available aboard the vessel. The case affirmed the historical duty of the ship owner and Master to provide proper medical treatment and attendance for a mariner taken ill or sustaining an injury in the service of the owner's ship.

In the case of the IROQUOIS [21], the Master was allowed extremely broad discretion concerning the decision to deviate, and was even allowed to take the convenience of its cargo into account in making that decision. The court in that case stated: "We cannot say that in every instance where a serious accident occurs the Master is bound to disregard every other consideration and put into the nearest port, though if the accident happened within a reasonable distance of such port, his duty to do so would be manifested. Each case must depend upon its own circumstances, having reverenced to the seriousness of the injury, the care that can be given the sailor on ship board, the proximity of an intermediate port, the consequences of delay to the interests of the ship owner, the direction of the wind and the probability of its continuing in the same direction, and the fact whether a surgeon is likely to be found with competent skill. With reference to putting into port, all that can be demanded of the Master is the exercise of reasonable judgment, and the ordinary acquaintance of a seaman with the geography and resources of the country. He is not absolutely bound to put into such port if their cargo be such as would be seriously injured by the delay. Even the claims of humanity must be weighed in a balance with the loss that would probably occur to the owners of the ship and cargo. A seafaring life is a dangerous one, accidents of this kind are peculiarly liable to occur, and the general principle of law that a person entering a dangerous employment is regarded as assuming the ordinary risks of such employment is peculiarly applicable to the case of seamen."

Many factors are to be taken into consideration when a decision to deviate is contemplated. A modern court would probably place much less emphasis upon

[20] Jones Act 46 U.S.C. § 688
[21] The IROQUOIS, 194 U.S. 240 (1904)

the convenience to the vessel owners or to cargo when balanced against the necessity for medical treatment to a seriously ill or injured crew member. If an incorrect decision is made, the most likely result will be a civil suit against the vessel owner by the injured or ill crew member, a suit which will not involve the vessel's Master. However, it should be remembered that any decision made regarding deviation or even treatment of a crew member may be scrutinized by the U.S.Coast Guard. Such U.S. Coast Guard scrutiny may result in a proceeding being instituted by the U.S. Coast Guard against the vessel Master's license for negligence or inattention to duty.

Many of the duties that are owed to the crew member are also owed to a passenger. A passenger is one who travels aboard a vessel by way of a contract, express or implied, for some payment of fare or other consideration to the carrier.[22]The standard of care for passengers and all other persons lawfully aboard a vessel has been "reasonable care under the circumstances."[23] This same standard is also afforded to visitors. Visitors are not passengers but have in fact boarded the vessel with the consent of the owner or operator of the vessel and are thereby entitled to the same standard of care.[24] If a passenger or visitor is injured, it is the duty of the Master to give such care as is reasonably practical given the facilities available on board. If a competent physician happens to be available and is consulted by the Master, following such advice will exonerate the Master.[25] Again, with seriously infirm passengers or crew members, it may be necessary to decide whether or not to deviate to a nonscheduled port to obtain medical attention.

The court in Gamble listed a number of factors, which should be considered when assessing the reasonableness of the decision to deviate or not to deviate for the care of passengers. The court stated that: "It is generally established that a vessel is not required to deviate from its course in every instance in order to procure medical assistance for an injured passenger." The factors to be considered parallel those mentioned above for crewmembers with the added responsibility that hospitality would demand. The role of passengers aboard a vessel differs slightly from that of crewmember in that the passenger is more of a guest aboard the vessel rather than a functional member of the crew, thus courtesy and kindness afforded to them are consideration in respect to care.

Other forms of passengers include stowaways and those rescued at sea. A stowaway is owed no greater duty than whatever constitutes "humane treatment".[26] Maltreatment or physical punishment is not approved by the law. Though a stowaway will not succeed in a cause based on negligence, one could

[22] The Vueltabajo, 163 Fed. 594 (S.D. Ala. 1908).
[23] Kermarec v. Companie Generale Transatlantique, 358 U.S. 625 (1959).
[24] Rutledge v. A&P Boat Rentals, Inc., 633 F.Supp. 654 (W.D. La. 1986).
[25] Gamble v. The NEW BEDFORD, 111 F. Supp. 8, 12 (D.C. R.I. 1953)
[26] The Laura Madsen, 112 Fed. 72 (W.D. Wash. 1901); Ryder v. United States, 373 F. 2d 73 (4th Cir. 1967).

succeed in an action for willful or wanton misconduct. It is clearly the duty of the Master to give assistance to strangers rescued at sea and this is one area in particular where the owner is not held accountable if the Master neglects this duty.

The Master must, if he or she can do so without causing serious risk to vessel, crew, or passengers, render assistance to every person who is found at sea in danger of being lost: and if he or she fails to do so, shall, upon conviction, be liable to a penalty of not exceeding $1,000, or imprisonment for a term not exceeding 2 years, or both.[27]

In one case, the court exonerated the vessel's owner for its Master's failure to give aid to strangers.[28] The court noted that the International Salvage Treaty of 1910, which specifically holds the Master liable for failure to give such aid, was adopted by the United States (which was an original signatory to the treaty, and passed by the Congress as 46 U.S. Code § 2304.). Although the Master was not involved in the Warshaeur case, the court, implied that the Master could be held civilly liable for damages for failure to give aid, as well as criminally liable under the statute.

Politically unstable regions of the world invite consideration of the refugee. As a medical matter, humanitarian aid should be provided to such persons, protecting the vessel's own crew appropriately from the possibility of unknown communicable diseases. The legal consequences and exposure to liability by rendering humanitarian aid are few. The taking aboard of shipwrecked or persons fleeing political oppression raises legal issues better dealt with after the successful rescue and rendering of aid to such distressed persons. The humanitarian care and safety of human life should be addressed first, and political or legal issues dealt with thereafter.

Two other parties often allowed aboard ship who are not exactly the responsibility of the Master are longshoreman and scientific personnel. When a longshoreman is injured aboard a merchant vessel, the vessel is usually tied up at pier side. Responsibility is shifted in large part to the longshoreman's hatch boss, ship foreman, or even to the vessel's port captain and pier personnel. Of course if first aid can be rendered or aid given by personnel within the Master's control, then such should be done immediately.

The Oceanographic Research Vessels Act (ORVA)[29] exempts scientific personnel from the general protections of Title 46 of the United States Code relating to the welfare and protection of seamen, including the Jones Act. This is because such personnel are usually employed by a separate institution, university, or company. The application of ORVA is only to a vessel officially

[27] 46 U.S.C.§ 2303 and § 2304.
[28] Warshaeur v. Lloyd Sabaudo S.A., 71 F.2d 146 (2d Cir. 1934)
[29] 46 U.S.C. §§ 441-445.

inspected and classified by the U.S. Coast Guard as an "oceanographic research vessel."[30] The exemption relieves scientists of the requirement to obtain seaman's documents. Though not eligible for Jones Act protection, the general maritime law does protect scientific personnel, and claims for unseaworthiness can be brought.

One last category of crewmembers is that of oil rig crews. The application of law to oil rigs is dependent upon whether the rig is fixed or floating. A fixed rig is deemed an artificial island, and is not generally subject to the precepts of general maritime law, which is not to say a vessel servicing such a platform is not. A floating, towable platform, however, is accommodated under the Jones Act. The standard of care for a Jones Act negligence claim is applied.

An interesting legal situation may occur when a vessel's Master is faced with a crewmember whom he suspects may be mentally ill or suffering from delirium tremens, and presents as a danger to himself or herself and perhaps to other crewmembers.

The U.S. Coast Guard has instituted licensing proceedings against Masters who failed to safeguard mentally infirm crewmembers. The necessity for placing the infirm crewmember under restraint, as well as the form and extent of restraint used, have been closely examined by the Coast Guard.

In Commandant's Decision No. 629, the U.S. Coast Guard was faced with a situation wherein a Master was charged for failure to adequately guard a mentally infirm crewmember. In that case, the crewmember had exhibited symptoms of mental infirmity and had actually jumped overboard at one point. The evidence at the hearing showed that the crewmember was suffering from delirium tremens, as result of suddenly stopping heavy alcohol use. An adequate guard was not placed over the crewmember, even after he had jumped overboard and had been rescued. The crewmember later killed himself by slashing his wrist with a piece of glass he had obtained from the bridge. The Coast Guard, holding that a person in such a condition must be guarded until he regained "mental composure and the ability to care for himself", found the Master negligent in the license proceedings. Based on this ruling, the fact that the crewmember was not violent and was outwardly calm after having been shackled for a short period of time did not relieve the Master from his responsibility. The reasoning was that the crewmember had appeared to be rational before he had jumped overboard, but the act of jumping highly discredited any such appearances. In a similar case, a ship owner was found liable for contributing to the death of a seaman who disappeared at sea. In that case, the Master had been aware of the seaman's severe psychiatric condition and was in possession

[30] Smith v. Odom Ooffshore Surveys, Inc., 791 F.2d 211 (11th Cir. 1993).

of the seaman's suicide note prior to the seaman's death. The court determined that the seaman should have been under constant observation.[31]

In Commandant's Decision No. 910, the U.S. Coast Guard determined a vessel's Master used unreasonable force in subduing a mentally infirm crewmember, actually shooting and killing him. The decision discussed the right of Masters to use firearms to arrest a mutinous seaman, but contrasted this with a mentally infirm seaman, whose mental infirmity was known to the Master. Since the crewmember was not actively creating any danger to others in the crew, it was held that the Master's duty to protect a mentally ill crewmember would predominate over his or her duty to make an arrest for purposes of discipline and protecting his or her authority in command. The seaman in this case was also suffering from delirium tremens, and the "Ship's Medicine Chest" was sited in discussing the proper treatment of a crew member so afflicted. The vessel's Master was found negligent and action was taken against his license. Although not discussed, the Master may have been subjected to criminal penalties in that case.

By contrast with the decisions mentioned above In U.S. Coast Guard Decision No. 594, a Master was found not negligent for failing to safeguard a crew member who exhibited symptoms of hallucinations. The crew member was lost at sea as a result of his affliction, but the U.S. Coast Guard exonerated the Master. The salient difference between this situation and others discussed thus far is that the Master here, although aware of the hallucinations of the crew member, was not sufficiently apprised of any tendency toward violence or self-injury.

The U.S. Coast Guard stated: "While the shipmasters have well defined responsibility, including timely and apt measures for protection of their crew members, the evidence of this case falls far short of establishing culpable fault or negligence against this shipmaster. The deranged crew member had committed no violence to either his shipmates or himself. He had readily responded to the reasoning of his shipmates; and those who were in more close association with him than the Master were reluctant to even suggest much less recommend his confinement. Mere delusions are not sufficient basis for committing to an institution."

Whether a vessel's Master may be held negligent for failure to search for a crew member missing at sea depends upon the circumstances of the case. An appellate court found negligence where a Master of a vessel made no attempt to search for a seaman who was not reported missing until 5 hours after he was last seen.[32] The Court of Appeals stated: "We think the Court was in error (referring to the lower court) in its basic premise that Gardner was overboard soon after he was last seen. In truth, no one could easily know with any degree of certainty

[31] Bednar v. U.S. Lines, Inc., 360 F. Supp. 1313 (D.C. Ohio 1973).

[32] Gardner v. National Bulk Carriers, Inc., 310 F.2d 284 (4th Cir. 1962).

whether the fatal plunge occurred 5 minutes after he was last seen, or 5 minutes before he was reported missing. Unless such a search was made by that or other vessels in the area, it could not be determined that Gardner was beyond rescue."

However, a court in another case declined to find negligence where a seaman was last seen 11 hours before he was reported missing.[33] In this case the Master turned the vessel back on its course, but stopped searching when darkness fell, 70 miles from the place where the vessel had been when the seaman had last been seen. The court stated: "A series of speculations must all be indulged in and resolved in favor of the missing crew member in order to find any basis for saying that he could possibly have stayed afloat and alive long enough to be pulled up. Each of these speculations must also reach a result which is contrary to the overwhelming probabilities."

Even if a crewmember has not been seen for hours and is suddenly determined to be missing, a search should be made. This is necessary because it is usually unclear whether or not the crewmember fell overboard just after he or she was last seen, or just before he or she was noted to be missing. There is, however, a rule of reason applied as to when the search can be called off. When the probabilities are that the crewmember will not be rescued, it is doubtful that the U.S. Coast Guard or a court will question a Master who acts reasonably in that regard.

A Master's responsibility, of course, does not completely end when an injured or infirm crewmember dies during a voyage. Even if the Master has acted reasonably and well up to that point, he or she is still tasked with certain duties concerning the deceased crewmember. 46 U.S.C. § 10706 defines such duties: "When a seaman dies in the United States and is entitled at death to claim money, property, or wages from the Master or owner of a vessel on which the seaman served, the Master or owner shall deliver the money, property, and wages to a district court of the United States within one week of the seaman's death. If the seaman's death occurs at sea, such money, property, or wages shall be delivered to district court or a consular officer within one week of the vessel's arrival at the first port call after the seaman's death."

In summary, the law imposes duties on owners and masters of ships to care for the health of members of a crew, passengers, guests and others. This includes being able to respond to medical emergencies that may arise. Pre-planning for medical situations and acting responsibly when problems arise will be helpful in avoiding legal liability.

[33] Miller v. Farrell Lines, 247 F. 2d 503 (2nd Cir. 1957).

# CHAPTER 10

# IMMERSION HYPOTHERMIA, NEAR-DROWNING AND WATER SURVIVAL


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|---|---|
| Introduction | 10-1 |
| Physiological Responses to Cold-Water Immersion | 10-1 |
| Stages of Hypothermia | 10-2 |
| Rescue and Management of Hypothermia | 10-4 |
| Near-Drowning | 10-6 |
| Water Survival | 10-7 |

CHAPTER

10

# IMMERSION HYPOTHERMIA, NEAR-DROWNING AND WATER SURVIVAL

## INTRODUCTION

Immersion in cold water is a hazard for anyone who participates in recreational, commercial or military activities in the oceans, lakes, and streams of all but the tropical regions of the world. For practical purposes, significant risk of immersion hypothermia usually begins in water colder than 77° F. This means that the risk of immersion hypothermia in North America is nearly universal during most of the year. Cold water immersion is associated with two significant medical emergencies: near drowning and hypothermia. The following pages discuss these topics, with emphasis on the body's response to immersion and on the treatment of hypothermia and near-drowning. The chapter concludes with a brief primer on surviving in cold water.

## PHYSIOLOGICAL RESPONSES TO COLD-WATER IMMERSION

Sudden immersion in cold water results in an immediate decline in skin temperature which, in turn, stimulates a cold-shock reflex. This reflex causes an instantaneous gasping for air and sudden increases in heart rate, respiratory rate, blood flow and blood pressure. The cold-shock reflex (see below for a more complete discussion) only lasts for a few minutes, but it can be deadly if the victim's head is underwater (leading to immediate aspiration and drowning) or if the victim has no flotation assistance and cannot keep his/her head above the water. As body temperature declines, metabolism increases and shivering begins. Also, the muscles of the extremities cool rapidly, leading to a loss of manual dexterity and grip strength. As the body continues to cool, shivering eventually ceases, heart rate and blood pressure decrease, and the victim begins to suffer mental impairment, difficulty in thinking clearly, impaired perception, and finally loss of consciousness. An unconscious victim in the water will drown, oftentimes even if he/she is wearing a personal flotation device. If an immersed unconscious hypothermia victim does not drown, continued body cooling will eventually lead to cardiac arrest.

The following is a simple guide to the levels of hypothermia and their associated signs and symptoms: Note: for accuracy, body temperatures should be measured in the esophagus, if possible, or at the eardrum (but not by infrared sensor), or rectally. Oral temperatures and axillary (armpit) temperatures are not accurate in hypothermia.

**Normal:** Core body temperature @98.6 ± 1.0° F.

**Mild hypothermia:** Core body temperature 90-95° F. Shivering; impaired manual dexterity, grip strength and muscle coordination; impaired mental processes.

**Moderate hypothermia:** Core body temperature 82-90° F. Shivering ceases; loss of consciousness (at body temperatures under 86° F.); increased risk of cardiac irritability and dysrhythmias (irregular or abnormal heart rhythms).

**Severe hypothermia:** Core body temperature <82° F. Extremity stiffness; vital signs difficult to measure or absent; severe risk of ventricular fibrillation or cardiac arrest from rough handling during rescue or treatment; cardiac arrest or ventricular fibrillation usually occurs spontaneously at body temperatures below 77° F.

The body's responses to cold-water immersion can be divided into three stages: 1) initial immersion and the cold-shock response; 2) short-term immersion and loss of performance; and 3) long-term immersion and the onset of hypothermia. Each phase is accompanied by specific survival hazards for the immersion victim from a variety of physiological mechanisms. Deaths have occurred in all three phases of the immersion response.

**Stage 1:** Initial Immersion: the Cold Shock Response: The cold shock response occurs within the first 1-4 minutes of cold water immersion and is dependent on the extent and rate of skin cooling. The responses are generally those affecting the respiratory system and those affecting the heart and the body's metabolism. Rapid skin cooling initiates an immediate gasp response, the inability to breath-hold, and hyperventilation. The gasp response may cause drowning if the head is submersed during the initial entry into cold water. The significant lessening of breath holding time makes it more difficult to escape underwater from a capsized vessel, and it further increases the risk drowning in high seas. Finally, hyperventilation may cause a low level of blood carbon dioxide, which can lead to decreased brain blood flow and oxygen supply. This may lead to disorientation, loss of consciousness and drowning.

Skin cooling also initiates peripheral vasoconstriction (the constriction of small blood vessels in the skin and superficial tissues) as well as increased cardiac output, heart rate and blood pressure. The increased workload on the heart may lead to myocardial ischemia (low blood oxygen levels in the heart muscle) and arrhythmias (abnormal heart rhythm), including ventricular fibrillation. Thus, sudden death can occur either immediately or within a matter of minutes after immersion in susceptible individuals (i.e., victims with pre-existing heart disease or high blood pressure.

**Stage 2:** Short-Term Immersion: Impaired Performance: For those surviving the cold shock response, significant cooling of muscles and other soft tissue, especially in the extremities, continues with most of the effect occurring over the first 30 minutes of

immersion. This cooling has a direct negative effect on neuromuscular activity (nerve and muscle control). This effect is especially significant in the hands, where blood circulation is negligible, leading to finger stiffness, poor coordination of gross and fine motor activity, and loss of power. It has been shown that this effect is primarily due to peripheral and not central cooling. The loss of motor control makes it difficult, if not impossible, to execute survival procedures such as grasping a rescue line or hoist, operating a radio, using signaling devices, etc. Thus the ultimate cause of death is drowning, either through a failure to initiate or maintain survival performance (i.e., keeping afloat, swimming, grasping onto a liferaft, etc.) or excessive inhalation of water under turbulent sea conditions.

These phenomena have obvious survival implications. It is, of course, advisable to avoid cold water exposure completely. If cold-water immersion does occur however, it is best to quickly determine and execute a plan of action: 1) try to enter the water without submersing the head; 2) escape (i.e., pull oneself out of the water, inflate and board a liferaft); 3) minimize exposure (i.e., get as much of one's body as possible out of the water and onto a floating object); 4) ensure flotation if one must remain in the water (i.e., don or inflate a personal flotation device); and 5) call for assistance (i.e. activate signaling devices). It may be difficult to execute these actions while the cold shock is active. However, once the respiratory effects have subsided, immediate action should be taken. If self-rescue is not possible, actions to minimize heat loss should be initiated by remaining as still as possible, curling up in a fetal position. This posture is often called the "Heat Escape Lessening Posture", or HELP, but it requires the use of personal flotation device (PFD) – see Figure (1)), or huddling with other survivors. Drawstrings should be tightened in clothing to decrease the flow of cold water within clothing layers.



Figure 1

**Stage 3:** Long-term immersion: hypothermia: Many cold-water deaths likely result from drowning during the first two stages of cold-water immersion. In general, true hypothermia usually only becomes a significant contributor to death if immersion lasts more than 30 minutes. The individual who survives the immediate and short-term stages of cold-water immersion faces the possible onset of hypothermia as continuous heat loss from the body eventually decreases core body temperature.

The rate of body core cooling during cold-water immersion depends on the following variables: water temperature and sea state; clothing; body morphology; amount of the body immersed in water; behavior (e.g. excessive movement) and posture (e.g. fetal position, huddling, etc.) of the body in the water; amount of shivering; and other non-thermal factors.

# RESCUE AND MANAGEMENT OF HYPOTHERMIA

The primary goals in pre-hospital management of victims of accidental immersion hypothermia are prevention of cardiopulmonary arrest, prevention of continued cooling, moderate core rewarming if practicable, and transportation to a site of definitive medical care. Aggressive rewarming in moderate or severe hypothermia is usually ill-advised, since the means to either diagnose or manage the many potential complications are often unavailable outside the hospital. However, when transportation to a site of definitive care is impossible, as is often the case aboard a vessel, rewarming the patient using the principles and techniques of management described in the following paragraphs, is appropriate.

Retrieval of a victim from cold water immersion must be performed with caution. Sudden reduction of the "hydrostatic squeeze" applied to tissues below the water's surface may worsen low blood pressure. Since a hypothermic patient's normal cardiovascular defenses are impaired, the cold heart may be incapable of increasing cardiac output in response to a sudden drop in blood pressure. A victim's vertical posture may also worsen low blood pressure. Low blood volume, secondary to combined cold- and immersion-induced urination, and increased blood viscosity only aggravate these effects. The net result of sudden removal of a hypothermic patient from the water is similar to the sudden deflation of antishock trousers on a patient in hypovolemic (low blood volume) shock: abrupt hypotension (low blood pressure). This has been demonstrated experimentally in mildly hypothermic human volunteers, and it has been suspected as a cause of post-rescue death in many immersion hypothermia victims. Accordingly, rescuers should attempt to maintain hypothermic patients in a horizontal position during retrieval from the water and aboard the rescue vehicle. If rescuers cannot recover the patient horizontally, they should place the victim in a supine posture as quickly as possible after removal from cold water.

The patient's core temperature may continue to decline (depending on the quality of insulation provided, the patient's own heat production, active or passive manipulation of extremities, and the site of core temperature measurement) even after he/she has been rescued. This phenomenon is called afterdrop. To diminish this effect, the patient's physical activity must be minimized. Conscious patients should not be required to assist in their own rescue (for example, by climbing up a scramble net or ship's ladder) or to ambulate once out of the water (as by walking to a waiting ambulance or helicopter). Physical activity increases afterdrop, presumably by increasing the blood flow to cold muscle tissue with relatively warm blood. As this blood is cooled, venous return contributes to a decline in heart temperature,

increasing the risk of ventricular fibrillation. Experiments on moderately hypothermic volunteers (esophageal temperature 91° F) demonstrated a threefold greater afterdrop during treadmill walking than while lying still. Such an exercise-induced enhancement of afterdrop could precipitate post-rescue collapse and death. Throughout the rescue procedures and during subsequent management, hypothermic patients must be handled gently. Excessive mechanical stimulation of the cold heart is another suspected cause of deaths after rescue.

Once the patient has been brought aboard the recovery vessel, vital signs, including core body temperature (using the techniques previously mentioned), must be carefully measured. Measure pulse and respirations for a full minute to ensure accuracy. For mild hypothermia, (e.g., the patient is alert and vigorously shivering), remove the wet clothing, provide a barrier to evaporation, and insulate the patient from further heat loss (including the head and neck). For patients who are fully conscious and who can eat or drink, supplying sugar containing food or drinks is appropriate, in order to provide energy for the patient's shivering. Warm fluids may also be provided. A hot shower or bath may be used for rewarming. Otherwise, insulate the patient in a sleeping bag so as to retain the heat of shivering. Heating pads or other warm objects may also be used, but their value is reduced because these external sources of heat usually decrease the patient's shivering, which is a more efficient means of rewarming.

For moderate or severe hypothermia (e.g., the patient is not shivering, has a reduced level of consciousness or is unconscious), maintain the patient in a horizontal posture. Do not permit them to sit, stand or exercise, and do not put them in a hot shower or hot bath. If available, administer heated, humidified oxygen. Insulate them as above, but do not provide any food or fluids by mouth. Moderate or severely hypothermia victims have both a reduced gag reflex and a diminished cough reflex, thus increasing their risk for aspiration (inhaling) fluid or food particles. External sources of heat should be used to rewarm the patient (e.g., forced heated air, heating pads, hot water bottles, warmed blankets, radiant heat, body-to-body rewarming, etc.). However, be aware that cold skin is easily burned (severe burns have resulted from hot water bottles placed directly on hypothermic skin), so insulate the skin from direct contact to warm objects. If available, administer warm intravenous fluids (heated to 104-108° F). If the patient requires intubation, ventilate and pre-oxygenate for 3 minutes before intubating. Avoid hyperventilation. If the victim is in cardiopulmonary arrest (for severely hypothermic patients, check the pulse for 60 seconds before diagnosing pulselessness) CPR and modified techniques of Advance Cardiac Life Support (ACLS) must be instituted. Do NOT administer any of the cardiac drugs used in the usual ACLS protocols, as the cold patient does not metabolize these drugs normally. If defibrillation is required, use only one shock if the core temperature is less than 86° F; further defibrillations are permitted at higher body temperatures, if necessary.

## Near-Drowning

Drowning is the most common cause of death for victims who accidentally fall into the sea or who enter the water as a result of a vessel sinking or capsizing. Submersion is the term used to describe a victim whose body and head are both underwater; immersion is the term used to describe a victim whose body is underwater, but whose head remains out of the water. The term near-drowning is used for victims who are undergoing treatment or who have survived water submersion or immersion and where they aspirated water into their airways. The term drowning is usually reserved for someone who has already died following water aspiration into their airways. Near-drowning during submersion occurs when the victim can no longer hold his breath and inhales water. It is important to understand that near-drowning can also occur for immersed victims who become hypothermic, or who otherwise cannot keep their nose and mouth free of the water, even while wearing flotation equipment (e.g., from loss of consciousness or inability to cope with heavy seas).

Aspiration of water into the airways initiates several reflex defense mechanisms: coughing to clear the airways, or when the head is totally submerged, laryngospasm (closing of the vocal cords) to prevent water from entering the airways and lungs. A victim in laryngospasm can no longer breathe, and will eventually lose consciousness from hypoxia (lack of oxygen). When the vocal cords relax, water can then enter the airways and lungs, either passively (if the victim has stopped breathing) or actively if the victim is still breathing.

In all cases, the primary physiologic problem in near-drowning is hypoxia. The human body can normally withstand hypoxia for 4-6 minutes. This is true both for cardiac arrest on land and for near-drowning in warm water (>80° F). However, near-drowning in cold-water can result in a much longer survival time (up to 60 minutes of underwater time or hypoxia). This dramatic increase in potential time for successful resuscitation is likely due to rapid cooling of the brain, particularly if the victim continues to breathe cold-water after losing consciousness, and to the effects of the mammalian diving reflex (a physiologic mechanism used by whales, seals, porpoises, etc. wherein the heart rate slows dramatically and blood flow is distributed mainly to vital organs). For these reasons, victims of cold-water near-drowning should be vigorously resuscitated and not declared dead prematurely, simply because they were submerged for longer than 4-6 minutes.

The treatment of all near-drowning cases involves the careful removal of the victim from the water (taking care to protect the neck in the event of spinal injury), assessment for breathing and pulse (check for a full minute, if the victim has been in cold water), clearing the airway of any water, vomit or other objects), CPR, administration of oxygen, and defibrillation if necessary when appropriately trained medical personnel and equipment are available. The most crucial part of near-drowning resuscitation is supplying oxygen to the victim and reversing the effects of hypoxia.

In clearing the airway prior to CPR, do not perform the Heimlich maneuver! The Heimlich maneuver has no role in drowning resuscitation, unless a solid foreign body obstructs the airway (this does not mean water or vomit) and ventilation is otherwise impossible. For ACLS, the same modifications of normal protocols apply for cold-water near-drowning victims as for hypothermia victims (see above: for victims colder than 86° F., no administration of cardiac drugs and only one defibrillation attempt). Hypothermic near-drowning victims should be rewarmed while CPR is ongoing, and no victim should be declared dead until they are rewarmed and fail to respond to CPR or other resuscitative efforts. Transportation from a vessel to a site of more definitive medical care is recommended, particularly if the ship is not equipped for ACLS.

**Water Survival**

Survival in the water depends on the avoidance of both drowning and hypothermia and on the many factors related to these risks. These include: 1) ability to swim; 2) ability to keep the head out of water (even without flotation aids); 3) ability to avoid panic; 4) sea state; 5) availability and type of personal flotation device (PFD); 6) availability of a life raft; 7) availability of other floating objects to increase buoyancy (such as a capsized boat); 8) water temperature; 9) physical characteristics of the survivor (i.e., body size and weight); 10) type of protective clothing worn against immersion hypothermia and initial immersion cold shock; 11) behavior of the survivor in the water; 12) availability of signaling devices (whistles, flares, strobe lights, radios, and mirrors) and the ability to use these devices; and 13) proximity of rescue personnel.

Drowning is the most immediate survival problem following water entry. To maintain airway freeboard and to avoid drowning, a survivor must possess the physical skills and psychological aptitude to combat the effects of wave action. Although a PFD assists in maintenance of airway freeboard (the distance above the water of the survivor's nose and mouth), waves can still submerge a survivor's head, especially in rough seas (see Figure (1)). But even in moderately calm seas, survivors at night (who cannot see oncoming wavers) or those with a diminished level of consciousness may inhale water, even while wearing a PFD. To reduce the risk of drowning in rough seas, a survivor can increase effective airway freeboard by partially exiting the water (for example, clinging to an overturned vessel or other debris floating in the water – see Figure (2)) or by climbing totally out of the water into a life raft or onto a capsized vessel. In both these environments, however, the survivor may still be exposed to waves.

Figure 2



In cold-water survival, it is important to remember that swimming or other movement in the water increases the body's heat loss. Cold water transmits heat 25 times faster than air at the same temperature. Therefore, as rapidly as the body produces heat through swimming or muscle activity, cold water removes it, increasing the body's cooling rate. Therefore, for a survivor wearing a PFD, holding still with legs curled up and arms on the chest (i.e. a semi-fetal position – the HELP position) increases survival time, as does huddling with other survivors (see Figure (3). Even more importantly, a survivor should get as much of his body out of the water as possible. Elevating the body out of the water onto an overturned boat or other floating objects can significantly increase survival time. If a survivor has an option to get out of the water, even if the air conditions are cold, wet and windy, he should do so as soon as possible; he should not worry about wind-chill. Being immersed in cold water is far worse than being exposed to cold air and wind in almost any combination of air and water temperatures. In addition, a survivor should protect the head and neck from exposure to cold water. Immersion of the head in cold water accelerates the body's heat loss, impairs mental functioning, and hastens loss of consciousness (and therefore drowning).

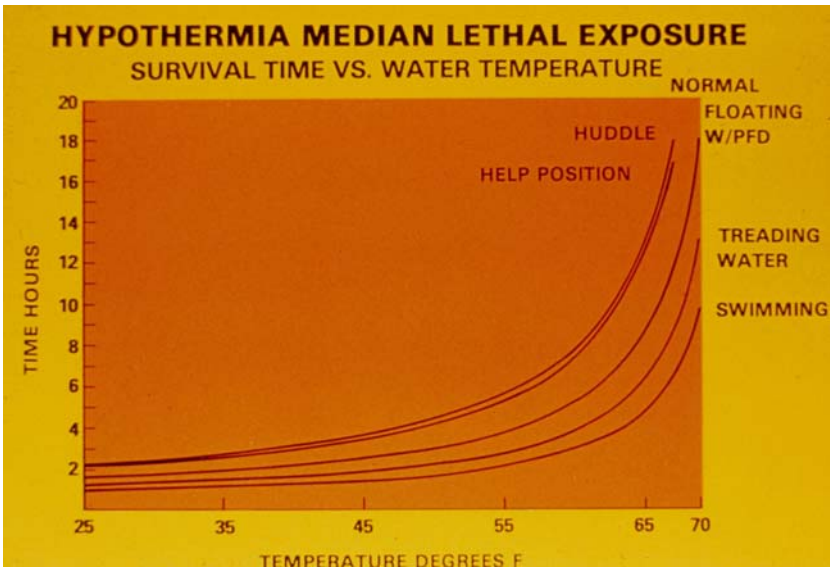



Figure 3

The prediction of survival time in cold water is complex, given the many variables discussed above. However, Figure (4) provides a rough estimate of survival times at various water temperatures (given in both degrees C. and degrees F.). The graph shows predicted calm-water survival times of lightly clothed, non-exercising humans in cold water. The graph shows a line for the average expectancy and a broad zone that indicates the large amount of individual variability associated with different body size, build, and degree of fatness, clothing worn, survival posture and behavior in the water, state of health, and the amount of the body immersed in the water. The zone

would include approximately 95% of the variation expected for adult and teenage humans under the conditions specified. In the zone where death from hypothermia is highly improbable, cold water can still cause death from drowning from "cold shock" (as discussed above) in the first few minutes of immersion, especially for those not wearing personal flotation devices. It is important to note that Fig. (4) refers to only calm-water survival times. It is important to understand that rough water decreases survival times.

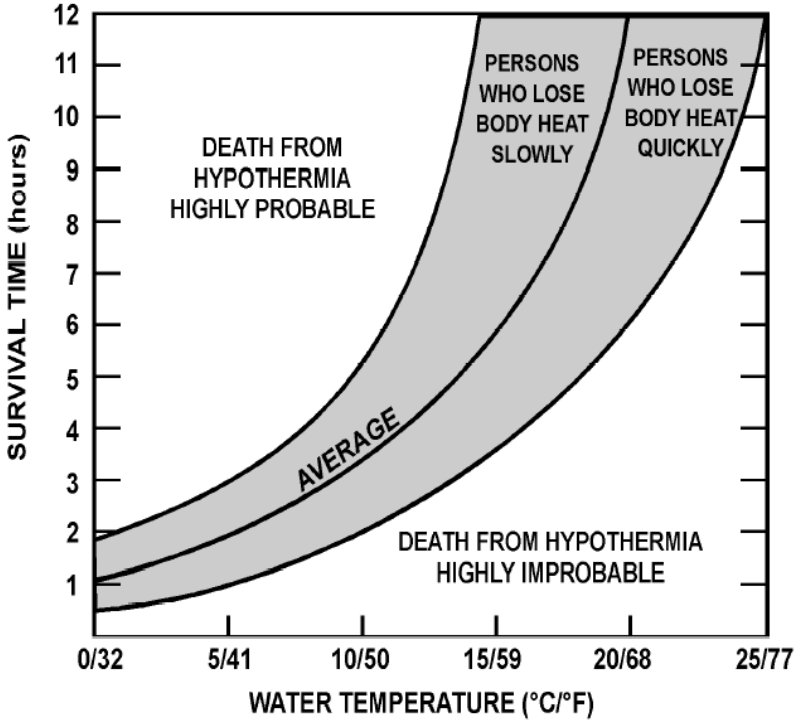



Figure 4
Predicted Survival Times in Calm Water
(see text for constraints on using this graph)

For victims who fall through ice into the water, survival time is significantly longer than the few minutes that most people assume to be true. Unless a victim drowns during the cold-shock response (in the first few minutes) from inability to keep his airways free of the water, hypothermia will not result in death in ice water for most people for an hour or longer. Once the discomfort of the reflex gasping and rapid breathing subsides, there is plenty of time to attempt to get out of the water onto the ice and/or activate signaling devices. It is quite difficult to pull oneself out of the water onto ice after having broken through the surface. However, it can be done if the survivor elevates his legs (to a near horizontal position) and kicks in the water while at the same time pulling himself out by his arms. It is important for the survivor to do this as soon as possible after water entry, before the cooling of arm and leg muscles reduce muscle strength. If the victim cannot get totally out of the water, he should try

to get his arms and as much of his trunk as possible out of the water and onto the ice. If the survivor's wet clothing then freezes to the ice, it will prevent him from sliding back into the water, even if he loses consciousness. Having part of his body out of the ice water significantly increases survival time and allows a greater chance for eventual rescue.

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# APPENDIX A

# STANDARDS OF TRAINING, CERTIFICATION AND WATCHKEEPING FOR SEAFARERS (STCW CODE)


| | |
|---|---|
| Introduction | A-1 |
| Occupational Safety, Medical Care and Survival | A-2 |
| Implementation | A-2 |
| Coast Guard NMC Policy Letter 9-99 dated December 3, 1999 | A-3 |
| Enclosure (1) Competency in Elementary First Aid | |
| Enclosure (2) Competency as Medical First Aid Provider | |
| Enclosure (3) Competency as a Person in Charge of Medical Care | |
| Enclosure (4) Competency at the Management Level | |

APPENDIX

A

# STANDARDS OF TRAINING, CERTIFICATION AND WATCHKEEPING FOR SEAFARERS (STCW CODE)

## INTRODUCTION

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, as amended, sets qualification standards for masters, officers and watch personnel on seagoing merchant ships. STCW was adopted in 1978 by conference at the International Maritime Organization (IMO) in London, and entered into force in 1984. The Convention was significantly amended in 1995. The 133 current state-parties to the Convention represent approximately 98 percent of the world's merchant vessel tonnage. The United States became a party in 1991. One of the fundamental objectives of the Convention is to establish standards of competence for the performance of tasks and to have assessments as to whether an individual meets each competence level. In addition, the 1995 Amendments require that all mariners receive basic safety training (including elementary first aid and personal and social responsibility training). The Convention is based in part on the principle that proper training, coupled with effective application of quality management principles and use of proper procedures, will promote shipboard practices which prevent human error or detect errors at a point when adverse consequences can be averted.

The regulations specify minimum standards of competence for the range of certificates to be issued under STCW. The standards are presented in tables with four columns: a) 'competence' or ability to be established; b) area of 'knowledge, understanding and proficiency' within each competence; c) 'methods of demonstrating competence', and d) 'criteria for evaluating competence. The Coast Guard developed standards and procedures and performance measures for use by designated examiners to evaluate competence in various areas.

# OCCUPATIONAL SAFETY, MEDICAL CARE AND SURVIVAL

Within the 1995 amendments to the Convention are emergency, occupational safety, medical care and survival functions detailed in Chapter VI of the regulations and the Tables in Section A of the STCW Code. This chapter details the requirement for all seafarers to receive Basic Safety Training (BST), which includes elementary first aid as one of the four elements of training (see STCW regulation VI/1 and Section A-VI/1 of the Code). This chapter in STCW also details the mandatory minimum requirements relating to medical first aid and medical care (see regulation VI/4 and Section VI/4). The USCG requires medical first aid for licensed officers. Person in Charge of Medical Care is required of staff officers who are medical practitioners assigned aboard a vessel.

3. Section A of the STCW Code cross-refers directly to the articles and regulations and should be read in conjunction with the Convention regulations. Part A, of the Code, includes the mandatory provisions to which specific reference is made in the regulations and which give, in detail, the minimum standards required.

# IMPLEMENTATION

The new requirements require assessment of a seafarer's skills to demonstrate they are competent in the functions detailed in the Convention. This means using the U.S. Coast Guard guidelines for assessing a seafarer's skills in elementary first aid (regulation VI/1, section A-VI/1 and table A-VI/1-3), using the U.S. Coast Guard guidelines for assessing certain seafarer's skills in medical first aid (regulation VI/4, section A-VI/4 and table A-VI/4-1), and using the U.S. Coast Guard guidelines for assessing certain seafarer's skills for those designated to take charge of medical care on board a ships (table A-VI/4-2). A mariner still has to demonstrate knowledge and understanding for the various competencies and this is accomplished through a U.S. Coast Guard approved training course and/ or U. S. Coast Guard administered examination.

The **Navigation & Vessel Inspection Circulars (NVICS)** can be found at: http://www.uscg.mil/hq/g-m/nvic/

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16721
NMC Policy Letter 9-99

December 3, 1999

From: Commanding Officer, National Maritime Center
To: Distribution

Subj: Medical Training And Qualifications Set Forth In The International Convention On Standards Of Training, Certification And Watchkeeping For Seafarers, 1978, As Amended (Stcw)

1. This policy letter provides guidance concerning training requirements for certification of mariner competence in the field of medical care.

2. This policy letter supersedes and cancels NMC Policy Letter 21-98, *Acceptance of Training for Qualification as a Person in Charge of Medical Care Onboard Ship.*

3. Strictly speaking, the scheme for medical care competency required of a seafarer laid out in the STCW provides four levels of competency and affects every mariner on a seagoing vessel. Each level of competency is defined and briefly discussed below, and in separate enclosures which may be reproduced locally as information fliers.

a. The first level of medical competency, elementary first aid, is the training included as one of the four elements of basic safety training (BST) described in the STCW Code, Section A-VI/1.2.1 and Table A-VI/1-3. This training is discussed in enclosure (1).

b. The second level of medical competency is for mariners designated to provide medical first aid onboard a ship and is set forth in the STCW Code, Section A-VI/4.1 to .3 and Table A-VI/4-1. Under the STCW, each applicant for a license as an officer in charge of either a navigational watch or an engineering watch must meet the requirements of STCW Table A-VI/4-1 (required by STCW Code, Table A-II/1 for deck officers and Table A-III/1 for engineering officers). In addition to these mandatory requirements, other mariners may qualify in this competency and be issued the appropriate documentation. The requirements to qualify as a Medical First Aid Provider are discussed in enclosure (2).

c. The third level of medical training is required for a mariner who is designated to take charge of medical care onboard ship and is set forth in the STCW Code, Section A-VI/4.4 to .6 and Table A-VI/4-2. Issues relating to the training and certification for Person in Charge of Medical Care (PIC Medical Care) are discussed in enclosure (3).

d. The fourth level applies to officers qualified at the management level for service on vessels of 500 gross tons (ITC tonnage) or more. Applicants for licenses as master and chief mate must demonstrate the medical competencies identified in STCW Code, Table

Subj: MEDICAL TRAINING AND QUALIFICATIONS SET FORTH IN THE STCW

A-II/2. Applicants may elect to demonstrate these competencies by completion of approved or accepted training as discussed in enclosure (4).

4. In addition to the competencies discussed in the enclosures, the STCW Code, Section A-VI/1.6 requires that all crew members receive sufficient information and instruction to take immediate action upon encountering an accident or other medical emergency before seeking further medical assistance onboard. Crewmembers who have completed the elementary first aid element of basic safety training meet this requirement, as discussed in enclosure (1).

5. The training that leads to competency in levels one, two, and three is modular. While many of the topics are similar, each course stands alone. To qualify for a competency at levels two or three, a mariner must already be qualified at the lower level(s). Elementary First Aid is a prerequisite for competency as Medical First Aid Provider. Elementary First Aid and Medical First Aid Provider are prerequisites for competency as PIC Medical Care.

6. The approval of courses to meet STCW standards is discussed in the enclosures. A training provider who wishes to have a course approved should contact the National Maritime Center (NMC) in accordance with the guidance in NMC Policy Letter 7-98, *Submission of Applications for Course Approval*.

7. Each of the enclosures may be reproduced locally to serve as an information flier about the medical competencies.

M. S. BOOTHE

Encl: (1) Competency in Elementary First Aid
(2) Competency as Medical First Aid Provider
(3) Competency as a Person in Charge of Medical Care
(4) Competency at the Management Level

Dist: All District Commanders (m)
Commandant (G-MSO-1)
All COs MSOs
All Activity Commanders
All RECs

# COMPETENCY IN ELEMENTARY FIRST AID

## OVERVIEW

1. Elementary first aid training is designed to provide a mariner with the knowledge, understanding, and proficiency to take immediate action upon encountering an accident or other medical emergency.

2. The STCW Code, Section A-VI/1 requires seafarers employed or engaged on a seagoing ship on the business of that ship as part of the ship's complement with designated safety or pollution prevention duties in the operation of the ship to receive appropriate BST. Elementary First Aid is one element of BST. For this element, each crewmember described above must provide evidence of having achieved the required standard of competence to undertake the tasks, duties, and responsibilities listed in column 1 of STCW Code, Table A-VI/1-3. Once initial competence is achieved, the mariner must be reassessed in this competency at least every five years.

3. The requirement for completion of this element of BST became effective 1 February 1997. All mariners who are required to meet the Elementary First Aid requirements must carry acceptable proof of competency as required by 46 CFR 15.1105(c), even if they have a Medical First Aid Provider or Person in Charge of Medical Care endorsement. To accommodate the large number of mariners who needed this training immediately, several alternative schemes were devised to enable mariners to rapidly meet the required standards. These interim schemes and the acceptable proofs of competency are summarized in NMC Policy Letter 5-99 available on the World Wide Web at http://www.uscg.mil/hq/g-m/marpers/pag/policy.htm.

4. Mariners who have completed a course approved or accepted by the Coast Guard as a course in Elementary First Aid meet the requirement for first aid training in the familiarization training required by STCW Code, Section A-VI/1.6 and 46 CFR 15.1105(a)(2)(vi). The course must have been completed on or after August 1, 1993.

5. The following personnel have been determined to meet the STCW's standards of training and assessment in Elementary First Aid:

   a. A staff officer holding a certificate of registry as a medical doctor, professional nurse, marine physician's assistant, or hospital corpsmen; or

   b. A mariner holding a valid qualification as an emergency medical technician (EMT) (non-ambulance), EMT (ambulance) or as a paramedic.

Personnel meeting the Elementary First Aid requirements in this manner should carry the appropriate credential as the proof of meeting these requirements required by 46 CFR 15.1105(c).

## TRAINING AND COURSE APPROVAL

1. The Coast Guard will approve Elementary First Aid courses that cover the learning objectives of Table A-VI/1-3 of the STCW Code. International Maritime Organization (IMO) Model Course No. 1.13, *Medical Emergency - Basic Training*, contains the recommended course content with a length of 12 hours. The Coast Guard has determined that a one day course of eight hours in length

would meet the STCW requirements. Training providers may further refine the IMO Model Course and submit to the NMC for approval, but should ensure that all STCW competencies are taught and assessed.

2. The Elementary First Aid course may be taught separately or included as a part of the required BST course or program.

3. The Coast Guard has not yet determined whether courses approved to meet the requirements of 46 CFR 10.205(h) also meet STCW training requirements. We are working with the American National Red Cross to resolve this issue. In the interim, such courses are not considered equivalent to STCW-compliant courses. To be accepted as meeting the requirements for initial or reassessment of skills in Elementary First Aid, course completion certificates must specifically state that the course is Coast Guard approved as meeting the STCW Code, Section A-VI/1.2.1.3. Some Red Cross Chapters have asked for and received STCW approval; these courses are on the approved course list maintained by the NMC.

4. Once trained, mariners must maintain the minimum standard of competency in elementary first aid, as well as the other required elements of BST. Mariners can demonstrate that they have maintained these skills by assessment of a practical demonstration of their skills and abilities by a Coast Guard approved designated examiner, or completion of a Coast Guard approved or accepted refresher course.

# COMPETENCY AS MEDICAL FIRST AID PROVIDER

OVERVIEW

1. Training as a medical first aid provider is the second level of medical training required by the STCW. Medical first aid providers must have the knowledge and skill to conduct a primary and secondary survey of a sick or injured crewmember, immobilize the patient, and begin immediate treatment to preserve life. These are all skills which typically must be performed before obtaining radio medical advice. The STCW Code, Table A-VI/4-1 is a complete list of the required competencies.

2. The STCW Code, Table A-II/1 requires an applicant for certification as an officer in charge of a navigational watch on seagoing vessels 500 gross tons (GT) as measured under the International Tonnage Convention (and equivalent to 200 gross register tons using the domestic tonnage scheme) or more to meet the standards in Section A-VI/4.1 to .3. Similar provisions in the STCW Code, Table A-III/1, apply to an applicant for certification as an officer in charge of an engineering watch or a designated duty engineer on a vessel with main propulsion machinery of 750 Kw (1,000 HP) or more. Officers licensed as a mate of vessels of 500 gross register tons or more or as an assistant engineer on vessels of 1,000 or more HP must meet this requirement to receive an STCW form if:

a. They began the service or training after 1 August 1998; or

b. They are issued their licenses on or after 1 February 2002.

The requirement for this training does not apply to currently licensed officers or to candidates for licenses who began training or service before 1 August 1998 and who receive their licenses before 1 February 2002.

These requirements are summarized in the following table.

| **ISSUANCE DATE OF LICENSE** | **AND THE TRAINING OR SERVICE BEGAN** | **THEN THE MARINER MUST COMPLETE AN APPROVED COURSE MEETING** |
|---|---|---|
| Before 1 February 2002 | Before 1 August 1998 | 46 CFR 10.205(h) |
| Before 1 February 2002 | On or after 1 August 1998 | The STCW's standards in STCW Code, Table A-VI/4-1* |
| On or after 1 February 2002 | Anytime | The STCW's standards in STCW Code, Table A-VI/4-1* |

* The course's approval letter must specifically state that completion of the course meets these STCW standards.

3. Licensed mariners described in paragraph two and licensed officers at the management level will not have the Medical First Aid Provider endorsement placed on their license, MMD, or STCW form because it is an inherent qualification of the license. A mariner who is not required to complete Coast Guard approved or accepted training as Medical First Aid Provider may still elect to do so and will have his or her STCW form endorsed as Medical First Aid Provider in accordance with 46 CFR 12.13. If no other STCW qualifications require the issuance of an STCW form, the endorsement will be placed on his or her merchant mariner's document (MMD). If the mariner does not hold an MMD, the endorsement will be placed on his or her license.

4. The following personnel have been determined to meet the STCW's standards of training and assessment for Medical First Aid Provider:

a. A staff officer holding a certificate of registry as a medical doctor, professional nurse, marine physician's assistant, or hospital corpsmen; or

b. A mariner holding a valid qualification as an emergency medical technician (EMT) (non-ambulance), EMT (ambulance) or as a paramedic.

Personnel qualifying as Medical First Aid Provider in this manner will be issued an endorsement, if appropriate, in accordance with paragraph 3 above.

Personnel qualifying as Medical First Aid Provider in this manner also meet the Elementary First Aid training requirements and should carry the appropriate credential as the proof of meeting these requirements required by 46 CFR 15.1105(c).

5. Other mariners may qualify for this endorsement based upon completion of Coast Guard approved or accepted training, or other training equivalent to the STCW's standards. Applicants using the latter alternative should forward the following information to the National Maritime Center for evaluation:

a. A resume of his or her training and skills in this area, including information on course's content, provider and instructor(s);

b. Proof of completion;

c. Proof of any professional rating (i.e., EMT, etc.); and

d. If the training was completed over five years ago, information about maintenance of the skills in this area.

## TRAINING AND COURSE APPROVAL

1. The Coast Guard will refer to this second level training course as the Medical First Aid Provider Course.

2. The Coast Guard will approve a course that leads to the endorsement of Medical First Aid Provider if the course covers the learning objectives of Table A-VI/4-1 of the STCW Code. IMO Model Course 1.14, *Medical Emergency - First Aid*, is a useful guide to achieving the learning

objectives. The IMO Model Course recommends a course length of 21 hours. The Coast Guard agrees that a course of 21 hours in length would satisfactorily meet the STCW requirements. Training providers may further refine the IMO Model Course and submit to the NMC for approval, but should ensure that all STCW competencies are taught and assessed.

3. To be accepted as meeting the requirements for assessment of skills as Medical First Aid Provider, course completion certificates must specifically state that the course is Coast Guard approved as meeting the STCW Code, Table A-VI/4-1.

4. Completion of a course approved as meeting the STCW Code, Table A-VI/4-1 will also meet the requirements of 46 CFR 10.205(h).

5. A prerequisite for starting this course is to have achieved competency in Elementary First Aid.

# COMPETENCY AS A PERSON IN CHARGE OF MEDICAL CARE

OVERVIEW

1. Training as a Person in Charge of Medical Care (PIC Medical Care) is the third level of medical training provided under the STCW. This competency provides for a specified crew member or crew members to effectively participate in coordinated schemes for medical assistance on seagoing ships and to provide the sick or injured with a satisfactory standard of medical care while they remain onboard. Among other competencies, skill must be demonstrated at: using various splints, braces, dressings and bandages; using a resuscitator; using a stretcher; suturing; nursing care; and administration of medications. The average ship's crew member, including senior officers, is typically unfamiliar with such skills.

2. A mariner who meets the requirements for this competency will have his or her STCW form endorsed as PIC Medical Care. If no other STCW qualifications require the issuance of an STCW form, the endorsement will be placed on his or her merchant mariner's document (MMD). If the mariner does not hold an MMD, the endorsement will be placed on his or her license.

3. Because Medical First Aid Provider is a prerequisite of PIC Medical Care, and neither endorsement has a requirement for refresher or other recurring training, endorsement as both is not necessary. The PIC Medical Care endorsement replaces the Medical First Aid Provider endorsement on the mariner's credential.

4. The STCW is not a manning document; it establishes standards for a mariner's professional qualification. The manning laws and regulations of the United States do not require a vessel to have someone specifically designated as a person responsible to take charge of medical care. If by practice, company policy, or to meet STCW requirements, someone aboard a seagoing ship is designated to take charge of medical care, that individual must meet the standards of competency set forth in STCW Code, Section A-VI/4-2, and be able to produce evidence of having met those standards. Having a mariner onboard with this certification may eliminate potential port-state control problems which could otherwise result.

5. Staff officers holding a certificate of registry as a medical doctor, professional nurse, marine physician's assistant, or hospital corpsman have been determined to meet the STCW's standards of training and assessment for PIC Medical Care. Personnel obtaining the PIC Medical Care endorsement in this manner will be issued an endorsement in accordance with paragraph 2 above. Personnel qualifying as PIC Medical Care in this manner also meet the Elementary First Aid training requirements and should carry the appropriate credential as the proof of meeting these requirements required by 46 CFR 15.1105(c).

6. NMC Policy Letter 21-98, *Acceptance of Training for Qualification as a Person in Charge of Medical Care Onboard Ship*, which is cancelled by this policy (NMC Policy Letter 9-99), erroneously allowed a mariner holding a valid qualification as an emergency medical technician (EMT) (non-ambulance) to receive an endorsement as PIC Medical Care. A more in-depth comparison of EMT training and assessment procedures with Table A-IV/4-2 of the STCW Code

has shown that the Code requires training and assessment in topics not usually covered in EMT courses, such as: suturing; wound healing; nursing care; diseases and disease prevention; dental care; etc. EMTs should no longer be given the PIC Medical Care endorsement.

TRAINING AND COURSE APPROVAL

1. The Coast Guard will approve courses leading to qualification as PIC Medical Care if the course covers the learning objectives of Table A-VI/4-2 of the STCW Code. IMO Model Course No. 1.15, *Medical Care,* is a useful guide to achieving the learning objectives. The IMO Model Course recommends a course length of 40 hours. The Coast Guard agrees that a course of 40 hours in length would satisfactorily meet the STCW requirements. Training providers may further refine the IMO Model Course and submit to the NMC for approval, but should ensure that all STCW competencies are taught and assessed.

2. To be accepted as meeting the requirements for assessment of skills as PIC Medical Care, course completion certificates must specifically state that the course is Coast Guard approved as meeting the STCW Code, Table A-VI/4-2.

3. The prerequisites for starting a course leading to a PIC Medical Care endorsement are to have achieved competency in Elementary First Aid and as a Medical First Aid Provider.

# COMPETENCY AT THE MANAGEMENT LEVEL

## OVERVIEW

1. Training at the management level is the fourth level of medical training required by the STCW. The fourth level applies to applicants for licenses as Master and Chief Mate for service on vessels of 500 gross tons (ITC tonnage) or more. Such applicants must demonstrate the medical competencies surrounding organizing and managing the provision of medical care onboard ship. These are identified in Table A-II/2 of the STCW Code.

2. For all practical purposes, the medical care competencies in Table A-II/2 of the STCW Code are a subset of the competencies required for PIC Medical Care.

## TRAINING AND COURSE APPROVAL

1. The Coast Guard will approve courses to assess medical care competencies leading to qualification as Master and Chief Mate for service on vessels of 500 gross tons (ITC tonnage) or more. Such courses must cover only the medical care learning objectives of organizing and managing the provision of medical care onboard ship in Table A-II/2 of the STCW Code. These competencies must be covered in the same manner and same level of detail as generally accepted to satisfy the training requirements for PIC Medical Care as shown in IMO Model Course 1.15, *Medical Care*.

2. No such courses have been approved by the NMC to date. Training providers may submit courses satisfying this requirement to the NMC (NMC-4B).

3. A mariner who completes a Coast Guard approved or accepted PIC Medical Care Course also meets the requirements for proving competence in medical care at the management level.

4. To be accepted as meeting the requirements for assessment of skills at the management level, a course must be Coast Guard approved as meeting Table A-II/2 of the STCW Code, unless it has been approved as meeting the requirements for PIC Medical Care.

# APPENDIX B

# STANDARDS OF COMPETENCE FOR SEAFARERS DESIGNATED TO PROVIDE ELEMENTARY FIRST AID


| | |
|---|---|
| Standards | B-1 |
| Specification of Minimum Standard of Proficiency in Elementary First Aid | B-2 |
| Coast Guard Assessment Guideline of Table A-VI/1-3 | B-3 |

APPENDIX

B

# STANDARDS OF COMPETENCE FOR SEAFARERS DESIGNATED TO PROVIDE ELEMENTARY FIRST AID

## STANDARDS – SECTION A-VI/1-3 OF STCW CODE

Standards Regarding Emergency, Occupational Safety, Medical Care and Survival Functions

Seafarers employed or engaged in any capacity on board ship on the business of that ship as part of the ship's complement with designated safety or pollution prevention duties in the operation of the ship shall, before being assigned to any shipboard duties, receive appropriate approved basic training or instruction in elementary first-aid as set out in table A-VI/1-3; be required to provide evidence of having achieved the required standard of competence to undertake the tasks, duties and responsibilities listed in column 1 of tables A-VI/1-3 within the previous five years through:

.1 demonstration of competence, in accordance with the methods and the criteria for evaluating competence tabulated in columns 3 and 4 of those tables; and

.2 examination or continuous assessment as part of an approved training programme in the subjects listed in column 2 of those tables.

The Administration may, in respect of ships other than passenger ships of more than 500 gross tonnage engaged on international voyages and tankers, if it considers that a ship's size and the length or character of its voyage are such as to render the application of the full requirements of this section unreasonable or impracticable, exempt to that extent the seafarers on such a ship or class of ships from some of the requirements, bearing in mind the safety of people on board, the ship and property and the protection of the marine environment.

# TABLE A-VI/1-3 of STCW CODE

# STANDARD OF COMPETENCE FOR SEAFARERS DESIGNATED TO PROVIDE

# ELEMENTARY FIRST AID

**Specification Of Minimum Standard Of Proficiency In Elementary First Aid**

| COMPETENCE | KNOWLEDGE, UNDERSTANDING AND PROFICIENCY | METHODS FOR DEMONSTRATING COMPETENCE | CRITERIA FOR EVALUATING COMPETENCE |
|---|---|---|---|
| Take immediate action upon encountering an accident or other medical emergency | Assessment of needs of casualties and threats to own safety<br><br>Appreciation of body structure and functions<br><br>Understanding of immediate measures to be taken in cases of emergency, including the ability to:<br><br>.1 position casualty<br><br>.2 apply resuscitation techniques<br><br>.3 control bleeding<br><br>.4 apply appropriate measures of basic shock management<br><br>.5 apply appropriate measures in event of burns and scalds, including accidents caused by electric current<br><br>.6 rescue and transport a casualty<br><br>.7 improvise bandages and use materials in emergency kit | Assessment of evidence obtained from approved instruction or during attendance at an approved course | The manner and timing of raising the alarm is appropriate to the circumstances of the accident or medical emergency<br><br>The identification of probable cause, nature and extent of injuries is prompt and complete and the priority and sequence of actions is proportional to any potential threat to life<br><br>Risk of further harm to self and casualty is minimized at all times |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-3**
**Specification for minimum standard of competency in Elementary First Aid**

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | Knowledge of body structure and function | When given a body chart and asked to identify the basic components and describe function of each major body system when named, | the candidate will identify and describe (or select the answer that identifies and describes) the basic components and function of each named major body system. | For each major body system (respiratory, circulatory, lymphatic, nervous, musculosketetal, integumentary, digestive, endocrine and genito-urinary), the candidate will identify and describe (or select the answer that identifies and describes) the system's basic function. |
| | Knowledge of immediate measures to take in cases of emergency, including the ability to:<br><br>.1 position the casualty | When asked in an approved written examination to list the reasons for not changing the position of a patient, | the candidate will list (or select the answer that lists) the reasons for not changing the position of a patient. | The candidate will list (or select the answer that lists) the reason or reasons for not changing the position of a patient: possibility of causing further injury or aggravating other internal injuries; and, possibility of the existence of a spinal cord injury. |
| | | When asked in an approved written examination to list the reasons for changing the position of a patient, | the candidate will list (or select the answer that lists) the reasons for positioning a patient. | The candidate will list (or select the answer that lists) the reason or reasons for positioning a patient: to eliminate airway obstruction; to alter level of consciousness to recovery position; and, as part of shock management. |

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Conditions | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | .2 apply resuscitation techniques | Given a resuscitation mannequin, when asked to demonstrate determining whether resuscitation is required, | the candidate will use the resuscitation mannequin to demonstrate determining whether resuscitation is required. | The candidate will use the resuscitation mannequin to demonstrate determining whether resuscitation is required by doing all of the following in 30 seconds or less in the order stated: call out to the individual, gently shake the individual, assess the response in each case, and then, if no response, call for help. |
| | | Given a resuscitation mannequin, when asked to demonstrate the opening of the airway and checking for breathing, | the candidate will demonstrate the opening of the airway and checking for breathing. | The candidate will in 1 minute or less correctly use the resuscitation mannequin to demonstrate the opening of the airway and checking for breathing by doing both of the following: administering the modified jaw thrust or the head-tilt/chin-lift, and listening and feeling for breathing. |
| | | When asked in an approved written examination to describe procedures for two-person CPR, | the candidate will list (or select the answer that lists) the proper procedures for two-person CPR. | The candidate will list (or select the answer that lists) the proper procedures for two-person CPR, including determining whether resuscitation is required, opening the airway and checking for breathing and pulse, proper hand placements, proper compressions and ventilations. |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-3**
**Specification for minimum standard of competency in Elementary First Aid**

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | | Given a resuscitation mannequin, and told to take the appropriate action for an unresponsive person who is not breathing, | the candidate will demonstrate the proper action to take for an unresponsive person who is not breathing | The candidate will use the resuscitation mannequin to demonstrate the proper action by immediately providing 2 ventilations (mouth-to-mouth or mouth-to-nose or mouth-to-barrier device), achieving good chest rise and taking 1-1/2 to 2 seconds each. |
| | | Given a resuscitation mannequin, and asked to demonstrate the procedure for determining if a patient has a pulse, | the candidate will demonstrate the procedure for determining if a patient has a pulse. | The candidate will use the resuscitation mannequin to correctly demonstrate the procedure for determining if a patient has a pulse by checking the carotid artery pulse for 5 to 10 seconds. |
| | | Given a resuscitation mannequin, and asked to demonstrate proper hand placements for chest compressions, | the candidate will demonstrate proper hand placements for chest compressions. | The candidate will use the resuscitation mannequin to demonstrate proper hand placements for chest compressions, ensuring all of the following: compression site is two finger widths above xiphoid process, heel of hand is on sternum with other hand on top, and fingers are off ribs. |

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | | Given a resuscitation mannequin, when asked to demonstrate proper CPR compressions for 2 minutes, | the candidate will demonstrate proper CPR compressions for 2 minutes. | The candidate will use the resuscitation mannequin to demonstrate proper CPR compressions for 2 minutes, ensuring all of the following: cycles of 15 compressions followed by 2 slow ventilations are maintained, compressions are administered at a rate of 80 - 100 compressions per minute, compression depths are 1½ to 2 inches, and the patient is reassessed for breathing and pulse after the fourth cycle. |
| | Two person<br><br>Entrance of second rescuer | Given a resuscitation mannequin with one candidate performing one person CPR, when asked to perform two person CPR, | the second candidate will take over proper CPR compressions for 2 minutes while the first candidate maintains proper ventilations; after two minutes, the candidates will switch positions and continue two person CPR. | The candidates will use the resuscitation mannequin to demonstrate proper two person CPR compressions and for 2 minutes, ensuring all of the following: cycles of 5 compressions followed by 1 slow ventilation are maintained, compressions are administered at a rate of 80 - 100 compressions per minute, compression depths are 1½ to 2 inches, and the patient is reassessed for breathing and pulse after the fourth cycle. |

## Coast Guard Assessment Guidelines for TABLE A-VI/1-3
## Specification for minimum standard of competency in Elementary First Aid

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | | Given a resuscitation mannequin, when asked to demonstrate proper actions for a conscious adult with a foreign body airway blockage, | the candidate will demonstrate proper actions for a conscious adult with a foreign body airway blockage. | The candidate will use the resuscitation mannequin to correctly demonstrate proper actions for a conscious adult with a foreign body airway blockage by doing all of the following: asking, “Are you choking?” and if the response is affirmative, giving abdominal or chest thrusts, using proper hand placement, until effective or victim becomes unconscious. |

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Conditions | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | | Given a resuscitation mannequin, when asked to demonstrate the proper series of actions for an adult with a foreign body airway blockage and slipping into an unconscious state, | the candidate will demonstrate the proper series of actions for an unconscious adult with a foreign body airway blockage until attempts are successful. | The candidate will use the resuscitation mannequin to correctly demonstrate the proper series of actions for an unconscious adult with a foreign body airway blockage by doing all of the following until attempts are successful: establishes patient's unresponsiveness; calls for help; opens airway by using head-tilt/chin lift; attempts to ventilate; when told 1st attempt is unsuccessful, repositions head and attempts to ventilate a 2nd time; when told 2nd attempt is unsuccessful and victim is unconscious, performs up to 5 abdominal or chest thrusts using proper hand placement; performs tongue-jaw lift and finger sweep; repeats repositioning of the head and ventilation attempts until told attempts are successful. |
| | .3 control bleeding | Given a rescue mannequin with a bleeding injury simulated or described and asked to demonstrate proper bleeding control techniques, taking into consideration the location and severity of the injury, | the candidate will use the rescue mannequin with a simulated or described bleeding injury to demonstrate proper bleeding control techniques, taking into consideration the location and severity of the injury. | Using the rescue mannequin, the candidate will correctly demonstrate proper bleeding control techniques, taking into consideration the location and severity of the injury, by doing the following: applying direct pressure; elevating the extremity; and applying pressure at the appropriate pressure point. |

## Coast Guard Assessment Guidelines for TABLE A-VI/1-3
## Specification for minimum standard of competency in Elementary First Aid

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | .4 apply appropriate measures of basic shock management | When asked in an approved written examination to identify the signs and symptoms of shock development, | the candidate will identify (or select the answer that identifies) the signs and symptoms of shock development. | The candidate will identify (or select the answer that identifies) the following sets of signs and symptoms of shock development: (1) rapid and shallow respiration; (2) thirst, nausea and vomiting; (3) weak and rapid pulse; and (4) restlessness, excitement and anxiety. |
| | | When asked in an approved written examination to describe the position for a patient in shock that does not have an injury to the spine or a lower extremity, | the candidate will describe (or select the answer that describes) the position for a patient in shock that does not have an injury to the spine or a lower extremity. | The candidate will describe (or select the answer that describes) the position for a shock patient that does not have an injury to the spine or a lower extremity including all of the following: (1) patient lying on the floor, and (2) legs elevated. |
| | .5 apply appropriate measures in event of burns and scalds, including accidents by electric current | When asked in an approved written examination to identify the kinds of burns that can occur, | the candidate will identify (or select the answer identifies) the kinds of burns that can occur. | The candidate will identify (or select the answer that identifies) the following kinds of burns: thermal, chemical, electrical, respiratory and radiation. |

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | | When asked in an approved written examination to describe the nature, severity and differentiating characteristics of first, second, and third degree burns, | the candidate will describe (or select the answer that describes) the nature, severity and differentiating characteristics of first, second, and third degree burns. | The candidate will describe (or select the answer that describes) first, second and third degree burns: (1) first degree – affects only outer epidermal area, characterized by redness, pain, increased warmth, or tenderness; (2) second degree – affects entire layer of epidermis, characterized by blistering, deep reddening, considerable swelling and severe pain; (3) third degree – affects epidermis and possibly muscle and bone, characterized by charring which may be black, brown, hard, cherry red and dry, milk white, or thick and leathery. |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-3**
**Specification for minimum standard of competency in Elementary First Aid**

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | | When asked in an approved written examination to identify the means of reducing the possibility of infection for burn victims, | the candidate will identify (or select the answer that identifies) the means of reducing the possibility of infection. | The candidate will identify (or select the answer that identifies) the following means of reducing the possibility of infection: (1) scrubbing hands before treating burn; (2) using sterile gloves; (3) cleansing area with water and povidone-iodine solution; (4) removing dirt and debris from around burn site; and (5) not opening blisters or removing pieces of tissue. |
| | .6 rescue and transport a casualty | When asked in an approved written examination when the victim *should not* be moved *prior* to evaluation and treatment, | the candidate will state (or select the statement that states) the circumstances when the victim *should not* be moved *prior* to evaluation and treatment. | The candidate will state (or select the answer that states) that the victim should not be moved prior to evaluation and treatment unless danger from fire, flooding, explosion and toxic substances, or any other immediate threat to life, requires movement from the area. |

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | | When asked in an approved written examination to list the circumstances when a victim *should* be moved from the scene, | the candidate will list (or select the answer that lists) the circumstances when a victim *should* be moved from the scene. | The candidate will list (or select the answer that lists) the circumstances when a victim should be moved from the scene by indicating both of the following: (1) after suspected fractures have been immobilized and severe bleeding has been stopped; (2) movement is necessary due to an unsafe scene or in order to further treat the victim. |
| | | Given a rescue mannequin or a volunteer patient, and given a variety of splints and ties, when asked to demonstrate the immobilization of a fracture, | the candidate will demonstrate the immobilization of a fracture named by the assessor using splints and ties on either the rescue mannequin or volunteer patient. | The candidate will in 10 minutes or less, correctly demonstrate the immobilization of the simple limb fracture named by the assessor using splints and ties on either the rescue mannequin or volunteer patient, achieving all of the following: (1) proper traction; (2) stability; and (3) padding. |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-3**
**Specification for minimum standard of competency in Elementary First Aid**

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | | Given a rescue mannequin or a volunteer patient, when asked to demonstrate a log-roll, | the candidate, as team leader, will use a rescue mannequin or volunteer patient to demonstrate a logroll. | Using the rescue mannequin or volunteer patient, the candidate will, in 10 minutes or less, act as the team leader to correctly demonstrate a log-roll, doing all of the following: supporting the head; directing other rescuers to position themselves on the side of the patient; directing other rescuers hand placement on patient's shoulder, waist, hip, thigh, and legs; informing the other rescuers that on command, to roll the patient toward them, calling the command to "roll" while maintaining alignment of head with body; directing placement of spine board behind patient; and, calling the command for moving the patient onto spine board. |

| Column 1<br><br>STCW Competence | Column 2<br><br>Knowledge, understanding and proficiency | Column 3<br><br>Performance Conditions | Column 4<br><br>Performance Behavior<br>(Mariner knowledge or action) | Column 5<br><br>Performance Standard(s)<br>(Criteria against which performance is measured) |
|---|---|---|---|---|
| | .7 improvise bandages and use materials in first aid kit | Given a roller bandage, a triangular bandage, a tubular rolled bandage and a cravat, when asked to demonstrate bandaging techniques for wound treatment for each injury site indicated, | the candidate will select the appropriate bandage(s) and/or cravat, and demonstrate the bandaging technique for wound treatment for each injury site indicated. | The candidate will select the proper bandage(s) and/or cravat, and correctly demonstrate the bandaging technique for wound treatment that holds dressing securely in place, but does not interfere with circulation for 70% (3) of any 4 of the following injury sites (named by the assessor) in the time frame indicated: (1) forearm (5 minutes; uses roller bandage); (2) chest or back (10 minutes; uses triangular bandage); (3) shoulder or hip (10 minutes; uses cravat and triangular bandages); or (4) hand or foot (5 minutes; uses triangular bandage). |

# APPENDIX C

# STANDARD OF COMPETENCE FOR PERSONS DESIGNATED TO PROVIDE MEDICAL FIRST AID


| | |
|---|---|
| Standards | C-1 |
| Specification of Minimum Standard of Proficiency in Medical First Aid | C-2 |
| Coast Guard Assessment Guideline of Table A-VI/4-1 | C-3 |

APPENDIX

C

# STANDARD OF COMPETENCE FOR PERSONS DESIGNATED TO PROVIDE MEDICAL FIRST AID

## STANDARDS - SECTION A-VI/4-1 OF STCW CODE

Every seafarer who is designated to provide medical first aid on board ship shall be required to demonstrate the competence to undertake the tasks, duties and responsibilities listed in column 1 of table A-VI/4-1.

The level of knowledge of the subjects listed in column 2 of table A-VI/4-1 shall be sufficient to enable the designated seafarer to take immediate effective action in the case of accidents or illness likely to occur on board ship.

Candidate for certification under the provisions of regulation VI/4, paragraph 1 shall be required to provide evidence that the required standard of competence has been achieved in accordance with the methods for demonstrating competence and the criteria for evaluating competence tabulated in columns 3 and 4 of table A-VI/4-1.

# TABLE A-VI/4-1 of STCW CODE

# STANDARD OF COMPETENCE FOR SEAFARERS DESIGNATED TO DESIGNATED TO PROVIDE

# MEDICAL FIRST AID

**Specification Of Minimum Standard Of Proficiency In Medical First Aid**

| COMPETENCE | KNOWLEDGE, UNDERSTANDING AND PROFICIENCY | METHODS FOR DEMONSTRATING COMPETENCE | CRITERIA FOR EVALUATING COMPETENCE |
|---|---|---|---|
| Apply immediate first aid in the event of accident or illness on board | First aid kit<br><br>Body structure and function<br><br>Toxicological hazards on board, including use of the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG) or its national equivalent<br><br>Examination of casualty or patient<br><br>Spinal injuries<br><br>Burns, scalds and effects of cold<br><br>Fractures, dislocations and muscular injuries<br><br>Medical care of rescued persons<br><br>Radio-medical advice<br><br>Pharmacology<br><br>Sterilization<br><br>Cardiac arrest, drowning and asphyxia | Assessment of evidence obtained from practical instruction | The identification of probable cause, nature and extent of injuries is prompt, complete and conforms to current first aid practice<br><br>Risk of harm to self and others is minimized at all times<br><br>Treatment of injuries and the patients condition is appropriate, conforms to recognized first aid practice and international guidelines |

# COAST GUARD ASSESSMENT GUIDELINES

# TABLE A-VI/4-1

# SPECIFICATION OF MINIMUM STANDARD OF COMPETENCE FOR PERSONS DESIGNATED TO PROVIDE

# MEDICAL FIRST AID

Each candidate for an STCW endorsement as an officer in charge of a navigational watch, as an officer in charge of an engineering watch in a manned engine room, or as a designated duty engineer in a periodically unmanned engine, or each candidate seeking to meet the standards of competence for seafarers designated to provide medical first aid on board ship, must meet the standards of competence set out in STCW Code Table A-VI/4-1. To accomplish this, each candidate must:

- Complete approved education and training and meet all the competencies listed in the table;
- Pass a written examination for the portion of the competencies on knowledge and understanding; and
- Successfully accomplish a practical demonstration of skill for selected competencies.

The United States Coast Guard requires each mariner seeking proficiency as a seafarer designated to provide medical first aid on board ship to attend a course approved by the National Maritime Center. For this reason, these guidelines contain the assessment criteria for both requirements, knowledge (listed in the paragraph below) and skill requirements of Table
A-VI/4-1.

**Written Assessments**

The knowledge-based or understanding-based portion of the following competencies may be assessed through a written multiple-choice examination. The candidate must achieve a minimum passing grade of 70% in each kind of knowledge or understanding within the competency: the contents of a standard first-aid kit; the anatomy of the body and function of each body system sufficient to understand and apply the required knowledge and understanding; toxicological ship-board hazards; identification of the hazardous substance and the hazards of exposure; assessment of patients; standard isolation techniques; the treatment of burns and scalds, including the description of burns and the rule of nines; heat and cold emergencies; treatment of electrical and chemical burns, including safety of the scene and removal of electrical power; signs, symptoms and treatment of hyperthermia, hypothermia, and dehydration; information on patients to be communicated to radio medical services; medications; and sterilization and sterile techniques.

**Demonstrations of Skill**

In addition to passing a written examination, the competency entitled “Apply immediate first aid in the event of accident or illness on board” requires a practical demonstration of skill to assess proficiency. These assessment guidelines establish the conditions under which the assessment will occur, the performance or behavior the candidate is to accomplish, and the standards against which to measure the performance. The examiner should use a checklist in conducting assessments of practical demonstrations of skill. Checklists allow a training institution or designated examiner to avoid overlooking critical tasks when evaluating a candidate’s practical demonstration. Training institutions and designated examiners should develop their own checklists for use in conducting the assessments in a complete and structured manner.

## Coast Guard Assessment Guidelines for TABLE A-VI/4-1 of STCW Code
## Specification for minimum standard of competency in Medical First Aid

**** Indicates a proficiency from Table A-VI/4-1***

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| Apply immediate first aid in the event of accident or illness on board | **Examination of casualty or patient*** | In a graded practical exercise, given a simulated non-critical patient, | the candidate will perform an initial assessment (primary survey). | The candidate correctly assesses and treats, within 1 minute, life-threatening conditions, including:<br>1. level of responsiveness;<br>2. breathing;<br>3. circulation; and severe bleeding. |
| | | In a graded practical exercise, given a simulated non-critical patient, | the candidate will perform a detailed physical assessment (secondary survey). | The candidate correctly :<br>1. observes and records, within 10 minutes, all of the following:<br>a. temperature (±2ºF);<br>b. pulse (±6, rhythm, and strength);<br>c. respiration (±6, depth, rhythm, and character); and<br>d. blood pressure (±10 mm Hg systolic and diastolic); and<br>2. performs a head-to-toe assessment to identify<br>any deformities, contusions, abrasions, penetrations, burns, tenderness, lacerations, or swelling. |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-1 of STCW Code
## Specification for minimum standard of competency in Medical First Aid

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | **Spinal Injuries*** | In a graded practical exercise, given a simulated non-critical patient, use of a cervical immobilization device, a long spine board, and a team of rescuers, | the candidate will properly immobilize the patient's spine. | The candidate correctly performs, within 20 minutes and in proper sequence, all of the following:<br>a. stabilizes cervical spine;<br>b. selects and applies appropriate size cervical spine-immobilization device;<br>c. maintains cervical alignment and traction while directing a team performing a log-roll onto a long spine board; and<br>d. demonstrates securing the patient to a long spine board, securing the torso, then the head. |
| | **Fractures, dislocations, and muscular injuries*** | In a graded practical exercise, given a simulated non-critical patient and assistance from a second rescuer, and using a device to apply traction to the femur (Hare traction, Thomas D-ring, or Sager splint), | the candidate will properly immobilize and apply traction to a simulated femoral fracture. | The candidate properly applies, within 10 minutes, an appropriate femoral traction device (Hare traction, Thomas D ring , or Sager splint), performing the following tasks:<br>a. manually stabilizes the leg;<br>b. assesses neuro-vascular distal function;<br>c. properly measures and prepares device for application; |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-1 of STCW Code
## Specification for minimum standard of competency in Medical First Aid

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | | | d. applies and maintains manual traction while<br>i. positioning device on leg;<br>ii. securing proximally;<br>iii. securing distally; and<br>iv. applying mechanical traction;<br>e. secures supporting straps;<br>f. and re-evaluates distal pulse and neurological status. |
| | | In a graded practical exercise, given a simulated non-critical patient and assistance from a second rescuer | the candidate will use rigid splints to immobilize a long-bone fracture of the forearm and a bent knee fracture. | For each fracture, the candidate properly applies rigid splints, within 5 minutes, and performs the following critical elements:<br>a. manually stabilizes arm;<br>b. assesses neuro-vascular distal function;<br>c. selects and properly applies appropriate device(s);<br>d. secures splinting device(s) to extremity(ies) with appropriate materials; and |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-1 of STCW Code
## Specification for minimum standard of competency in Medical First Aid

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | | | (con't)<br>e. reassesses distal neuro-vascular function.<br>*Note:* Bent-knee fracture—padded board splints should be secured transversely to the medial and lateral aspects of the leg both above and below (distal to) the knee. |
| | **Cardiac arrest, drowning, asphyxia, and obstruction of airway by a foreign body** | In a graded practical exercise, given an adult manikin designed for cardio-pulmonary resuscitation, | the candidate will demonstrate airway-management techniques and management of a patient in cardiac arrest. | The candidate correctly demonstrates, according to standards of the American Heart Association, the following:<br>a. assessing responsiveness;<br>b. calling for help if victim remains unresponsive;<br>c. opening airway by head-tilt/chin-lift (if neck injury not suspected) or modified jaw-thrust (suspected neck injury);<br>d. assessing breathing by looking, listening, and feeling;<br>e. giving rescue breaths (2) to non-breathing victim; |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-1 of STCW Code
## Specification for minimum standard of competency in Medical First Aid

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | | | (con't)<br>f. assessing for signs of circulation by looking for normal breathing, coughing, or movement;<br>g. if no pulse, properly locating hand positions for chest compressions and administering 15 chest compressions followed by 2 ventilations;<br>h. continuing CPR for a total of 4 cycles (one minute) of 15:2;<br>i. after performing 1 minute CPR, reassess breathing and pulse;<br>j. if no pulse or breathing, continue CPR;<br>k. if pulse but no breathing, continue rescue breathing; and<br>l. if pulse and breathing present, place victim in recovery position (on side). |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-1 of STCW Code
## Specification for minimum standard of competency in Medical First Aid

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | **Cardiac arrest, drowning, and asphyxia*** | In a graded practical exercise, given an adult manikin designed for cardio-pulmonary resuscitation, simulating a patient in pulseless V-tach, V-tach over the maximum rate, or V-fib, and an Automated External Defibrillator (AED), | the candidate will demonstrate the proper set-up and simulate the use of an AED. | The candidate correctly demonstrates, according to standards of the American Heart Association:<br>a. attaching AED to pulseless victim over 12 years-of-age and 90 pounds;<br>b. activating AED according to operating procedures; and<br>c. stating the circumstances under which CPR may be terminated (victim revived, unsafe to continue, too exhausted to continue, relieved by competent provider). |
| | | In a graded practical exercise, given an adult manikin designed for cardio-pulmonary) resuscitation, | the candidate will demonstrate airway-management techniques and management of a choking/obstructed airway in a conscious victim. | The candidate correctly demonstrates, according to standards of the American Heart Association:<br>a. asking the victim whether he or she is(cont'd) choking;<br>b. if victim cannot respond, performing sub-diaphragmatic thrusts (5); and<br>c. re-assessing the victim. |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-1 of STCW Code
## Specification for minimum standard of competency in Medical First Aid

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | | | (con't)<br>*Note:* If the victim is still choking, the candidate should repeat performing sub-diaphragmatic thrusts until victim is breathing or becomes unconscious. |
| | | In a graded practical exercise, given an adult manikin designed for cardio-pulmonary resuscitation, | the candidate will demonstrate airway-management techniques and management of a choking or obstructed airway in an unconscious victim | The candidate correctly demonstrates, according to standards of the American Heart Association:<br>a. assessing (look, listen, feel);<br>b. laying victim on his or her back;<br>c. attempting rescue breathing, repositioning head if necessary;<br>d. if airway blocked, performing appropriate (adult, child, infant) CPR (no abdominal thrusts or mouth sweeps); and<br>e. continuing until airway cleared |

# APPENDIX D

# STANDARD OF COMPETENCE FOR SEAFARERS DESIGNATED TO TAKE CHARGE OF MEDICAL CARE ON BOARD SHIP


| | |
|---|---|
| Standards | D-1 |
| Specification of Minimum Standard of Proficiency in Medical Care on Board Ship | D-2 |
| Coast Guard Assessment Guideline of Table A-VI/4-2 | D-4 |

APPENDIX

D

# STANDARD OF COMPETENCE FOR SEAFARERS DESIGNATED TO TAKE CHARGE OF MEDICAL CARE ON BOARD SHIP

## STANDARD - SECTION A-VI/4-2 OF STCW CODE

Every seafarer who is designated to take charge of medical care on board ship shall be required to demonstrate the competence to undertake the tasks, duties and responsibilities listed in column 1 of table A-VI/4-2.

The level of knowledge of the subjects listed in column 2 of table A-VI/4-2 shall be sufficient to enable the designated seafarer to take immediate effective action in the case of accidents or illness likely to occur on board ship.

Every candidate for certification under the provisions of regulation VI/4, paragraph 2 shall be required to provide evidence that the required standard of competence has been achieved in accordance with the methods for demonstrating competence and the criteria for evaluating competence tabulated in columns 3 and 4 of table A-VI/4-2.

# TABLE A-VI/4-2

# STANDARD OF COMPETENCE FOR SEAFARERS DESIGNATED TO TAKE CHARGE OF

# MEDICAL CARE ON BOARD SHIP

**Specification Of Minimum Standard Of Proficiency In Medical Care On Board Ship**

| COMPETENCE | KNOWLEDGE, UNDERSTANDING AND PROFICIENCY | METHODS FOR DEMONSTRATING COMPETENCE | CRITERIA FOR EVALUATING COMPETENCE |
|---|---|---|---|
| Provide medical care to the sick and injured while they remain on board | **Care of casualty involving:**<br>Head and spinal injuries<br>Injuries of ear, nose, throat and eyes<br>External and internal bleeding<br>Burns, scalds and frostbite<br>Fractures, dislocations and muscular injuries<br>Wounds, wound healing and infection<br>Pain relief<br>Techniques of sewing and clamping<br>Management of acute abdominal conditions<br>Minor surgical treatment<br>Dressing and bandaging<br>**Aspects of nursing:**<br>General principles<br>Nursing care | Assessment of evidence obtained from practical instruction and demonstration<br>Where practicable, approved practical experience at a hospital or similar establishment | Identification of symptoms is based on the concepts of clinical examination and medical history<br>Protection against infection and spread of diseases is complete and effective<br>Personal attitude is calm, confident and reassuring<br>Treatment of injury or condition is appropriate and conforms to accepted medical practice and relevant national and international medical guides<br>The dosage and application of drugs and medication complies with manufacturers' recommendations and accepted medical practice<br>The significance of changes in patients' condition is promptly recognized |

| | | | |
|---|---|---|---|
| Provide medical care to the sick and injured while they remain on board (continued) | **Diseases, including:**<br>Medical conditions and emergencies<br>Sexually transmitted diseases<br>Tropical and infectious diseases<br>Alcohol and drug abuse<br>Dental care<br>Gynaecology, pregnancy and childbirth<br>Medical care of rescued persons Death at sea<br>Hygiene<br>**Disease prevention including:**<br>Disinfection, disinfestation, de-ratting<br>Vaccinations<br>**Keeping records and copies of applicable regulations:**<br>Keeping medical records<br>International and national maritime medical regulations | | |
| **COMPETENCE** | **KNOWLEDGE, UNDERSTANDING AND PROFICIENCY** | **KNOWLEDGE, UNDERSTANDING AND PROFICIENCY** | **CRITERIA FOR EVALUATING COMPETENCE** |
| Participate in coordinated schemes for medical assistance to ships | **External assistance, including:**<br>Radio-medical advice<br>Transportation of the ill and injured, including helicopter evacuation<br>Medical care of sick seafarers involving co-operation with port health authorities or outpatient wards in port | | Clinical examination procedures are complete and comply with instructions received<br>The method and preparation for evacuation is in accordance with recognized procedures and is designed to maximize the welfare of the patient<br>Procedures for seeking radio-medical advice conform to established practice and recommendations |

# COAST GUARD ASSESSMENT GUIDELINES

# TABLE A-VI/4-2

# SPECIFICATION OF MINIMUM STANDARD OF COMPETENCE FOR

# PERSONS IN CHARGE OF MEDICAL CARE

Each candidate for an STCW endorsement as a Person in Charge of Medical Care must meet the standards of competence set out in STCW Code Table A-VI/4-2 (46 CFR 10.203(j)). To accomplish this, he or she must:

- Complete approved education and training and meet all the competencies listed in the table;
- Pass a written examination for the portion of the competencies on knowledge and understanding; and
- Successfully accomplish a practical demonstration of skill for selected competencies.

The United States Coast Guard requires each mariner seeking proficiency as Person in Charge of Medical Care aboard ship to attend a course approved by the National Maritime Center. For this reason, these guidelines contain the assessment criteria for both requirements, knowledge (listed in the paragraph below) and skill, Table A-VI/4-2.

**Written Assessments**

The knowledge-based or understanding-based portion of the following competencies may be assessed through a written multiple-choice examination. Written examination in these areas of assessment will satisfy applicable parts of 46 CFR 10.901 if these national guidelines are used in lieu of an alternative set discussed in paragraph 5.c: Signs and symptoms of bleeding; signs and symptoms of burns, scalds and frostbite; types of wounds and their treatment; signs of infection; procedures to manage systemic pain; procedures to manage pain before cleaning; uses of lidocaine with and without epinephrine; suturing a wound and removing sutures; identifying wounds that may be sutured and criteria for removing sutures; signs, symptoms, and emergency treatment for acute abdominal conditions; steps involved in minor surgical procedures; steps for treating an abdominal evisceration; bandaging a sucking chest wound; identifying general principles of nursing care; inserting or simulating inserting a urinary drainage catheter (male and female); inserting a naso-gastric tube; injecting medicine by intramuscular and subcutaneous route; signs, symptoms and treatments for

hyperglycemia, anaphylaxis, dehydration, gonorrhea, syphilis, genital herpes, systemic infections, malaria, and hepatitis A and B; signs of alcoholism and drug abuse; signs of and treatment for toothache and other dental problems; signs, symptoms, and treatments for gynecological conditions, pregnancy and childbirth; methods to determine cause of death and how to prepare a body for storage at sea; personal hygiene; preventing disease aboard ship; preventing disease through vaccination; preparing a patient for evacuation; and methods of cooperation with health authorities in port.

**Demonstrations Of Skill**

In addition to passing a written examination, the competency entitled “Provide medical care to the sick and injured while they remain on board” requires a practical demonstration of skill to assess proficiency. These assessment guidelines establish the conditions under which the assessment will occur, the performance or behavior the candidate is to accomplish, and the standards against which to measure the performance. The examiner can use a checklist in conducting assessments of practical demonstrations of skill. Checklists allow a training institution or designated examiner to avoid overlooking critical tasks when evaluating a candidate’s practical demonstration. Training institutions and designated examiners can develop their own checklists for use in conducting the assessments in a complete and structured manner.

## Coast Guard Assessment Guidelines for TABLE A-VI/4-2 of STCW Code

## Specification Of Minimum Standard Of Competence For Persons In Charge Of Medical Care

**** Indicates a proficiency from Table A-VI/4-2***

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| Provide medical care to the sick and injured while they remain on board | **Care of the casualty involving head and spinal injuries*** | In a graded practical exercise, given a patient simulating a head injury, | the candidate will demonstrate the techniques for conducting a neurological assessment. | The candidate correctly demonstrates the following assessment techniques and states the significance of each finding:<br>1. pupillary reaction;<br>2. level of consciousness;<br>3. verbal communication; and<br>4. sensory motor status. |
| | **Care of the casualty involving injuries to ear, nose, throat and eye*** | In a graded practical exercise, given a patient simulating a bleed from the ear, | the candidate will use external bandages to control bleeding from the ear. | The candidate correctly:<br>1. demonstrates the proper procedures for self-protection against the transmission of blood-borne pathogens;<br>2. applies an external bandage to stem bleeding of the ear; and<br>3. does not pack the ear. |
| | | In a graded practical exercise, given a patient simulating a nose bleed, | the candidate will demonstrate the proper techniques to stop bleeding from the nose. | The candidate:<br>1. demonstrates the proper procedures for self-protection against the transmission of blood-borne pathogens; |

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | | | 2. positions the patient sitting upright with the head tilted forward;<br>3. pinches the bridge of the nose; and<br>4. places ice on the back of the neck or the forehead. |
| | | In a graded practical exercise, given a patient simulating an object impaled in the eye, | the candidate will demonstrate the proper method of bandaging an eye impaled by a foreign object. | The candidate:<br>1. immobilizes the object impaled in eye; and<br>2. bandages both the affected and unaffected eyes. |
| | | In a graded practical exercise, given a patient simulating a foreign liquid or solid substance in the eye, | the candidate will demonstrate the proper method of treating a foreign liquid or solid substance in the eye. | The candidate flushes the affected eye with copious amount of water (saline, if immediately available) to wash away chemicals or solid particles. |
| | | In a graded practical exercise, given a patient simulating a soft-tissue injury to the throat, | the candidate will demonstrate the proper method of treating a soft-tissue injury to the throat. | The candidate:<br>1. anticipates a compromised airway; and<br>2. maintains airway management techniques. |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-2 of STCW Code

## Specification Of Minimum Standard Of Competence For Persons In Charge Of Medical Care

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | **Care of the casualty involving external and internal bleeding*** | In a graded practical exercise, given a patient simulating a bleeding wound, | the candidate will demonstrate application of pressure dressing and location of pressure points. | The candidate correctly demonstrates the:<br>1. proper procedures for self-protection against the transmission of blood-borne pathogens;<br>2. location of the brachial and femoral pressure points; and<br>3. application of a pressure dressing at the wound site. |
| | | In a graded practical exercise, given a patient simulating an arterial bleed of an extremity, | the candidate will state when to use a tourniquet. | The candidate correctly states that a tourniquet will only be applied when:<br>1. all other methods of controlling bleeding have failed; and<br>2. continued bleeding is life-threatening.<br><br>NOTE: The candidate shall demonstrate the proper procedures for self-protection against the transmission of blood-borne pathogens. |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-2 of STCW Code

## Specification Of Minimum Standard Of Competence For Persons In Charge Of Medical Care

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | **IV Therapy*** | In a graded practical exercise, given a simulated patient or simulated arm designed for training in intravenous (IV) infusion and the necessary materials to initiate an IV infusion, | the candidate will demonstrate the proper technique for initiating maintaining, and calculating the rate of flow for the IV infusion set being used such as macro/micro drip unit an IV infusion | The candidate correctly:<br>1. demonstrates the technique for calculating rate of flow;<br>2. selects infusion equipment while maintaining sterility;<br>3. demonstrates the use of body substance isolation precautions throughout the procedure;<br>4. assembles infusion equipment while maintaining sterility, including:<br>a. infusion fluid (inspects for type of fluid, expiration date, and presence of precipitates in solution;<br>b. infusion tubing for damage;<br>c. IV catheter;<br>d. constriction band;<br>e. tape; and<br>f. insertion site dressing;<br>5. spikes infusion tubing into IV fluid container and primes tubing to remove air;<br>6. selects vein in upper extremity suitable for intravenous catheter insertion;<br>7. cleanses the insertion site with alcohol or povidone (ask about allergy to povidone); |

| | | | | |
|---|---|---|---|---|
| | | | | 8. applies constriction band;<br>9. locates vein and inserts an over-the-needle type catheter into the vein;<br>10. advances the catheter into the vein when blood enters the flash chamber;<br>11. removes the constriction band when the catheter is fully advanced;<br>12. attaches infusion tubing and secures infusion device to the patient using tape;<br>13. applies a sterile dressing to the insertion site and tapes the infusion tubing into a tension loop; and<br>14. demonstrates the method to open infusion of fluid by releasing the tubing roller clamp. |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-2 of STCW Code

## Specification Of Minimum Standard Of Competence For Persons In Charge Of Medical Care

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | **Care of the casualty involving fractures, dislocations and muscular injuries*** | In a graded practical exercise, given a patient simulating a fracture of the ankle and a dislocated shoulder, and materials for splinting, | the candidate will demonstrate the splinting of an ankle fracture and immobilization of a dislocated shoulder, | The candidate correctly applies a pillow splint to an ankle fracture, following these procedures:<br>1. manually stabilizes the fractured ankle or leg;<br>2. assesses distal neuro-vascular function;<br>3. applies pillow to the ankle and lower leg, wrapping it around the ankle and leg and keeping the foot exposed;<br>4. secures pillow using cravats or other device to tie ends together; and<br>5. re-assesses distal neuro-vascular function<br>The candidate correctly immobilizes a dislocated shoulder using the following procedures:<br>1. assesses distal neuro-vascular function;<br>2. applies sling using triangular bandage or commercial-type sling (knot of sling should not be pressing on neck); |

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | | | 3. using a cravat or other binding, applies a swath over sling and around body; and<br>4. re-assesses distal neuro-vascular functions |
| | **Care of the casualty involving techniques of sewing and clamping*** | In a graded practical exercise, given a simulated wound, suturing needle and thread, clamps, and suture-removal scissors | the candidate will utilize all of the equipment to demonstrate the proper technique to suture the wound, including the application of steri-strips. | The candidate correctly demonstrates a standard instrument tie to include the following:<br>1. ties all knots to one side of the wound;<br>2. begins sutures at center of wound and proceeds outward; and<br>3. uses strategic sutures to match up obvious points in irregular wounds.<br><br>The candidate correctly demonstrates application of steri-strips to a laceration which does not require sutures.<br><br>The candidate correctly demonstrates suture removal to include the following:<br>1. lifts suture with forceps;<br>2. cuts suture near skin surface; and<br>3. pulls suture out holding the knotted end of the suture. |

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | | | NOTE: The candidate shall demonstrate the proper procedures for self-protection against the transmission of blood-borne pathogens. |
| | | In a graded practical evaluation, given a simulated chest wound, occlusive dressing materials, and tape, | the candidate will bandage a sucking chest wound. | The candidate correctly demonstrates the following:<br>1. the proper procedures for self-protection against the transmission of blood-borne pathogens;<br>2. surveys and determines the entrance (and exit) wound(s);<br>3. covers wound(s) with occlusive dressing;<br>4. tapes three sides of the dressing over the wound; and<br>5. monitors respiratory effort of victim |
| | **Nursing Care*** | In a graded practical evaluation, given a real patient or urinary-catheterization simulator, and supplies for urinary-catheter insertion, | the candidate will insert or simulate inserting a urinary- drainage catheter (male and female). | The candidate correctly demonstrates the following:<br>1. maintenance of correct sterile techniques;<br>2. cleansing of the meatus ;<br>3. lubrication of the catheter; |

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | | | 4. insertion of the catheter into urethra until urine drains; and<br>5. opening of the roller clamp of the tubing. |
| | | In a graded practical evaluation, given a mannequin and supplies for naso-gastric tube insertion, | the candidate will insert a naso-gastric tube. | The candidate correctly demonstrates the following:<br>1. utilizes proper precautions for isolating bodily substances;<br>2. measures length of tube to insert;<br>3. lubricates tube;<br>4. positions patient;<br>5. inserts tube through nose;<br>6. demonstrates one test to confirm placement; and<br>7. secures tube to nose with tape. |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-2 of STCW Code

## Specification Of Minimum Standard Of Competence For Persons In Charge Of Medical Care

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | In a graded practical evaluation, given a real or simulated patient, and supplies for injections of medicine, | the candidate will administer medication injection by intramuscular route. | The candidate:<br>1. confirms the medicine order, calculates proper dosage, identifies correct medicine and confirmed expiration date;<br>2. draws up correct dosage from medicine vial using sterile technique, checking medicine to medicine order at least three times and using correct needle and syringe for injection based on location of injection and amount of medicine;<br>3. demonstrates the proper procedures for self-protection against the transmission of blood-borne pathogens;<br>4. Locates the injection site (deltoid, glutens, or vastus lateralis);<br>5. Cleanses the injection site with alcohol pad using circular motion;<br>6. Inserts the needle into muscle at 90° angle;<br>7. Aspirates the syringe, and, if no blood, injects the medication; and<br>8. Displays the proper handling and disposal of the needle. |

## Coast Guard Assessment Guidelines for TABLE A-VI/4-2 of STCW Code

## Specification Of Minimum Standard Of Competence For Persons In Charge Of Medical Care

| STCW Competence | Knowledge, Understanding, and Proficiency | Performance Condition | Performance Behavior | Performance Standards |
|---|---|---|---|---|
| | | In a graded practical evaluation, given a real or simulated patient, and supplies for injections of medicine, | the candidate will inject medicine by subcutaneous route and intra-muscular (IM) route.. | The candidate:<br>1. confirms the medicine order, calculates proper dosage, identifies correct medicine and confirms expiration date;<br>2. draws up the correct dosage from medicine vial using sterile technique, checking medicine to medicine order at least three times and using correct needle and syringe for injection based on location of injection and amount of medicine;<br>3. demonstrates the proper procedures for self-protection against the transmission of blood-borne pathogens;<br>4. locates the injection site;<br>5. cleanses the injection site with alcohol pad using circular motion;<br>6. inserts the needle:<br>a. into subcutaneous tissue at 45° angle;or<br>b. into intra-muscular tissue at 90° angle;<br>7. aspirates the syringe, and, if no blood, injects the medicine; and<br>8. displays the proper handling and disposal of the needle |

# APPENDIX E

# STANDARD OF COMPETENCE FOR SEAFARERS DESIGNATED TO PROVIDE PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES


| | |
|---|---|
| Standard | E-1 |
| Specification of Minimum Standard of Competence in Personal Safety and Social Responsibilities | E-3 |
| Coast Guard Assessment Guidelines of Table A-VI/1-4 | E-5 |

APPENDIX

E

# STANDARD OF COMPETENCE FOR SEAFARERS DESIGNATED TO PROVIDE PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES

## STANDARD - SECTION A-VI/1-4 OF STCW CODE

.2 Seafarers employed or engaged in any capacity on board ship on the business of that ship as part of the ship's complement with designated safety or pollution prevention duties in the operation of the ship shall, before being assigned to any shipboard duties:

.1 receive appropriate approved basic training or instruction in:

.1.1 personal survival techniques as set out in table A-VI/1-1,

.1.2 fire prevention and fire-fighting as set out in table A-VI/1-2,

.1.3 elementary first-aid as set out in table A-VI/1-3, and

.1.4 personal safety and social responsibilities as set out in table A-VI/1-4.

.2 be required to provide evidence of having achieved the required standard of competence to undertake the tasks, duties and responsibilities listed in column 1 of tables A-VI/1-1, A-VI/1-2, A-VI/1-3 and A-VI/1-4 within the previous five years through:

.2.1 demonstration of competence, in accordance with the methods and the criteria for evaluating competence tabulated in columns 3 and 4 of those tables; and

.2.2 examination or continuous assessment as part of an approved training programme in the subjects listed in column 2 of those tables.

3 The Administration may, in respect of ships other than passenger ships of more than 500 gross tonnage engaged on international voyages and tankers, if it considers that a ship's size and the length or character of its voyage are such as to render the application of the full requirements of this section unreasonable or impracticable, exempt to that extent the seafarers on such a ship or class of ships from some of the requirements, bearing in mind the safety of people on board, the ship and property and the protection of the marine environment.

# TABLE A-VI/1-4 OF STCW CODE

# STANDARD OF COMPETENCE FOR SEAFARERS DESIGNATED TO PROVIDE

# PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES

**Specification Of Minimum Standard Of Competence In Personal Safety And Social Responsibilities**

| COMPETENCE | KNOWLEDGE, UNDERSTANDING AND PROFICIENCY | METHODS FOR DEMONSTRATING COMPETENCE | CRITERIA FOR EVALUATING COMPETENCE |
|---|---|---|---|
| Comply with emergency procedures | Types of emergency which may occur, such as collision, fire, foundering<br>Knowledge of shipboard contingency plans for response to emergencies<br>Emergency signals and specific duties allocated to crew members in the muster list; muster stations; correct use of personal safety equipment<br>Action to take on discovering potential emergency, including fire, collision, foundering and ingress of water into the ship<br>Action to take on hearing emergency alarm signals<br>Value of training and drills<br>Knowledge of escape routes and internal communication and alarm systems | Assessment of evidence obtained from approved instruction or during attendance at an approved course | Initial action on becoming aware of an emergency conforms to established emergency response procedures<br>Information given on raising alarm is prompt, accurate, complete and clear |

| | | | |
|---|---|---|---|
| Take precautions to prevent pollution of the marine environment | Effects of operational or accidental pollution of the marine environment<br>Basic environmental protection procedures | Assessment of evidence obtained from approved instruction or during attendance at an approved course | Organizational procedures designed to safeguard the marine environment are observed at all times |
| **COMPETENCE** | **KNOWLEDGE, UNDERSTANDING AND PROFICIENCY** | **METHODS FOR DEMONSTRATING COMPETENCE** | **CRITERIA FOR EVALUATING COMPETENCE** |
| Observe safe working practices | Importance of adhering to safe working practices at all times<br>Safety and protective devices available to protect against potential hazards aboard ship<br>Precautions to be taken prior to entering enclosed spaces<br>Familiarization with international measures concerning accident prevention and occupational health* | Assessment of evidence obtained from approved instruction or during attendance at an approved course | Safe working practices are observed and appropriate safety and protective equipment is correctly used at all times |
| Understand orders and be understood in relation to shipboard duties | Ability to understand orders and to communicate with others in relation to shipboard duties | Assessment of evidence obtained from approved instruction or during attendance at an approved course | Communications are clear and effective at all times |
| Contribute to effective human relationships on board ship | Importance of maintaining good human and working relationships aboard ship<br>Social responsibilities; employment conditions; individual rights and obligations; dangers of drug and alcohol abuse | Assessment of evidence obtained from approved instruction or during attendance at an approved course | Expected standards of work and behavior are observed at all times |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-4**
**Specification for minimum standard of competency in Personal Safety and Social Responsibility**

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| Comply with emergency procedures | Knowledge of types of emergencies which may occur | When asked to describe the types of emergencies which may occur, | the candidate will describe in writing the types of emergencies that may occur. | The candidate will correctly describe at least 70% (4) of the following emergencies: (1) collision, (2) fire, (3) foundering, (4) grounding and (5) weather related emergencies. |
| | Knowledge of emergency signals and specific duties allocated to crew members in the muster list; muster stations; correct use of personal safety equipment | When asked to state the location of station bills and forecastle card, and describe the information they contain, | the candidate will state in writing the location of station bills and forecastle card, and describe the information they contain. | The candidate will state the location of station bills and forecastle card, and describe all of the following information they contain: (1) fire alarm signal; (2) actions to be taken by crew and passengers upon hearing the general alarm; (3) abandon ship signal; and, (4) duties assigned to each member of the crew along with the location of their lifeboat station. |
| | | When asked to state the purpose, location, and circumstances requiring lifejackets, exposure suits, hardhats, goggles, respirators, emergency escape breathing device, hearing protection, safety shoes and lumbar support belt, | the candidate will state in writing the purpose, location, and circumstances requiring lifejackets, exposure suits, hardhats, goggles, respirators, emergency escape breathing device, hearing protection, safety shoes and lumbar support belt. | The candidate will correctly state the purpose, location, and circumstances requiring lifejackets, exposure suits, hardhats, goggles, respirators, emergency escape breathing device, hearing protection, safety shoes and lumbar support belt. |

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | Knowledge of shipboard contingency plans for response to emergencies | When asked to list the steps to taken to report a fire, | the candidate will list in writing the steps to taken to report a fire. | The candidate will correctly list all of the following steps to be taken to report a fire: (1) pass word to an area where an alarm can be sounded i.e. bridge or engine room or sound the general alarm if available; (2) give all pertinent details concerning the fire location, type and size; and, (3) report actions taken so far. |
| | | When asked to list the steps to take upon seeing or hearing a person fall overboard, | the candidate will list in writing the steps to take upon seeing or hearing a person fall overboard. | The candidate will list all of the following actions to take upon seeing or hearing a person fall overboard: (1) shout “Man Overboard;" (2) throw a life ring; (3) notify the bridge as quickly as possible; and, (4) attempt to keep person in sight. |
| | Know actions to take on discovering potential emergencies, including fire, collision, foundering and ingress of water into the ship | When given a particular situation, and asked to identify the proper person to alert, | the candidate will identify in writing the proper person to alert for the situation given. | The candidate will correctly identify the proper person to alert for all of the following situations given: (1) fire; (2) collision; (3) foundering; and, (4) ingress of water into the ship. |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-4**
**Specification for minimum standard of competency in Personal Safety and Social Responsibility**

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | Know actions to take on hearing emergency alarm signals | When asked to list the actions to be taken upon hearing fire and abandon ship alarms, | the candidate will list in writing the actions to be taken upon hearing fire and abandon ship alarms. | The candidate will correctly list all of the following actions to be taken upon hearing a fire alarm: (1) follow directions on station bill by reporting to assigned emergency fire station; and (2) will, in 1 minute or less, correctly list all of the following actions to be taken upon hearing an abandon ship signal: (1) don appropriate clothing; (2) don PFD; (3) bring immersion suit; (4) perform assigned station bill duties prior to reporting to boat station; and, (5) report to boat station. |
| | Know value of training and drills. | When asked to list the reasons for requiring crew participation in training and drills, | the candidate will list in writing the reasons for requiring crew participation in training and drills. | The candidate will list at least 1 of the following reasons for requiring crew participation in training and drills: (1) prepares crew for any possible emergency; (2) repetition through drills allows for an immediate response to emergencies; (3) proper emergency procedures can save your life; or (4) all crew members rely on each other to carry out their assigned duties during emergency situations. |

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | | When a shipboard communication device is named by the assessor and asked to describe its location and operation, | the candidate will describe in writing the location and operation of each shipboard communication device named by the assessor. | The candidate will, in 1 minutes or less for each device, describe the location and operation of all of the following shipboard communication devices named by the assessor: (1) internal phone system; (2) sound powered phone system; (3) intercoms; (4) voice tubes; and, (5) hand held radios. |
| | | When a shipboard alarm system in named and then, asked to describe its location, purpose and actions to be taken for its alarm, | the candidate will describe in writing the locations, purpose and actions to be taken for each of the shipboard alarm systems named. | The candidate will, for each system, correctly describe the locations, purpose and actions to be taken when each of the following shipboard alarm systems is named by the assessor: (1) general alarms; (2) ship's whistle; (3) ship's bell; (4) $CO_2$ alarm; and, (5) engineer's call alarm. |
| Take precautions to prevent pollution of the marine environment | Know the effects of operational or accidental pollution of the marine environment. | When asked to describe the short and long term effects of pollution on water, the shoreline and marine life, | the candidate will in writing describe the short and long-term effects of pollution on water, the shoreline and marine life. | the candidate wil correctly describe in writing the short and long-term effects of pollution on each of the following: water, shoreline and marine life. |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-4**
**Specification for minimum standard of competency in Personal Safety and Social Responsibility**

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | Know the basic environmental protection procedures. | When asked to describe the important provisions of MARPOL, annexes 1 & 5, | the candidate will describe in writing the important provisions of MARPOL, annexes 1 & 5. | The candidate will correctly describe the important provisions of MARPOL, annexes 1 & 5 to include under what conditions and in what locations the discharge of oil, garbage and plastics is permissible; and, (2) the obligation to report oil spills. |
| | | When asked to explain why operational procedures must be followed to safeguard the marine environment, | the candidate will explain in writing why operational procedures must be followed to safeguard the marine environment based on appropriate tenets of MARPOL. | The candidate will explain why operational procedures must be followed to safeguard the marine environment by stating one or more of the following concepts: (1) operational procedures reflect requirements of the law; (2) operational procedures reflect the analysis of how the ship systems need to operate to comply with the law; or (3) operational procedures are designed to take the “guess work” out of safeguarding the marine environment. |

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| Observe safe working practices | Know the importance of adhering to safe working practices at all times. | When asked to describe areas or conditions aboard ship where injuries are common (frequent or more likely) and special attention to prevention is needed, | the candidate will describe in writing areas or conditions aboard ship where injuries are common (frequent or more likely) and special attention to prevention is needed. | The candidate will describe at least 5 of the following areas or conditions aboard ship where injuries are common (frequent or more likely) and special attention to prevention is needed: (1) slippery surfaces; (2) stairwells and ladders; (3) dimly lit areas; (4) areas of moving machinery; (5) mooring lines, and coiled lines or hoses; (6) electrical hazards; (7) hot surfaces; (8) areas of entrapment. |
| | | When asked to describe common safety practices for shipboard work, | the candidate will describe in writing common safety practices for shipboard work. | The candidate will correctly describe all 3 common safety practices for shipboard work: (1) "one hand for me and one for the ship"; (2) proper lifting techniques; and, (3) get help when needed. |
| | Know precautions to be taken prior to entering enclosed spaces. | When asked to define an "enclosed space" and describe the dangers associated with enclosed spaces, | the candidate will define in writing an "enclosed space" and describe the dangers associated with enclosed spaces. | The candidate will correctly define an "enclosed space" and describe at least 2 of the following dangers associated with enclosed spaces: (1) lack of oxygen; (2) dangerous gases, fumes and vapors; (3) lack of lighting; (4) limited access; (5) poor lighting; and (6) poor footing. |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-4**
**Specification for minimum standard of competency in Personal Safety and Social Responsibility**

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | | When asked to list procedures to take prior to entry into an enclosed space, | the candidate will list in writing procedures to take prior to entry into an enclosed space. | The candidate will correctly list all of the following procedures to take prior to entry into an enclosed space: (1) open and ventilate space; (2) test atmosphere; (3) obtain entry approval; (4) have available and use proper entry equipment; and, (5) continue to monitor atmosphere and entry personnel. |
| | Familiarization with international measures concerning accident prevention and occupational health. | When asked to identify dangerous conditions, safety hazards or other non-conformities, | the candidate will identify in writing dangerous conditions, safety hazards or other non-conformities as noted in applicable national or international standards. | The candidate will correctly identify dangerous conditions, safety hazards or other non-conformities. |
| Understand orders and be understood in relation to shipboard duties | Ability to understand orders and to communicate with others in relation to shipboard duties. | When asked to describe the importance of understanding and obeying orders and communicating with others in carrying out their shipboard duties, | the candidate will describe in writing the importance of understanding and obeying orders and communicating with others in carrying out their shipboard duties. | The candidate will describe the importance of understanding and obeying orders and communicating with others in carrying out their shipboard duties. |

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | | When asked to explain the necessity to learn and use proper shipboard terminology and technical terms as soon as possible, | the candidate will explain in writing the necessity to learn and use proper shipboard terminology and technical terms as soon as possible. | The candidate will explain the necessity to learn and use proper shipboard terminology and technical terms as soon as possible by listing at least 1 of the following reasons: (1) shipboard terminology is cultural; (2) shipboard terminology provides a uniform and most commonly understood means of communication; (3) most shipboard tasks and operations are either large or complex and thus, involve coordination and communication with other departments or people; or, (4) other similar concepts. |
| | | When asked to explain the need for effective communication skills aboard ship, | the candidate will explain in writing the need for effective communication skills aboard ship. | The candidate will explain the need for effective communication skills aboard ship by discussing any of the following points: (1) ship operations are complex and require the coordinated action of many crew members; (2) ship systems are complex and require precise communication to operate and maintain; and, (3) emergency situations require fast, precise communication for lives and the vessel to be saved. |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-4**
**Specification for minimum standard of competency in Personal Safety and Social Responsibility**

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| Contribute to effective human relationships on board ship | Know the importance of maintaining good human and working relationships aboard ship. | When asked to describe why cooperation is necessary, and why interpersonal problems should be reported before they escalate, | the candidate will describe in writing why cooperation is necessary, and why interpersonal problems should be reported before they escalate. | The candidate will describe why cooperation is necessary, and why interpersonal problems should be reported before they escalate by stating any of the following concepts as: (1) harmony and teamwork are essential to crew effectiveness; (2) good interpersonal relations foster teamwork and harmony; (3) the unique circumstances of operational stress and being confined to a vessel make good interpersonal relationships vital; (4) seeking help is one of the most effective means toward resolving interpersonal problems. |
| | | When asked to state the circumstances when harassment against another person is permitted, | the candidate will state in writing the circumstances when harassment against another person is permitted. | The candidate will state that there are no circumstances when harassment against another person is permitted. |
| | | When asked to give examples of verbal, physical and sexual harassment, | the candidate will give in writing examples of verbal, physical and sexual harassment. | The candidate will give at least one example each for verbal, physical and sexual harassment. |

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | | When asked to describe the necessity of following orders to ensure the safe and productive operation of the vessel, | the candidate will describe in writing the necessity of following orders to ensure the safe and productive operation of the vessel. | The candidate will describe the necessity of following orders to ensure the safe and productive operation of the vessel by stating at least 1 reason similar to the following: (1) the master of the vessel and crew will assume that the order is being complied with as they continue to operate the vessel; (2) orders reflect the individual's role in the larger, more complex operation of the ship; (3) when an order is given, others depend on its successful and prompt completion in order to carry out their duties. |
| | Understand social responsibilities; employment conditions; individual rights and obligations; dangers of drug and alcohol abuse. | When asked to name organizations the seafarer has the right to report situations concerning harassment, unfair practices, or unsafe conditions, | the candidate will name in writing organizations the seafarer has the right to report situations concerning harassment, unfair practices, or unsafe conditions. | The candidate will name at least one of the following organizations the seafarer has the right to report situations concerning harassment, unfair practices, or unsafe conditions: (1) appropriate federal agencies; (2) union representatives; or (3) company officials. |

**Coast Guard Assessment Guidelines for TABLE A-VI/1-4**
**Specification for minimum standard of competency in Personal Safety and Social Responsibility**

| Column 1<br>STCW Competence | Column 2<br>Knowledge, understanding and proficiency | Column 3<br>Performance Condition(s) | Column 4<br>Performance Behavior (Mariner knowledge or action) | Column 5<br>Performance Standard(s) (Criteria against which performance is measured) |
|---|---|---|---|---|
| | | When asked if performing assigned duties while under the influence of alcohol or illicit drugs is a violation of federal law and why, | the candidate will state in writing whether performing assigned duties while under the influence of alcohol or illicit drugs is a violation of federal law and explain why. | The candidate will state that performing assigned duties while under the influence of alcohol or illicit drugs is a violation of federal law because these chemicals severely impair judgment, speech and emotional stability. |

*** These competencies are knowledge based. The assessment of the required knowledge may be a written multiple-choice examination. The student must achieve a minimum-passing grade of 80%.**

# APPENDIX F

# ADDITIONAL HEALTH CARE PROVIDER CAPABILITIES


| | |
|---|---|
| Introduction | F-1 |
| Emergency Intervention | F-1 |
| Patient Assessment | F-2 |
| Basic Life Support and Ventilation | F-2 |
| Ventilation Equipment and Oxygen Therapy | F-2 |
| Hemorrhage and General Emergencies | F-3 |
| Shock | F-3 |
| General Injuries | F-3 |
| Fractures, dislocations and Sprains | F-3 |
| Head Injuries and Medical Emergencies | F-4 |
| Injuries to the Eye, Ear and Throat | F-4 |
| Chest Injuries and Medical Emergencies | F-4 |
| Allergies and Anaphylactic Reactions | F-5 |
| Abdomen and General Emergencies | F-5 |
| Heart Disease | F-5 |
| Environmental Emergencies | F-5 |
| Psychiatric Conditions | F-5 |
| Substance Abuse | F-5 |
| Clinical Sickcall | F-6 |
| Head | F-6 |
| Vision | F-6 |
| Ear | F-7 |
| Sinus/Nose | F-7 |
| Throat | F-7 |
| Neck | F-8 |
| Respiratory/Thorax/Circulatory | F-8 |
| Skin Conditions | F-9 |
| Abdomen/Reproductive | F-9 |
| Diabetes | F-10 |
| Muscular Skeletal | F-12 |
| Upper Extremities | F-12 |
| Lower Extremities | F-13 |
| Psychological Conditions | F-14 |
| Wellness | F-14 |
| Administration | F-14 |
| Patient Affairs | F-15 |
| Supply and Fiscal Management | F-16 |
| Basic Instruction | F-16 |
| Safety and Environmental Health | F-16 |

APPENDIX

F

# ADDITIONAL HEALTH CARE PROVIDER CAPABILITIES

## INTRODUCTION

The needed medical care competencies available aboard ship have changed over time, as medical standards of care and technology have changed. A decade or two ago, the shipboard medic often independently managed, without outside consultation, a range of medical conditions. In today's world, the medic will immediately stabilize a patient, and then promptly contact a shoreside medical team for consultation about seriously ill patients. This consultation requires that the medic be able to carefully examine the patient, note normal and abnormal findings, and methodically report these to the shoreside consultant. These physical examination and communication skills are key to successful patient outcomes.

This section outlines the range of qualifications most shipboard medics will have. This chapter is provided as a guide, with recognition that some ships require a full medical staff while others may require only a first aid station. The level of medical care aboard ship varies with the health status of any passengers, operational risks to crew, distance from reliable shoreside health care, and a range of other variables. The specific requirements for a given ship on a given cruise should be made on an individual basis.

## EMERGENCY INTERVENTION

The following provides a summary of some commonly required medical skills. It can be used as a general reference or outline for developing adequate privileging credentials. Many ships will require the shipboard medical capability to be significantly greater; in some situations fewer skills may be needed.

In many shipboard environments the medical provider should have basic knowledge the following areas:

## PATIENT ASSESSMENT

Primary and Secondary Survey:

- Signs and symptoms
- Diagnostic signs
- Pulse
- Respirations
- Blood pressure
- Temperature
- Skin color
- Capillary refill
- Pupil size and responding to light
- Level of consciousness
- Scene safety
- Rapid and focused trauma assessment, as appropriate to patient's condition and/or mechanism of injury (compromised airway, breathing, and/or circulation, etc.)
- Immobilization, to include:
  - C-spine considerations while securing patient to spinal immobilization device for suspected spinal injury
  - Joint and long bone splinting
- Management of secondary injuries and wounds
- Continual monitoring of stable and unstable patient
- Preparation of patient for transport to definitive care
- Understand the vessel's multiple casualty incident plan, and roles and responsibilities to implement it

## BASIC LIFE SUPPORT AND VENTILATION:

Cardio Pulmonary Recitation (CPR)

- Airway assessment and management, including foreign body airway obstruction, considerations for C-Spine precautions, as appropriate.
- Breathing assessment and management, to include the breathing, non-breathing and inadequately breathing patient.
- Use of airway adjuncts and oxygen administration as appropriate for patient's condition.
- Circulation assessment and management, including CPR and hemorrhage control, as appropriate to patient's condition.
- Use of Automatic External Defibrillator (AED).
- Shock management

## VENTILATION EQUIPMENT AND OXYGEN THERAPY:

Demonstrate knowledge of, and treatment using, the following:

- Pocket mask with oxygen inlet
- Oropharyngeal airway (OPA)

- Nasopharyngeal airway (NPA)
- Bag-Valve Mask System (BVM)
- Portable and hand suctioning devices

**HEMORRHAGE AND GENERAL EMERGENCIES:**

Demonstrate knowledge and treatment of the following:

- Hemorrhage control by direct pressure and extremity elevation.
- Splinting
- Utilizing air pressure splinting
- Understand indications, use and dangers of the Pneumatic Anti-Shock Garment/PSAG (formerly known as Military Anti-shock Trousers (MAST pants).
- Utilization of a tourniquet

**SHOCK:**

Types of shock: signs, symptoms, treatment and causes to include:

- Cardiogenic shock
- Neurogenic shock
- Psychogenic shock
- Hypovolemic shock
- Metabolic shock
- Septic shock
- Nonvascular cause of shock: respiratory insufficiency and anaphylactic shock.

**GENERAL INJURIES:**

Soft Tissue (open and closed injuries):

- Abrasions
- Lacerations
- Avulsions
- Puncture wounds
- Impaled objects

**FRACTURES, DISLOCATIONS AND SPRAINS:**

Demonstrate knowledge of injury management, to include splint application to the upper and lower extremities:

- Fractures (open and closed injuries):
  - Greenstick fracture
  - Comminuted fracture
  - Pathologic fracture
  - Epiphyseal fracture
- Dislocations: signs and symptoms including treatment
  - Dislocation of the shoulder
  - Dislocation of the hip joint

- Sprains: signs and symptoms including treatment
- C-Spine injuries and treatment.

## HEAD INJURIES AND MEDICAL EMERGENCIES:

Demonstrate knowledge and treatment of the following**:**

- Cerebrovascular accident (CVA)
- Arterial rupture
- Cerebral embolism
- Stroke
- Dyspnea
- Scalp laceration
- Fractured skull.
- Concussion
- Contusion
- Intracranial bleed

## INJURIES TO THE EYE, EAR AND THROAT:

Demonstrate knowledge and treatment of the following**:**

- Foreign body, impaled object
- Burns: chemical, thermal and light burns
- Lacerations and blunt trauma
- Understand the appropriate advanced emergency treatment for a patient suffering from seizures, including status epilepticus.

## CHEST INJURIES AND MEDICAL EMERGENCIES:

Demonstrate knowledge and treatment of the following:

- Rib fracture
- Flail chest
- Penetrating injury
- Compression injury
- Asthma
- Pneumothorax
- Spontaneous pneumothroax
- Tension pneumothrax
- Hemothrax
- Sucking chest wound
- Subcutaneous emphysema
- Pulmonary contusion
- Acute pulmonary edema
- Pulmonary Embolism
- Chronic obstructive pulmonary disease (COPD)
- Mycardial contusion
- Pericardial tamponade

## ALLERGIES AND ANAPHYLACTIC REACTIONS:

Recognize and respond to an anaphylactic or adverse reaction due to immunization, latex exposure, food or medication ingestion, or an insect sting.

- Signs, symptoms and treatment of poisons, stings, and bites.
- Anaphylactic shock

## ABDOMEN AND GENERAL EMERGENCIES:

Demonstrate knowledge and treatment of the following:

- Closed abdominal injuries (blunt)
- Open abdominal injuries (penetrating)
- Evisceration
- Injuries to the genitourinary system
- Emergency childbirth procedures
- Acute abdomen

## HEART DISEASE:

Demonstrate knowledge and treatment of the following:

- Angina Pectoris
- Acute myocardial infarction (AMI)
- Congestive heart failure (CHF)
- Cardiogenic shock

## ENVIRONMENTAL EMERGENCIES:

Demonstrate knowledge and treatment of the following:

- Frostbite
- Hypothermia
- Heat exhaustion
- Heat stroke
- Heat cramps
- Drowning and near drowning
- Diving accidents

## PSYCHIATRIC CONDITIONS:

Demonstrate knowledge and treatment of the following:

- Acute psychotic episode/emotional episode
- Know how and when to request critical incident stress debriefing (CISD).

## SUBSTANCE ABUSE

Demonstrate knowledge and treatment of the following:

- Alcohol abuse
- Drug abuse

# CLINICAL SICKCALL

Most shipboard medical providers should be able to:

- Obtain a history of present illness (hpi), past medical history (pmh), and review of systems (ros), for a patient presenting with the below listed complaints.
- Develop treatment plan. Utilizing the pertinent data, develop a SOAP write-up and be able to provide a verbal case presentation for a patient with these chief complaints.
- Focus on information that enables a medical officer, or other "higher level" provider, to quickly familiarize themselves with patient's status and provide appropriate follow-on evaluation/treatment, either in person or via telecommunications.

In many shipboard environments the ship's medical personnel should be able to demonstrate complete knowledge and treatment applications of the following specific conditions:

**HEAD:**

Establish a differential diagnosis for a patient presenting with a non-traumatic headache. List as possible diagnoses:

- Migraine
- Cluster
- Tension (cervical)
- Sinusitis or sinus congestion
- Temporomandibular Joint (TMJ) induced headache

**VISION:**

Establish a differential diagnosis for a patient presenting with eye pain, red eye, foreign body or acute altered vision. Use the following list as possible diagnoses:

- Infectious conjunctivitis
- Allergic conjunctivitis
- Hordeolum
- Blepharitis
- Corneal abrasion
- Subconjunctival hemorrhage
- Acute iritis
- Acute retinal detachment
- Hyphema
- Flash burns
- Chemical burns

**EAR:**

Establish a differential diagnosis for a patient presenting with ear pain. Use the following list as possible diagnoses:

- Otitis media with effusion (Serous Otitis Media)
- Otitis media, acute
- Otitis externa
- Cerumen impaction
- Perforated/ruptured tympanic membrane due to trauma, including barotrauma
- Perforated/ruptured tympanic membrane due to suppuration
- Perforated/ruptured tympanic membrane due to retraction
- Foreign body
- Mastoiditis
- Temporomandibular joint (TMJ) syndrome

**SINUS/NOSE:**

Establish a differential diagnosis for a patient presenting with a nosebleed (epistaxis). Use the following list as possible diagnoses:

- Hypertension
- Digital manipulation
- Foreign object
- Medicamentosa
- Nasal fracture
- Contusion
- Sinus infection
- Nasal mucosa infection
- Nasal mucosa desiccation
- Fractured skull
    - Facial injuries
    - Sinusitis, infections
    - High blood pressure

**THROAT:**

Establish a differential diagnosis for a patient presenting with a sore throat. List as possible diagnoses:

- Epiglottitis
- Influenza
- Peritonsillar abscess
- Toxic shock syndrome
- Viral pharyngitis
- Streptococcal pharyngitis
- Tonsillitis
- Infectious Mononucleosis

**NECK:**

Establish a differential diagnosis for a patient presenting with neck pain. Use the following list as possible diagnoses:

- Meningitis
- Trapezius strain
- Cervical fracture
- Tension headache
- Dystonic reaction to phenothiazines (extrapyramidal (EPS) reaction to phenothiazines (such as phenergan, compazine) and butyrophenones, commonly used as anti-nauseants and antipsychotics).

**RESPIRATORY/THORAX/ CIRCULATORY:**

Establish a differential diagnosis for a patient presenting with cough, shortness of breath, and/or difficulty breathing. Use the following list as possible diagnoses:

- Asthma
- Acute bronchitis
- Upper respiratory infection
- Pneumonia, viral etiology
- Pneumonia, bacterial etiology
- Anaphylaxis
- Pulmonary embolism
- Upper airway obstruction

Establish a differential diagnosis for a patient presenting with “cold-like” symptoms (symptoms consistent with possible upper respiratory infection/uri). Use the following list as possible diagnoses:

- Sinus congestion
- Sinusitis
- Influenza
- Allergic rhinitis

Establish a differential diagnosis for a patient presenting with cough or difficulty breathing. List as possible diagnoses:

- Pulmonary edema
- Pneumothorax
- Status asthmaticus
- Influenza
- Pleuritis
- Tuberculosis

Establish a differential diagnosis for a patient presenting with chest pain. Use the following list as possible diagnoses:

- Gastroesophageal reflux disease (GERD)
- Angina pectoris

- Acute Myocardial Infarction
- Costochondritis
- Pulmonary Embolism
- Respiratory infection
- Myocardial infarction
- Pulmonary embolism
- Costochondritis
- Pleuritis
- Spontaneous pneumothorax

**SKIN CONDITIONS:**

Establish a differential diagnosis for a patient presenting with a papular skin rash. List as possible diagnoses:

- Psoriasis
- Seborrhea
- Cellulitis
- Folliculitis
- Insect bites (scabies, fleas)
- Drug reaction/allergies

Establish a differential diagnosis for a patient presenting with a vesicular skin rash. List as possible diagnoses:

- Dyshydrotic eczema
- Impetigo
- Herpes simplex
- Hand-foot-mouth disease (coxsackie virus)

Perform an examination of a burn patient and know how to diagnose and treat first, second and third degree burns. Know the following:

- Burns of the respiratory tract
- Circumferential burns
- Body Surface Area Percentage (BSA%) partial thickness burns and its application to burn care
- Body Surface Area Percentage (BSA%) full thickness burns and its application to burn care
- Associated injuries and potential complications

**ABDOMEN/REPRODUCTIVE:**

State signs, symptoms and describe appropriate emergency treatment for a diabetic patient including:

- Hyperglycemia, including that caused by patient taking insufficient insulin and/or inappropriate diet (i.e. diabetic ketoacidosis)
- Hypoglycemia, including that caused by patient taking too much insulin and/or "skipping" meals (i.e. insulin shock)

- Performing blood glucose check using glucose meter (such as Glucometer or Accucheck, or Dextrostix or equivalent reagent strip) with blood sample obtained via a fingerstick
- Performing urine reagent test and understand potential significance of positive ketones or sugar

**DIABETES:**

Demonstrate knowledge and treatment of the following:

- Diabetic coma
- Insulin shock

Establish a differential diagnosis for gynecological conditions. List as possible diagnoses:

- Torsion of ovarian tumor
- Uterine prolapse,
- Endometriosis

Establish a differential diagnosis for male health issues. List as possible diagnoses:

- Incarcerated inguinal hernia
- Testicular cancer
- Testicular torsion

Establish a differential diagnosis for a patient presenting with painful or bloody urination. List as possible diagnoses:

- Chronic asymptomatic hematuria
- Renal cancer
- Renal contusion or laceration
- Urethritis

Establish a differential diagnosis for a female patient presenting with abdominal or pelvic pain. Use the following list as possible diagnoses:

- Food poisoning, bacterial (infectious gastroenteritis)
- Appendicitis
- Normal pregnancy
- Ectopic pregnancy
- Peptic Ulcer disease
- Gastroesophageal reflux disease (GERD)
- Urinary tract infection
- Dysmenorrhea
- Sexually transmitted disease (STD)
- Perforated ulcer
- Bowel obstruction
- Abdominal aneurysm
- Hepatitis

- Pancreatitis
- Ovarian abscess
- Ovarian cyst
- Endometriosis
- Upper gastrointestinal (GI) bleeding
- Pelvic inflammatory disease
    - Colitis (inflammatory bowel disease)
    - Irritable bowel syndrome
    - Cholecystitis
    - Food-borne illness ("food poisoning" type gastroenteritis)

Establish a differential diagnosis for a male patient presenting with abdominal pain, using Mosby's Primary Care Consultant and Lange's Current Emergency Diagnosis & Treatment as your primary references. Use the following list as possible diagnoses:

- Hernia
- Irritable bowel syndrome
- Colitis (inflammatory bowel disease)
- Food-borne illness ("food poisoning" type gastroenteritis)
- Pancreatitis
- Cholecystitis
- Hepatitis
- Abdominal aneurysm
- Bowel obstruction
- Perforated ulcer
- Testicular torsion

Establish a differential diagnosis for a female patient presenting with excessive vaginal bleeding or pain. Use the following conditions as possible diagnoses:

- Threatened abortion (miscarriage)
- Ectopic pregnancy
- Dysfunctional uterine bleeding (DUB)
- Metrorrhagia (uterine bleeding at irregular intervals)

Establish a differential diagnosis for a female patient presenting with vaginal irritation. Use the following conditions as possible diagnoses:

- Herpes
- Trichomoniasis
- Candidiasis
- Condyloma acuminata
- Chlamydia
- Gonorrhea
- Syphilis
- Bacterial/gardnerella vaginosis
- Excoriation/trauma

Establish a differential diagnosis for a patient presenting with an apparent sexually transmitted disease. Use the following conditions as possible diagnoses:

- Herpes simplex virus (HSV), type II
- Condyloma acuminata
- Syphilis
- Gonorrhea
- Chlamydia

Establish a differential diagnosis for a patient presenting with rectal bleeding. Use the following conditions as possible diagnoses:

- External hemorrhoids
- Internal hemorrhoids
- Colon cancer
- Colitis (inflammatory bowel disease)
- Rectal trauma

**MUSCULAR SKELETAL:**

Establish a differential diagnosis for a patient presenting with low back pain. List as possible diagnoses:

- Aneurysm (such as ruptured abdominal aortic)
- Osteoarthritis (noninflammatory arthritis)
- Trauma

Establish a differential diagnosis for a patient presenting with shoulder pain. Use the following list as possible diagnoses:

- Bursitis, including Subacromial bursitis
- Tendinitis, including Bicipital tendonitis
- Trauma

Establish a differential diagnosis for a patient presenting with shoulder pain. List as possible diagnoses:

- Humeral head fracture
- Clavicle fracture
- Rotator cuff impingement
- Rotator cuff tear
- Sternoclavicular joint injury
- Acromioclavicular joint injury (i.e., dislocation, subluxation, sprain)
- Glenohumoral joint injury (i.e., dislocation, subluxation, sprain)

**UPPER EXTREMITIES:**

Establish a differential diagnosis for a patient presenting with elbow pain. List as possible diagnoses:

- Olecranon bursitis (including septic etiology)
- Lateral or medial epicondylitis
- Radial head fracture
- Dislocation
- Carpal tunnel syndrome

Establish a differential diagnosis for a patient presenting with wrist pain. list as possible diagnoses:

- Carpal tunnel syndrome
- Scaphoid fracture
- Radial/ulna fracture
- Tendinitis
- Degenerative joint disease/noninflammatory arthritis (also known by the misnomer 'osteoarthritis')

Establish a differential diagnosis for a patient presenting with a painful nail area. List as possible diagnoses:

- Paronychia
- Subungual hematoma

**LOWER EXTREMITIES:**

Establish a differential diagnosis for a patient presenting with knee pain. List as possible diagnoses:

- Patellofemoral disorders (arthralgia and compression syndrome)
- Lateral or medial collateral ligament (LML or MCL) injuries (sprain tear, or avulsion), being sure to use application of varum and valgum stress, with knee at proper degree of flexion, as part of your examination
- Anterior or posterior cruciate ligament (ACL or PCL) Injuries (sprain, tear, or avulsion), being sure to use positive and negative drawers, absence/presence of posterior 'sag,' and Lachman's tests as part of your examination
- Lateral and medial meniscus injuries, being sure to use McMurray's Test as part of your examination
- Fractures (i.e., tibial plateau, condylar, avulsion type, etc.)

Establish a differential diagnosis for a patient presenting with ankle pain. List as possible diagnoses:

- Achilles tendon rupture
- Achilles tendinitis
- Achilles bursitis
- Calcaneal fracture
- Plantar fascitis
- Deltoid ligament tear

**PSYCHOLOGICAL CONDITIONS:**

Establish a differential diagnosis for a patient presenting with signs of acute depression, consider the following conditions:

- Adjustment disorder
- Major depression
- Suicidal ideation
- Substance abuse

# WELLNESS

State four life style changes that can decrease a person's risk for heart disease. Know how to perform a wellness/fitness assessment. Assess a patient's major heart disease risks.

Know the risk factors, self-exam techniques (where applicable), screening procedures and screening intervals for the following cancers:

- Breast
- Lung
- Colon
- Cervical
- Ovarian
- Prostate
- Testicle
- Skin

State seven health hazards statistically correlated with the chronic use of substances or products containing alcohol, caffeine, and tobacco.

State the criteria for determination of substance abuse and substance dependence.

Identify ten physical disorders that have been associated with poor stress management.

# ADMINISTRATION

Understand the vessel's medical record system:

- Open a health record (medical and dental)
- Terminate a health record (medical and dental)
- Perform an accuracy and completeness check of a health record (medical and dental)
- Complete all required entries in a medical record, including the medical history, physical examination, laboratory, allergies, and other sections
- Complete all required entries on an eyewear prescription form
- Prepare a Request for Medical Records

- Complete all of the required patient and practitioner information on a fitness for duty form. Know how to use the vessel's log of persons not fit for duty

Understand the medical/clinic departmental Standard Operating Procedures (SOPs) for the vessel.

Understand how to prepare and interpret any required health statistical reports.

Understand the vessel policies on patient confidentiality and storage of medical records.

Maintain a Standard Operating Procedure (SOP) Manual for the vessel's Medical Treatment Facility. Incorporate any quality assurance checklists.

Develop and evaluate the quality assurance (QA) program. Include the required committees, frequency of their meetings, documentation of minutes, action for identified "problems," monitoring and evaluation reports, including appropriate follow-up if indicated, currency with MLC or external accreditation, status of departmental SOPs, etc.

Review any personnel staffing guidelines for clinical care, and determine/assure compliance.

## PATIENT AFFAIRS

Understand the standards of practice and/or legal requirements regarding patient sensitivity (confidentiality, use of chaperones and gender sensitivity).

State the Decedent Affairs Officer's duties and the role of the Medical Department Representative in decedent affairs.

Complete an inpatient hospitalization report message.

Understand the process and procedures to refer a patient to a civilian medical provider. Be familiar with billing policies and procedures.

Understand Workman's Compensation Insurance and Benefits, and the roles and responsibilities of the health care provider.

Understand any job medical requirements – both for initial employment and continued fitness for duty. Understand any waiver policies and procedures.

Understand basic employer and/or union health insurance options available to the crew.

## SUPPLY AND FISCAL MANAGEMENT

Develop appropriate list of medical pharmaceutical and other supplies. Conduct and maintain an inventory of existing supplies. Know policies and procedures for ordering supplies.

Understand policies and procedures to follow in establishing and maintaining a Preventive Maintenance Program as it pertains to health care equipment.

Know how to prepare a health care equipment acquisition request form.

Understand the medical departmental budget, and know how to follow the budget and develop future budgets.

## BASIC INSTRUCTION

Provide instruction on the following aspects of oral hygiene:

- Plaque & calculus formation
- Periodontal disease
- Brushing techniques
- Flossing
- Dietary aspects

Be qualified to instruct personnel in:

- "Standard First Aid" in accordance with American Red Cross standards
- Cardiopulmonary resuscitation in accordance with current Red Cross or American Heart Association standards.
- Shock
- Burns
- Patient transport
- Amputations
- Abdominal evisceration
- Compound fracture
- Electrocution
- Smoke inhalation
- Mass conflagration
- Prevention of sexually transmitted diseases
- Prevention of pregnancy (relative effectiveness of different methods including use of male and female condoms, foam, contraceptive sponges and methods requiring a medical prescription).
- Medical aspects of chemical, biological and radiological terrorism

## SAFETY AND ENVIRONMENTAL HEALTH

Perform a routine tuberculosis screening skin test, interpret and properly record the test results.

Conduct sanitation inspections and submit appropriate reports for the following:

- Food service facilities (galley, club)
- Berthing and living spaces
- Recreational areas

Test potable water for pH and halogen residual (free available chlorine(FAC)) or total bromine residual(TBR)) using the DPD (diethyl-p-phenylene) Test Kit and also for bacteriological contamination using Colilert or Membrane Filter Technique (e.g., Millipore).

Conduct a survey of a food service and living space for both cockroach and rodent infestations. Perform basic pest control using non-chemical methods Operate a heat stress meter in accordance with the manufacturer's operating instructions. Also state the percentage that each of the dry bulb, wet bulb, and globe temperature (WBGT) readings contribute to the final WBGT Index/reading (i.e., Wet Bulb is 70 percent of WBGT reading, etc.)

Prepare a computation of the work/rest cycle for personnel, based on the results of a Wet Bulb Globe Thermometer (WBGT) index.

Evaluate your clinic's infectious medical waste storage program for compliance with regulations.

Understand the key elements of the following Safety and Environmental Health Programs:

- Heat stress
- Hazard communication
- Water supply and wastewater
- Food service sanitation
- Hearing conservation
- Respiratory protection
- Occupational medical monitoring
- Personal protective equipment
- Alien migration interdiction operations
- Radiation Monitoring program

Monitor and evaluate the completion of sanitation inspections for the following:

- Food service facilities (galley, club)
- Berthing and living spaces
- Recreational areas

Prepare the following reports:

- Disease alert report
- Mishap report

Conduct an inspection of the vessel's potable water and sewage systems and complete the appropriate reports.

Conduct training on the following environmental health topics:

- Hearing conservation
- Heat stress
- Food service sanitation

Manage an environmental health program aboard the vessel to include the:

- Tuberculosis (TB) control program
- Occupational medical surveillance program
- Hazard communication
- Heat stress
- Emergency rescue of migrants or others
- Water supply & waste water management
- Respiratory protection program
- Blood borne pathogens

Evaluate the vessel's compliance with its Safety and Environmental Health Program in accordance the established Standard Operating Procedures (SOPs).

# APPENDIX G

# SICKBAY AND MEDICINE CHEST


| | |
|---|---|
| Introduction | G-1 |
| Medical Equipment | G-1 |
| Diagnostic | G-2 |
| Furniture | G-2 |
| Consumable Supplies | G-2 |
| Medical/Surgical Supplies/Sets | G-4 |
| EMS Equipment and Supplies | G-7 |
| Thomas Aeromedical Pack | G-7 |
| Supplemental Equipment for Thomas Aeromedical Pack | G-7 |
| Oxygen/Resuscitation Equipment | G-8 |
| Litters and Stretchers | G-8 |
| First Aid Kit, Life Raft | G-8 |
| First Aid Kit. Carry Bag | G-9 |
| Injury Dressing Stations (IDS) | G-10 |
| Injury Dressing Station Equipment/Supplies | G-11 |
| Portable Medical Lockers (PML) | G-12 |
| Decontamination Locker | G-13 |
| Antidote Locker | G-14 |
| Pharmaceuticals | G-14 |
| Items Used to Treat Exposure to Nerve Agents | G-17 |
| Dental Supplies and Equipment | G-18 |
| Environmental Health | G-18 |

APPENDIX

G

# SICKBAY AND MEDICINE CHEST

## INTRODUCTION

This section contains a list of health care materials (consumable supplies, minor and major equipment, sets, and outfits). Additional items may be suggested in other sections.

A system for rotating items should be developed to assure that sterile items remain sterile and items are used or replaced prior to their expiration date. Most equipment requires regular checks to assure it is functioning, and that routine maintenance and/or calibration is current. Readiness is critical; broken equipment cannot be repaired during a medical emergency; it must be in working order at all times.

Some ships will require more different types of supplies, others fewer. The appropriate quantity of each supply will also vary. If the items listed here are not included, a specific explanation should be made. The medical provider should be adequately trained in the use of supplies, equipment, and medications that are carried aboard. These should be adequate in quantity and variety to care for common conditions and those less common conditions that could be expected to occur underway. This list provides an initial guideline. A specific list of supplies and medications should be made for each vessel and each cruise, depending upon individual criteria such as:

- Skills of medical provider
- Size of crew (also age, gender)
- Health of crew (and known medical conditions)
- Length of voyage
- Distance from land
- Availability of shore side consultation (radio, phone, electronic, etc.)
- Availability of shore medical care
- Occupational or other risks (fishing accidents, diving injuries, etc.)
- Other conditions specific to the crew vessel or cruise
- Vessels with passengers should carefully consider the number, age, and health of passengers, and provide appropriate medical capability.

# MEDICAL EQUIPMENT

## DIAGNOSTIC

Automatic Portable Electrocardiogram, 115 V
Near Vision Visual Acuity Chart Set
Portable Electrosurgical Apparatus, 110V
Pseudoisochromatic 14 Plate Set
Schiotz Ophthalmic Tonometer
Surgical Suction Apparatus, 115 Volt, AC/DC
Visual Acuity/Distance Vision Chart Set
Woods Lamp (w/spare bulbs)

## FURNITURE

Adjustable Surgical Instrument Stand
Foot Operated Surgical Detergent Dispenser
Foot Stool with Revolving Seat, 18”
Medical Lockers (to outfit specific locker: antidote, decontamination, portable, etc.)
Refrigerator for Medical Supplies
Surgical Ceiling Light
Weight Scale, 300lbs

## CONSUMABLE SUPPLIES

### Bandages:

Adhesive Bandage ¾” X 3” (Band Aid)
Compress and Bandage, 4” X 4”, 18” X 22”
Compressed Gauze Bandage, 2”X 6”, 3” X 6”, 4”X 6”
Compressed Muslin Bandage (Cravat), 37” X 52”
Elastic Bandage, 4 In., (ACE)
Elastic Cotton Bandage, 3” X 4 YDS, 6” X 4 yds
Elastic Cotton Bandage with Rubber Wrap Threads, 3” X 4 ½ yds
Elastic Gauze Bandage, 4 ½" X 5 yds, 3" X 5 yds
Plaster of Paris Impregnated 4’ Cotton Bandage

### Sponges/Pads/Dressing:

Absorbent Gauze, 18" X 36"
Compress and Skull Cap, Head Dressing
Compressed Gauze Surgical Sponge, 4" X 4", 2" X 2"
Covered Gauze, 2 ½” X 2 1/8” (Eye Pads)
First Aid Field Dressing, 4” X 7”, 7 ½” X 8”, 11 ¾” Sq
First Aid Field Dressing, 4 X 7”, Pleated
Gauze Bandage Roll, 1” X 6yds
Iodoform Impregnated Gauze, “1/4” X 5 yds

Isopropyl Alcohol Pads
Kerlix Roller Gauze
Non-adherent 2” X 3” Pad
Petrolatum Gauze 3" X 18"
Povidone-Iodine Impregnated Pad
Sterile Eye Pad, 2 X 2”
Surgical Sponge, 4” X 4”
Water-Jel Burn Dressing
Wire Fabric 5 ¼” X 36”

**Splints/Walking Aids:**

Adjustable Wood Crutch, 48-59” with Sponge-Rubber Cushion
Aluminum Finger Splint, ¾ X 18”
Cane/Crutch Tip
Field Leg Splint, Support and Foot Rest
Knee Immobilizer, Medium and Large Sizes
Leg Splint, Thoms, Hare or Sagar
Pneumatic Arm Splint with Zipper Closure
Pneumatic Leg Splint with Zipper Closure
Stiff Neck Cervical Collar
(Size: No Neck, Short, Regular, Tall, Pediatric, Baby No Neck)
Stirrup Ankle Splint
Universal Sam Splint
Walking Cane with Curved Handle, 36”
Whole Leg Pneumatic Plastic Splint
Wrap-Around Splint for Leg/Arm/Back/Neck

**Adhesive Tape:**

Adhesive Surgical Tape, 1”X 5 yds, 1/2” X 10 yds
Rayon Adhesive Surgical Tape, 1” X 10 yds
Skin Closure Adhesive Tape, 1/4" X 4”

**Ear Plugs:**

Ear Plug Sizing Gauge
Ear Plug, Universal Fit Foam
Plastic Ear Plug Case
Plastic Ear Plugs (Various Sizes)
Rubber Ear Plugs, Triple Flanged (Various Sizes)
Silicone Rubber Ear Plug (Various Sizes)

**Miscellaneous:**

Deet Insect Repellent for Cloth & Skin, 20Z
Heat Pack, Medium & Body

Inflatable Oval Shaped Ring Cushion, 18”
Salicylic Acid Plaster, 3 X 2”

## MEDICAL/SURGICAL SUPPLIES/SETS

### Scissors/Blades:

Adson Tissue Forceps, 4 ½”
Bandage Scissors 5” (1 Sharp, 1 Blunt End), 7”(Angled Lister)
Disposable Surgical Scalpels with Blade Number 10, 11 and 15.
Finger-Ring Saw with Carbon Steel Blade
Ingrown Toenail Nipper, Concave, 5”
Iris Scissors, Curved and Straight, 4”
Plaster Cutting Hand Shears, Stille, 15”
Stryker Plaster Cast Spreader, 1-1/8”
Surgical Scissors, Curved, Mayo, Blunt Point, 5” and Straight, Mayo, Blunt Point, 6-3/4”
Surgical Scissors, Straight ,Blunt and Sharp Tips, 5”

### Gloves:

Latex Gloves,Pre-Powdered Ambidextrous, Medium size
Sterile Surgical Gloves, Size 6-1/2, 7, 7 ½, 8, 8 ½
Vinyl Gloves, Disposable

### Catheters:

Straight Catheter Type Stylet, Malleable
Suction Catheters (14g, 18g)
Tracheal Suction Catheter and Connector
Uretheral Catherterization Set, Disposable, 16 FR W/ 10ml Syringe

### Intravenous Sets:

IV Administration Extension Set
IV Solution Administration Set (Standard, Mini-Drip)
IV Therapy Sterile Stopcock, Disposable

### Syringe/Needle:

Cartridge Syringe Holder (Tubex, Carpuject)
Disposable Irrigating Syringe, 60ml
Disposable Sterile Hypodermic Syringes, 3ml, 5ml, 10ml, 20ml
Hypodermic Needles, Sterile, Disposal, 1”. Gauges: 18G, 20G, 21G, 22G, 26G
Hypodermic Needle, Disposable, 18g 1 ½”, 23g ¾”
Insulin Syringe with Needle, U-100
IV Needle with Catheter, 14G,16G, 18G, 20G, 22G
Metal Piston Type Ear Irrigating Syringe
Plastic Tuberculin Syringe and Needle, Disposable

**Medical/Surgical Sets:**

Anesthesia Tray Contents:
  Adult Handle Laryngoscope With At Least Four Sizes of Miller or Mcintosh Blades
  Endotracheal Tubes (Various Sizes)
Burn Pack, (Disposable)
Eye Dressing First Aid Kit
Minor Surgery Kits (Disposable)
Obstetrics Kit, Small Portable
Oxygen Delivery Set, (With Regulator And "D" Cylinder)
Pharyngeal Airway Set, Clear, sizes to fit Infant/Child/Small Adult/Large Adult
Sexual Assault Determination Kit (To be used by physician only)

**Sutures:**

Absorbable Poly-Acid Armed Suture, 4-0
Non-Absorbable Armed Nylon Suture, Sz 5-0
Non-Absorbable Armed Silk Suture, Sz 4-0
Suture Removal Kits (Disposable)
Vicryl Absorbable Suture, SZ 4-0

**Diagnostic Instruments:**

Aneroid Sphygmomanometer, 300mm/Blood Pressure Cuff
Combination Type Stethocope
Laryngeal Mirror, Long Handled, Size 3, ¾" diameter
Laryngoscope, Wisconsin
Nasal Speculum, Vienna, 5-3/4"
Otoscope/Ophthalmoscope Set, Battery Operated
Thermometer, Regular Oral, Rectal and Low Temperature (70-100°F )
Taylor Rubber Reflex Hammer, 8"
Tuning Fork, C-128 Vibrations
Vaginal Speculum, Graves Pivot Blade, 5"

**Miscellaneous Medical/Surgical Instruments And Items:**

Bag Valve Mask LSP
Disposable Finger Cot, Disposable
Disposable Sterile Wood Applicator
Endotracheal Tubes, Disposable Plastic, in assorted sizes
Instrument Tray without Cover
LSP Positive Pressure Regulator
Nasal Cannula for Oxygen
Non-Pneumatic Tourniquet with Buckle
Non-woven, Cupped Surgical Mask, Disposable
Oronasal Pocket Mask
Oronasal Semi-Rigid Plastic Mask, Disposable
Oxygen Diffuser Humidifier, 400ml Bottle

Pen Type Surgical Skin Marker
Rubber Surgical Drainage Tube, Disposable, 7/8”
Sterile Surgical Drape, 24 X 24”
Surgical Stomach Lavage Tube, 30 FR, FNL, 60”

**Miscellaneous:**

Aluminum Bowl, 6” Diameter
Ball Point Pen
Cotton Tipped Applicator
Flashlight
Hair Clippers, Battery Operated
Human Remains Pouch
Liquid Measure
Male Urinal, 2 QT
Nylon Surgical Scrub Brush
Operating Surgical Gown, Medium (Disposable)
Oval Steel Bedpan
Safety Pin, Regular and Large
Steel Kidney-Shaped Steel Emesis Basin, 500ml
Stopperless Rubber Bag for Hot Water-Ice, 2 QT
Surgical Mask  Disposable
Utility Pail, 12” High, 12 QT
Wash Basin, 4 ¼ qt, 9 qt
Wood Tongue Depressor, 6” X .75”
Ziplock Bags (Small, Medium, Large)

**Patient Transport:**

Medevac Rescue (SAR) Litter
Stokes Litter W/Flotation Gear

**Linens:**

Bed Blanket, Wool and Synthetic
Bed Sheet, Cotton-Polyester
Casualty Blanket
Cotton Bedspread
Cotton Hand Towel, Non-disposable, 36” X 17”
Cotton Pillowcase
Disposable Surgical Towel Pack
Sterile Burn Relief Blanket, 50 X 72”
Pillow, Non-allergenic Polyester, 20 X 26”
Plastic Sheet
White Bath Towel

## EMS EQUIPMENT AND SUPPLIES

**Item:**

Thomas Aeromedical Kit (Contents listed below)
LSP Oxygen Set
Medevac Rescue (SAR) Litter
Leg Traction Device
  Specific Type (Hare, Reel, Sager, #S-304) Optional
Mast Device Set
Portable Suction
Oxygen Mask, Non-Rebreather
Pressure Infusion Pump

## Thomas Aeromedical Pack Tt-890

**Item:**

Thomas Tt-890 Pack (Matrix Medical Inc.)
Aneroid Sphygmomanometer, 300mm/Blood Pressure Cuff
Glucose Gel 40% Gel, 31gm
Heat Pack, Body
Heat Pack, Medium
Oronasal Pocket Mask
Pharyngeal Airway Set, Clear, sizes to fit Infant/Child/Small Adult/Large Adult
Pre-Powdered Ambidextrous Latex Gloves, Medium size
Stiff Neck Cervical Collar
  (Size: No Neck, Short, Regular, Tall, Pediatric, Baby No Neck)
Water-Jel Burn Dressing

## Supplemental Equipment For Thomas Aeromedical Pack Tt-890

**Item:**

Adhesive Bandage ¾" X 3" (Band Aid)
Ball Point Pen
Bandage Scissors
Casualty Blanket
Charcoal, 50 Gm In Water, 240 ml
Clinical Thermometer, Subnormal and Regular
Compressed Muslin Bandage (Cravat), 37" X 52"
Elastic Bandage, 4 In., (ACE)
First Aid Field Dressing, 4" X 7", 7 ½" X 8", 11 ¾" Sq
Flashlight
Ipecac Syrup
IV Catheter (14g, 16g, 18g, 20g)
IV Solution Administration Set (Standard, Mini-Drip)
LSP Positive Pressure Regulator

Obstetrics Kit, Small Portable
Plastic Sheet
Stethoscope
Suction Catheters (14g, 18g)
Surgical Skin Marker, Pen-Type
Surgical Sponge, 4" X 4"
Surgical Towel Pack
Universal Sam Splint
Ziplock Bags (Small, Medium, Large)

### Oxygen/Resuscitation Equipment

Oxygen cylinders must never come in contact with organic lubricant (oil, grease, etc.). Cylinders should be stored in a permanently mounted rack in an upright position at all times unless in use within a portable container. All oxygen delivery and resuscitation equipment should be inspected weekly, inspection should be documented with the kit and in the medical department log. A three part tagging system (full, in use, empty), should be utilized to indicate status of tank. All medical oxygen containers shall be labeled "MEDICAL USE ONLY." All cylinders should be hydrostatically tested every five years. To clear dust particles, crack the tank valve slightly prior to applying a regulator to a new bottle. Make sure the tank valve is open before the oxygen delivery equipment (mask, etc.) is applied to the patient. Ensure that a non-ferrous wrench is used for tank manipulation.

Non-rebreather masks shall be used for patients in critical need of oxygen. Prior to placing non-rebreather masks on the patient, care should be taken to fully inflate the oxygen reservoir bag.

### Litters And Stretchers

Flotation Stokes. A minimum of one stokes litter should be maintained with flotation devices permanently affixed. Each end of the litter shall have a minimum of 20 feet (or longer based on ship's configuration), of 21 thread manila line permanently secured with a minimum of 4 – 5 tucks on each splice. The line will allow the stretcher to be handled from the main deck of the ship and above. A minimum of three patient securing straps shall be permanently affixed to the stretcher and stopped with twine. When possible the stretcher shall be secured away from weather and exposure to salt and ultraviolet (UV) light.

Medevac Rescue (SAR) Litter. Each ship will be required to have on board a full allowance of Medevac Rescue Litters. They are to be stored at or near the primary BDS, forward on the main deck, at or near after steering, and on the hangar deck (as applicable) and used by the repair locker stretcher bearer teams for use in rescue operations such as in-water, shipboard and confined spaces. Like the other litters used on board ship, the HS is responsible for the care, maintenance and training in the use of the Medevac Rescue Litter. A Horizontal

Hoisting Sling and Trail Line Assembly must be purchased for hoisting operations.

**First Aid Kit, Life Raft**

Each Life Raft comes equipped with a first aid kit. Below is a list of the contents of the first aid kit. Do not open life rafts to inspect or inventory first aid kits.

**Item:**

Inventory List
Adhesive Bandage, ¾"X 3" (Band Aids)
Adson Tissue Forceps, 4 ½"
Artificial Respiration & Mouth To Mouth Resuscitation Instruction Card
Aspirin Tablets, 325mg Tabs
Compress and Bandage, 4" X 4"
Compressed Gauze Bandage, 2"X 6", 4"X 6"
Compressed Gauze Sponge Surgical, 2"X 2"
Compressed Muslin Bandage (Cravat), 37" X 52"
Eye Dressing First Aid Kit
First Aid Field Dressing, 4"X 7"
First Aid Instruction Sheet
General Surgical Scissors, Straight 5 ½"
Lipstick, Antichap
Meclizine, 25 mg, Tabs
Medical Chest
Petrolatum Gauze 3" X 18"
Povidine Iodine Solution, 10%, ½ Fl Oz
Sulisobenzone Lotion U/V Screen 10% 75gm
Wire Fabric 5 ¼" X 36"

**First Aid Kit, Carry Bag**

These kits should be placed throughout the vessel for emergency use. They should also be available for all stretcher-bearer personnel. The kits should be inventoried quarterly and inspected monthly or immediately after use.

**Item:**

Inventory List
Absorbent Gauze, 18" X 36"
Adhesive Bandage, ¾"X 3" (Band Aids)
Adhesive Surgical Tape, 1"X 5 Yards
Compressed Gauze Bandage, 2" X 6", 3" X 6"
Compressed Muslin Bandage (Cravat), 37" X 52"
Compress and Skull Cap, Head Dressing
Elastic Cotton Bandage with Rubber Wrap Threads, 3" X 4 ½ yds
First Aid Field Dressing, 4" X 7", 7 ½" X 8", 11 ¾" Square

Kerlix Roller Gauze
Latex Gloves
Non-Pneumatic Tourniquet, 1 ½" X 42"
Oral Pharyngeal Airway Set
Oronasal Pocket Mask
Petrolatum Gauze 3" X 18"
Povidine Iodine Sol, 10%, 15 ml
Skin Marker
Surgical Sponge 4" X 4"
Universal Sam Splint

## INJURY DRESSING STATIONS (IDS)

The IDS may be used for any incident involving significant numbers of casualties. An inventory with expiration dates should be compiled and posted at the IDS. Any equipment should have operating instructions posted with the inventory list. Supplies and equipment should be inventoried quarterly or immediately after use.

The IDS locations should be determined by the captain of the vessel, with regards to the ship's configuration and needs of the medical department. These areas should be designated in writing and posted in the ships operational plan and sickbay operating plan. The IDS should be large enough to support the medical care of larger numbers of casualties (i.e., crew's mess deck, wardroom, etc.).

### Injury Dressing Station Equipment/Supplies

| PRIMARY IDS | SECONDARY IDS |
|---|---|
| Surgical Table | Table, Mess |
| Surgical Lighting | Temporary Mounting |
| Water Source:<br>Potable Water System, and emergency (separately piped in, canned or bottled water, minimum 15 gal.) | Water Source:<br>Separately piped in, canned or bottled water (Minimum 10 gal.) |
| Storage Locker:<br>Built in cabinets or portable lockers | Storage Locker:<br>Built in cabinets or portable lockers |
| Emergency Lighting:<br>Four (4) lanterns with swivel brackets and four (4) electrical relays installed around the surgical light. | Emergency Lighting:<br>Four (4) lanterns with swivel brackets and four (4) electrical relays installed around the surgical light. |

NOTE: For both Primary and Secondary IDS, a minimum of 4 lanterns should be mounted above the surgical table or mess deck operating table with swivel brackets. Lighting sources, including those in the secondary IDS should be checked weekly.

NOTE: Bottled water need not be stored in the IDS if space is limited. Health care personnel must ensure the water is secure and not being used for other purposes.

NOTE: Stock for the IDS should be reserve stock only and marked for “IDS USE ONLY”. Permanently mounted emergency water supplies must be checked monthly. At least three disposable minor surgical (suture) sets should be maintained ready for immediate use in each IDS. These surgical sets are inclusive of a ship’s overall supply. In addition, the following emergency sets should be immediately available for use:

**Injury Dressing Station Supplies**

**Item:**

Inventory List
Adhesive Bandage, ¾"X 3" (Band Aids)
Adhesive Surgical Tape, 12” X 10 yds
Aneroid Syphgmomanometer /Blood Pressure Cuff
Anesthesia Tray (1 Per IDS)Contents:
  Adult Handle Laryngoscope With At Least Four Sizes of Miller or Mcintosh Blades
  Endotracheal Tubes (Various Sizes)
Aspirin Tablets, 325 mg
Bag Valve Mask LSP
Bandage Scissors 5 ½”, 7”
Burn Pack, (Disposable) (Per IDS)
Cartridge Slide/Loading Syringe (Tubex, Carpuject)
Combination Type Stethoscope
Compress and Bandage, 18" X 22"
Compressed Gauze Surgical Sponge, 4" X 4", 2" X 2"
Compressed Muslin Bandage (Cravat), 37” X 52”
Compress and Skull Cap, Head Dressing
Cotton Tipped Applicator
Covered Gauze, 2 ½” X 2 1/8” 50s (Eye Pads)
Disposable Latex Gloves, Medium
Disposable Scalpel, W/No. 10, 11 Blades
Disposable Surgical Gloves
Elastic Cotton Bandage, 3" X 4 yds
Elastic Gauze Bandage, 4 ½" X 5 yds, 3" X 5 yds
Endotracheal Tube (Assorted Sizes)
Epinephrine Inj, 1:1000, 1ml
First Aid Field Dressing, 4" X 7", 7 ½" X 8", 11 ¾" Square
Gentamicin Ophth Oint, 0.3 %
Hydrogen Peroxide Solution, 1 Pt
Hypodermic Needle, Disposable, 18g 1 ½”, 23g ¾”
Hypodermic Syringe, Disposable, 5ml

Isopropyl Alcohol Pads
IV Catheter 14g, 16g, 18g, 20g, 22g
IV Solution Administration Set Mini-Drip and Regular
Lactated Ringers Intravenous Solution, 1000 ml
Lidocaine 1% With Epinephrine, 20 ml
Lidocaine HCL Inj 1% Plain, 50 ml
Minor Surgery Set, Disposable
Morphine Inj 10 mg/ml, 1 ml (Item Must Be Maintained In Sickbay Safe With Other Controlled Substances)
Non-woven, Cupped Surgical Mask, Disposable
Operating Surgical Gown, Medium (Disposable)
Oxygen Delivery Set, (With Regulator And "D" Cylinder)
Petrolatum Gauze, 3" X 18"
Povidine Iodine Solution 10%, 15 ml
Safety Pin
Sodium Chloride Intravenous Solution, 0.9%, 1000 ml
Straight Catheter Type Stylet, Malleable
Surgical Gloves, Size 6-1/2, 7, 7 ½, 8, 8 ½
Surgical Lubricant, 4oz
Surgical Scrub Brush
Syringe 10cc
Tetracaine 0.5% Ophth Sol, 15 ml
Uretheral Catherterization Set, Disposable, 16 FR W/ 10ml Syringe
Wash Basin, 4 ¼ qt

**PORTABLE MEDICAL LOCKERS (PML).**

Portable medical lockers contain enough medical supplies and equipment to support a large number of casualties remote from sickbay. Each PML should be located, one forward and one aft, at or near Damage Control Party Lockers. They are to be sealed to prevent pilferage. An inventory should be posted with expiration dates outside the locker. PMLs should be inspected monthly and inventoried quarterly.

**Item:**

ACE Bandage 3", 4", 6"
Adhesive Bandage ¾" X 3" (Band Aids)
Bandage Scissors, 7 ¼"
Cartridge Slide-Loading Syringe, (Tubex, Carpujet), For Use With 1, 2, & 2½ ml Cartridge/Needle Inserts Units.
Compressed Muslin Bandage (Cravat), 37" X 52"
Cotton Tipped Applicator
Covered Gauze, 2 ½" X 2 1/8" (Eye Pads)
Elastic Gauze Bandage, 4 ½" X 5 yds, 3" X 6 yds
Epinephrine Inj USP 1:1000 1ml

First Aid Field Dressing, 4" X 7, 11 ¾" Square
Hydrogen Peroxide Solution
Latex Gloves, Disposable
Minor Surgery Set, Disposable
Non-Pneumatic Tourniquet
Oronasal Pocket Mask
Petrolatum Gauze; 3" X 18"
Sterile Surgical Drape, 24 X 24"
Surgical Adhesive Tape, 1/2" X 10 yds
Surgical Gloves, Size 6-1/2, 7, 7 ½, 8, 8 ½
Surgical Mask, Disposable
Surgical Skin Marker, Pen-Type
Surgical Sponge, 4" X 4", 2" X 2"
Universal Sam Splint
Wool Bed Blanket
Atropine Inj, Automatic, 2 mg
**3 Atropine Injectors Per Potential Nerve Agent Casualty*
Pralidoxime Inj, Automatic
**3 Pralidoxime Injectors Per Potential Nerve Agent Casualty*
Convulsant Antidote Nerve Agent (Cana), (Diazepam 5 mg/ml 2 ml Autoinjector Syringe-Controlled Substance, Store In Sickbay Safe)
**1 Diazepam Injector Per Potential Nerve Agent Casualty*

**DECONTAMINATION LOCKER.**

Decontamination lockers should be maintained at or near each saltwater decontamination station as designated in the ships design. An inventory list should be posted outside the locker. This inventory should include as a minimum, nomenclature, quantity, quality control data, and documented date of inspections. Decontamination lockers should be inspected monthly and inventoried quarterly.

Decontamination Locker Requirements: One or two per vessel as required by ships configuration.

**Item:**

Antiseptic Soap, 2.5 oz
Atropine Sulf Inj, 2 mg/ml, 25 ml
Atropine Inj, Automatic, 2 mg
Cotton Tip Applicators
Hair Clippers, Battery Operated
Hydrogen Peroxide
Hypodermic Needle, Disposable, 22 g
Hypodermic Syringe, Disposable, 3 ml
Isopropyl Alcohol, 1 Qt
Lister Bandage Scissors, Angular, 5 Inch

Nail Clipper, 3 Inch
Nerve Agent Convulsant Antidote (CANA), (Diazepam 5 mg/ml 2 ml Autoinjector Syringe) Must Be Maintained In Sickbay Safe With Other Controlled Substances
Pralidoxime Inj, Automatic
Sterile Water For Irrigation, 1000ml
Surgical Gauze Compress Sponge, 4x4
Surgical Scrub Brush
Surgical Skin Marker
Vinyl Gloves, Disposable
White Bath Towel

## ANTIDOTE LOCKER

A properly labeled ("POISON ANTIDOTE LOCKER") antidote locker should be positioned outside of the sickbay. An inventory list with expiration dates should be affixed to the outside and the locker should be sealed in such a manner to ensure that tampering has not occurred. Antidote lockers should be inspected monthly and inventoried quarterly. Each antidote locker should have a pocket mask readily available within it.

Poison Control Center phone numbers should be posted on the outside of the antidote locker. (Ensure this number can be reached from any area the ship is deployed to.)

**Item:**

Baking Soda
Charcoal, 50 Gm In Water, 240 ml
Clear Pharyngeal Airway, Large Adult
Epsom Salts
Ipecac Syrup, 7%, 30 ml
Liquid Antacid (Maalox/Maalox Plus/Mylanta), 150 ml
Liquid Measure
Meat Tenderizer (Containing "Papain")
Oronasal Pocket Mask
Skin Cleansing Detergent
Vinegar
Wood Tongue Depressor, 6" X .75"

Note: In addition to these items, the following publication should be maintained in each antidote locker:

"DREISBACH'S HANDBOOK OF POISONING, DIAGNOSIS AND TREATMENT"
ISBN # 1850700389
McGraw-Hill Order Services
Blacklick, OH 43004-0545
Phone: 1 800 262 4729

## PHARMACEUTICALS.

Pharmaceuticals are expiration dated and should be rotated to avoid waste. Items annotated with a "**C**" are Drug Enforcement Administration designated Controlled Substances and must be stored in a safe within a secure area. Items annotated with a "**R**" must be stored under refrigeration.

### Analgesics:

Acetaminophen & Codeine 30 mg Tab-**C**
Aspirin Tablets, 325mg Tabs
Ibuprofen 800 mg Tab
Isometheptene, Dichloralphenazone, Acetaminophen Cap-**C**
Meperidine Hcl 100 mg/ml, 1ml-**C**
Morphine Sulf Inj 10mg/ml, 1 ml-**C**
Oxycodone HCL and Acetaminophen Tab-**C**
Phenazopyridine HCL 100 mg Tab

### Antibiotics / Anti-Infectives:

Acyclovir 200 mg Cap
Amoxicillin 250 mg Cap
Amoxicillin 250 mg Chewable Tab
Cefazolin Sod Inj 1 gm
Ceftriaxone Sod Inj 1 gm
Cephalexin 250 mg Cap
Chloroquine Phos 500 mg Tab
Ciprofloxacin Hcl 500 mg Tab
Doxycycline 100 mg Tabs
Erythromycin 250 mg E.C. Tab
Isoniazid 300 mg Tab
Metronidazole 250 mg Tab
Penicillin VK 250 mg Tab
Sulfamethoxazole/Trimethoprim DS Tab

### Anti-Inflammatory:

Dexamethasone Sod Phos Inj 4 mg/ml
Prednisone 5 mg Tab

### Asthma:

Albuterol Inh Aerosol, 17 gm, 200 Doses
Albuterol Sulfate Inh Soln 0.083%, 3ml
Epinephrine HCL Inj, 1:1000, 1 ml
Nebulizer, (For Use With Albuterol)

**Cardiac / Antihypertensive:**

Furosemide 10 mg/ml Inj
Nitroglycerin Tabs SL 0.4 mg

**Contraceptive / Gynecological:**

Clotrimazole 1% Vaginal Cream/Applicator, 45 gm
Condom (With Nonoxynol-9)
Female Condom
Contraceptive Foam, 20 gm

**Gastrointestinal:**

Charcoal 50 gm In Water, 240 ml
Docusate Sodium 100 mg Cap
Ipecac Syrup
Liquid Antacid (Maalox/Maalox Plus/Mylanta), 150 ml
Loperamide HCL 2 mg Tab
Promethazine 25 mg Suppositories
Promethazine 25 mg/ml Inj, 1 ml
Ranitidine 150 mg Tab
Sodium Phosphates Enema, Disposable, 133 ml

**Hormonal Products:**

Human Regular Insulin, 100 Units/ml-**R**

**Immunizations:**

Hepatitis B Immune Globulin-**R**
Hepatitis B Virus Vaccine, Inactivated-**R**
Tetanus & Diphtheria Toxoid (Adult)-**R**
Tuberculin Inj-**R**

**Miscellaneous:**

Codeine/Guiafenesin Cough Syrup, 4 Fl.Oz-**C**
Dextrose Inj 5%, 1000 ml Bag
Dextrose Inj 50%, 50 ml
Diphenhydramine 50 mg/ml Inj, 1 ml
Glucose 40% Gel, 31 gm
Lactated Ringers Intravenous Solution,1000 ml Bags
Meclizine, 25 mg, Tabs
Medical Oxygen, 99%, 95 gal (D Cylinder)
Naloxone HCL Inj 0.4 mg/ml, 10 ml
Sodium Chloride 0.9% Intravenous Solution, 1000 ml
Sterile Water For Injection

**ITEMS LISTED BELOW ARE USED TO TREAT EXPOSURE TO NERVE AGENTS:**

Atropine Inj, Automatic, 2 mg/0.7 ml
Atropine Sulf Inj Usp 2 mg/ml, 25 ml, (1 Vial Per Every 4 Personnel)
Nerve Agent Convulsant Antidote (CANA), (Diazepam 5 mg/ml 2 ml Autoinjector Syringe)-**C**
Pralidoxime Inj, Automatic, 300 mg/2 ml

### Ophthalmics:

Fluorescein Sodium Ophth Strips, 1 mg
Gentamicin 3 mg/ml Ophth Sol
Gentamicin Ophth Oint 0.3 %
Tetracaine 0.5% Ophth Sol

### Otics:

Carbamide Peroxide Otic Soln
Neomycin/Polymyxin/Hydrocortisone Otic Susp

### Psychotropics / Neurological:

Diazepam 5 mg Tab, 100s (Strip Packed)-**C**
Diazepam Inj 5 mg/ml-**C**
Haloperidol 1 mg Tab
Haloperidol Inj, 5 mg/ml

### Topicals:

Antiseptic Soap, 2.5 oz
Baking Soda
Tincture of Benzoin, 1 Pt
Clotrimazole 1% Cream, 15 gm
Epsom Salts
Hydrogen Peroxide Solution, 1 Pt
Isopropyl Alcohol, 1 Qt
Lidocaine 1% With Epinephrine, 20 ml
Lidocaine Hcl Inj 1% W/O Epinephrine, 50 ml
Lipstick, Antichap
Meat Tenderizer (Containing “Papain”)
Permethrins (Elimite) Lotion 60 ml
Permethrins (Nix) Shampoo 60 ml
Povidone Iodine Skin Cleanser, 7.5%, 118 ml
Povidone-Iodine Sol, 10%, 15 ml
Sodium Chloride for Irrigation, 1000 ml
Sterile Water For Irrigation, 1000 ml
Sulfadiazine Silver Cr 1%, 85 gm

Sulisobenzone Lotion U/V Screen 10% 75gm
Surgical Lubricant, 4oz
Transdermal Scopalomine 1.5 mg Patches, 4s
Triamcinolone Acet Cr, 0.1%, 15 gm
Triamcinolone Acet Dental Paste 0.1%, 5 gm
Vinegar

**Vitamins:**

Vitamin B6 (Pyridoxine) 50 mg Tab (To be co-administered with isoniazid only)

**DENTAL SUPPLIES AND EQUIPMENT**
**(see Chapter 5 – Dental Care And Emergencies for additional items)**

The best way to deal with dental emergencies is to prevent them. Nevertheless, the nature of sea duty is such that dental emergencies will arise periodically. While rarely serious, these emergencies can be extremely painful and can serve to debilitate any sailor. A working knowledge of the drug locker, especially antibiotic and analgesic medications, is essential in the management of dental emergencies at sea. Disposable items are encouraged if available.

**Item:**

Amalgam Dental Plugger, Single Ended, Black (No. 2)
Amalgam & Wax Amalgam & Wax Carver, Double Ended, Walls (No.3)
Chelon-Fil Glass Ionomer Restorative L-Light Powder (10g) Liquid (12ml)
Dental Explorer (No. 23)
Dental Spatula, (No. 324)
Eugenol, 1 Oz
Hatchet Shaped Blade Dental Excavator, No. 17 And 18
Iodoform Impregnated Absorbent Gauze,. 25” X 5yds
Iris Scissors, Curved
Mouth Examining Mirror (Disposable)
Oral Protective Paste (Orabase)
Plastic Filling Dental Plugger, Single Ended (Woodson No.3)
Polymer Mixing Pad Dental Paper, 6” X 6”
Tweezer Type Dressing Forceps, Angular Jaws, 6-7/4 In (No.17)

**ENVIRONMENTAL HEALTH**

Environmental health includes the following program areas:

Food service sanitation
Potable water supply
Pest control
Habitability
Wastewater treatment and disposal

Swimming pools
Disease control
Exposure to chemical, physical, or biological agents

**ENVIRONMENTAL HEALTH EQUIPMENT AND SUPPLIES.**

**Item:**

Color Chlorine - Bromine & Ph Determination Comparator Set, Dpd Method

Colilert Bacteriological Water Test Starter Kit (Cat. # Wp600), Idexx Laboratories Inc., One Idexx Drive, Westbrook, Me 04092 (800) 321-0207

Questemp 10 Heat Stress Monitor (Wbgt Meter)
Quest Electronics
510 S. Worthington
Oconomowoc, Wi 53066 (414) 567-4047
*(Second Unit To Be Used As Backup While Primary Unit Is Being Calibrated Or Repaired)

Thermometer, Pocket Max-Registering (Part #07293)
Adams-Burch, Inc.
5556 Tuxedo Rd. 20781 (800) 347-8093

Thermometer, Stick Type (Part #06017) Adams-Burch, Inc.
5556 Tuxedo Road
Tuxedo, Md 20781 (800) 347-8093

# APPENDIX H

# INFECTIOUS DISEASES


| | |
|---|---|
| Introduction | H-1 |
| Behavior and Infectious Disease | H-1 |
| Sexually Transmitted Diseases | H-1 |
| Human Immunodeficiency Virus Infection/ Acquired Immunodeficiency Syndrome (HIV/AIDS) | H-7 |
| Sexual Assault and Rape | H-9 |
| Tattooing | H-10 |
| Anthrax (Cutaneous) | H-11 |
| Chicken Pox (Varicella) | H-12 |
| Cholera | H-13 |
| Dengue Fever (Breakbone Fever) | H-15 |
| Diptheria | H-17 |
| Gastroenteritis/Diarrheal Disease | H-18 |
| Hepatitis, Viral | H-20 |
| Hepatitis A (HAV) | H-21 |
| Hepatitis B (HBV) | H-22 |
| Delta Hepatitis (HDV) | H-23 |
| Hepatitis C (HCV) | H-24 |
| Hepatitis E (HEV) | H-24 |
| Influenza (Flu) | H-25 |
| Legionnaires' Disease (Legionellosis) | H-26 |
| Malaria | H-26 |
| Measles (Rubeola) | H-28 |
| Measles, German (Rubella) | H-29 |
| Meningococcal Disease | H-30 |
| Mononucleosis, Infectious | H-32 |
| Mumps (Epidemic Parotitis) | H-32 |
| Plague | H-33 |
| Bubonic Plague | H-34 |
| Pneumonic Plague | H-34 |
| Septicemic Plague | H-35 |
| Poliomyelitis | H-36 |
| Rabies (Hydrophobia) | H-37 |
| Rheumatic Fever | H-39 |
| Relapsing Fever (Tick and Louse-Borne Relapsing Fever) | H-40 |
| Scarlet Fever | H-40 |
| Shingles | H-41 |
| Tetanus (Lockjaw) | H-41 |

| | |
|---|---|
| Tuberculosis | H-42 |
| Typhoid Fever (Enteric Fever) | H-43 |
| Typhus Fever | H-44 |
| Undulent Fever (Brucellosis, Malta Fever or Mediterranean Fever) | H-46 |
| Whooping Cough (Pertussis) | H-47 |
| Yaws | H-48 |
| Yellow Fever | H-49 |

APPENDIX

H

# INFECTIOUS DISEASES

## INTRODUCTION

This appendix provides information on a range of infectious diseases. Since the epidemiology and treatment recommendations change over time, as new antibiotics are developed and resistance to older ones evolves, more current information is available at the Centers for Disease Control and Prevention website at: http://www.cdc.gov/. Current information is critical for effective treatment. Obtain immediate medical consultation when treating patients suspected of having any serious infectious disease.

## BEHAVIOR AND INFECTIOUS DISEASE TRANSMISSION

The risk of many infectious diseases can be greatly reduced by protective behaviors. These may be as simple as wearing a long sleeved-shirt or applying insect repellant to prevent a tick-born or mosquito transmitted disease. Prophylactic medications can prevent diseases such as malaria. Vaccinations prevent other infections. Lifestyle, including sexual practices, is also linked to infectious disease transmission.

### SEXUALLY TRANSMITTED DISEASES

The goal is to prevent sexually transmitted diseases (STDs). Thus, prevention of STDs is an important part of any program of STD control, and prevention skills should be presented to both those at risk of becoming infected and to those already infected, so that future infections can be avoided. Education is also an important part of patient management.

Over 30 microorganisms can be sexually transmitted with many having similar symptoms. Despite this complexity, initial management (with subsequent referral) can be accomplished in many settings with a minimum of resources. The following clinical syndromes associated with sexually transmitted diseases will be discussed in this section:

- Urethral discharge (urethritis)

- Painful testicle (epididymitis)
- Genital ulcer
- Genital warts
- Lymphogranuloma venereum (LGV)
- Pruritis (itching)
- Vaginal discharge
- Lower abdominal pain

In evaluating patients at risk for STDs, remember that many of these diseases can be asymptomatic and the patient may not suspect he/she has infection. However, asymptomatic patients can also transmit disease to others.

The end of this section addresses general management issues including counseling, partner notification, referral, sexual practices, symptomatic individuals and prevention.

## Urethral Discharge (Urethritis)

Urethritis is characterized by a discharge from the urethra and burning with urination. It is usually caused by one of two bacteria: *Neisseria gonorrhoeae* (which causes gonorrhea) and *Chlamydia trachomatis* (which causes chlamydia), both of which infect and irritate the urethra.

The usual incubation period for gonorrhea is 3-5 days and the discharge is yellow or green. The incubation period for chlamydia is longer, 1-5 weeks (usually 10-16 days), and the discharge is less profuse, less purulent (often white or watery) and less painful. About 20% of men with gonorrhea also contract chlamydia at the same time.

If a microscope is available, examination of a Gram-stain of the discharge may disclose gram-negative diplococci inside of white blood cells, diagnostic of gonorrhea and the patient should be treated for both gonorrhea and chlamydia. If the Gram stain of the exudate does not disclose white cells with gram-negative intracellular diplococci, the patient should be treated for chlamydia. If no microscope is available, it is difficult to distinguish gonococcal urethritis from chlamydial urethritis with surety and the patient should be treated for both.

Younger women may occasionally develop urethritis caused by *C. trachomatis*. These women do not have a urethral discharge, but have pain with urination due to the urethral inflammation. However, a urinary tract infection is more common cause of painful urination.

Various antibiotic regimens have been developed to treat gonorrhea and chlamydia, separately and/or together.

## Painful Testicle (Epididymitis)

The epididymis, which stores sperm and is located on the posterior side of the testicle, may become infected by *C. trachomatis* (most commonly) or *N. gonorrhoeae*. In men >35 years of age, or in homosexual men, epididymitis is frequently caused by bacteria that cause urinary tract infections.

Epididymitis must be differentiated from acute testicular torsion (twisting of the testicle inside the scrotal skin, which can lead to loss of blood supply to the testicle.) **Acute testicular torsion is a medical emergency requiring immediate consultation and intervention**. If torsion is suspected, based primarily upon sudden onset, excruciating pain, age under 20, and elevation of the testicle, immediate consultation should be obtained because immediate surgery may be needed. Torsion of the testicle is a medical emergency.

Examination of a patient with epididymitis shows tenderness of the epididymis and possible swelling. In men with sexually transmitted epididymitis, there will usually be symptoms or signs of urethritis, but this may not be prominent (particularly in men with chlamydia). If possible, a microscopic examination of the urethral secretions or urine should be performed to look for white blood cells and microorganisms.

Management of epididymitis includes bed rest with elevation of the testicle, ice and analgesics. Antibiotics should be given for the presumed infecting agent.

### Genital Ulcer

Erosions of the skin (ulcers) may be caused by *Herpes simplex* virus (genital herpes), *Treponema pallidum* (syphilis) and *Haemophilus ducreyi* (chancroid). Erosions may be caused by trauma (during sex or in zippers) or less commonly by reactions to medications (particularly tetracyclines).

The most common disease is ***genital herpes***, whose incubation period is five to10 days. Initially, small, ***painful***, grouped blisters occur which, over several days, break open into shallow ulcerations. Painful, swollen, lymph nodes in the groin may accompany the blisters and ulcers. Over ensuing days, the ulcers crust and heal; the entire process takes about 21 days for initial attacks. Subsequent attacks may occur and last seven to 10 days. Women with initial attacks may have accompanying erosions of the cervix.

The primary stage of ***syphilis*** is characterized by one to four ***painless*** smooth ulcers which appear about 21 days following infection. Small, minimally tender lymph nodes in the groin may occur. Without treatment, the ulcers heal after two to six weeks. As the ulcers are healing, or several weeks afterward, the secondary stage of syphilis occurs and is characterized by a skin rash consisting of small flat patches, often most noticeable on the palms and soles; patients may have a low-grade fever. Without treatment, the rash will resolve after about two to six weeks, but may return. Without treatment at this stage, patients may develop tertiary syphilis in one to 30 years, characterized by neurologic (stroke, dementia) or cardiac (heart valve disease) abnormalities.

***Chancroid*** is characterized by one to four very ***painful*** ulcers which often appear quite ragged. Painful enlargement of the lymph nodes in the groin occurs in half of patients.

Management of genital ulcers is based upon the most likely diagnosis. Additional diagnostic tests (such as HIV/AIDS or syphilis) may also be indicated.

### Genital Warts

Genital warts occur several weeks following infection with human papilloma virus (HPV). HPV warts look like warts elsewhere on the body, but differentiation from other causes of skin growths is not always easy. In either case, treatment is not urgent and evaluation and therapy can be delayed. Women with genital warts should have a Pap smear of the cervix because of the relationship among genital warts, cervical cancer and HPV.

### Lymphogranuloma Venereum (LGV)

LGV is a systemic disease of venereal origin caused by a virus-like organism. The infectious agent is a *Bedsonia* organism closely related to that of psittacosis. Clinical disease is more common in males. Subclinical or inapparent infections, and an asymptomatic carrier state, have been described in females.

After an incubation period averaging one to four weeks, a small painless genital lesion occurs in about one fourth of patients. The lesion is an inconspicuous bump, blister, or shallow ulcer that heals within a few days and typically goes unnoticed by the patient. The earliest clinical signs are fever up to $103^0$F ($39.4^0$C), chills, headache, malaise, coughing, and muscle and joint pain. Shortly after the onset of these symptoms, the patient becomes aware of a painful swelling in one or both groin areas.

The inguinal bubo is common in males. Early in the course of regional node involvement, one can feel one or more enlarged discrete movable tender nodes. These eventually become matted together into an oval-shaped mass.

As the disease progresses, some of these matted nodes undergo softening. Because there are nodes in different stages of evolution, the mass becomes large and lobulated with alternating areas of softening and hardness. The overlying skin becomes swollen, sometimes bluish-red in color, and fixed to the underlying mass. When pus forms and breakdown occurs, multiple fistulous tracts may open to the skin surface. Other symptoms less commonly found include lower abdominal pain and diarrhea due to involvement of nodes in the pelvis and around the rectum.

In brief, the patient with LGV appears as an acutely ill individual with no residual primary genital lesion, but with a painful, tender, firm, oval-shaped inguinal mass. The pain is exaggerated when walking due to the pressure by the inguinal ligament. Some relief may be obtained by walking bent over. Unless one suspects LGV, the patient may be mis-diagnosed with an inguinal hernia. Such patients have been subjected to unnecessary surgery.

## Pruritus (Itching)

Pruritus may be caused by pubic lice (crabs) and scabies; both are parasites and in both cases, pruritus is caused by sensitization to the organism. The pruritus caused by lice is limited to the genital area while that due to scabies often occurs elsewhere on the body where the mite, *Sarcoptes scabiei*, has burrowed. For lice, the period between infestation and itching is 1-2 weeks for initial infections (and shorter for subsequent ones) while for scabies it is several weeks after initial infection but only a day or two after subsequent infection.

Adult lice and their eggs (nits) in egg casings may be seen with the naked eye clinging to pubic hairs, or adult lice may be in the crusts of skin scabs formed from scratching; a magnifying lens helps visualize adults and eggs. Pubic lice move slowly along hairs; they do not jump. Sarcoptes mites burrow under the skin, forming linear tracks and nodules (which house the mite); common locations are the groin, finger webs and axilla. Diagnosis of lice depends upon seeing the lice or their eggs; diagnosis of scabies depends upon seeing typical nodules.

Pubic lice are treated by: lindane shampoo (1%), (not recommended for pregnant or nursing women, or children <2 years of age);or, permethrin creme rinse (1%) or pyrethrins with piperonylbutoxide. Scabies is treated by: permethrin cream (5%); or, lindane (1%), applied to the body from the neck down and washed off after 8 hours. Carefully read and follow directions when using any of these preparations. They are toxic substances and are dangerous if misused. For both diseases, bedding and clothing should be machine washed and machine dried using a hot cycle. Ironing clothes also kills the parasites.

## Vaginal Discharge

Vaginal discharge is a common symptom that can be normal or a symptom of various infections. Normal vaginal secretions vary with hormonal balance and the menses cycle. Normal secretions are painless, clear, and thin, but can be quite profuse at some times of the month.

Some infections present with a vaginal discharge. Trichomonas causes a white, frothy discharge with itching. Monilia, or a yeast infection, is characterized by a white, cheesy discharge resembling cottage cheese. Nonspecific vaginitis is due to a range of bacteria, and can have differing presentations. Some infections, such as chlamydia and gonorhhea in women, may have no symptoms. Treatment of an abnormal vaginal discharge differs with the particular organism.

## Lower Abdominal Pain

Lower abdominal pain is characteristic of pelvic inflammatory disease (PID), in which microorganisms ascend through the cervix into the uterus and fallopian tubes. The most common organisms involved are *N. gonorrhoeae* and *C. trachomatis*. Other causes of lower abdominal pain, i.e. appendicitis, should always be considered before making a diagnosis of PID. **Appendicitis is a medical emergency that is life threatening if untreated.**

PID is characterized by acute or gradual onset of pain in the lower abdomen. Since many things can cause this, thorough abdominal and pelvic examinations by a qualified and credentialed provider are usually needed for accurate diagnosis. Because PID is difficult to diagnose, it is often treated on the basis of suspicion and reasonable exclusion of other causes of abdominal pain. Reasonable exclusion can be difficult, however, and consultation should be sought before beginning therapy. Appendicitis is one common condition that may be confused with PID.

Management of PID may require hospitalization. However, once the diagnosis is made, the patient can usually be treated with antibiotics as an out-patient.

### Counseling

Treatment of an STD should include counseling the patient about safe sexual practices to prevent further disease transmission. All patients with symptoms in the genital area, whether successfully treated or not, should not have sex until signs and symptoms have disappeared and they have been evaluated by skilled personnel. Because individuals with an STD have shown, by acquiring an STD, that they do not utilize safe sex practices, prevention counseling should be stressed.

### Partner Notification

Patients with STDs should ensure that their sex partners, including those without symptoms, are referred for evaluation and treatment.

### Referral

The management of patients with STDs, while seemingly simple, is complex and patients treated for an STD should be evaluated by more **skilled** personnel as soon as feasible, even if symptoms have gone away. Subsequent evaluation should include a physical and laboratory examination for the disease treated and other STDs, including a serologic test for syphilis and often a test for HIV.

### Sexual Practices

Gonorrhea and other venereal diseases can occur at several sites. Gonorrhea may occur in the pharynx, but is usually asymptomatic and examination will be normal. Gonorrhea in the anus may be asymptomatic or associated with an anal discharge and rectal urgency. The infections that cause genital ulcers may occur in the mouth or anus. The ulcer of syphilis in the anus may go unrecognized because it is painless.

### Exposed, but Asymptomatic, Individuals

Often individuals have had sex without a condom and, although asymptomatic, are worried about having possibly acquired an STD. The risk of having contracted an STD is dependent upon the likelihood that the partner had an STD (prostitutes or minimally-known partners having the highest risk), frequency of intercourse, and the gender of the worried individual (women being at higher risk). Prophylactic antibiotics are not recommended. The individual should watch for signs of illness and, even if

symptoms do not appear, seek medical attention for an examination as soon as feasible.

### Prevention

STDs can be prevented through abstinence, sex with a uninfected partner, or use of a latex condom; of these, abstinence is the surest means. It is not possible to know that a new sex partner is free of all STDs. Latex condoms are highly effective when used properly, but may be misused, and will not protect against STDs acquired through foreplay or from diseases that occur outside of the area protected by the condom, i.e. crabs or vulvar ulcers. Nevertheless, when abstinence is not possible, the high efficacy of condoms in protecting against STDs, and their correct use, should be stressed.

Individuals should also be counseled to cease sexual activity and seek medical attention should symptoms appear in the genital tract, whether condoms have been used or not.

## HUMAN IMMUNODEFICIENCY VIRUS INFECTION/ ACQUIRED IMMUNODEFICIENCY SYNDROME (HIV/AIDS)

**Incubation Period:** The time from HIV infection to seroconversion (a positive result on an HIV antibody laboratory test on blood or oral fluid) is a few weeks to a few months. The interval between HIV infection and diagnosis of AIDS varies greatly with today's treatment; the range in adults is from about two to 15 years.

**Isolation Period:** None – Standard Universal Precautions required.

Acquired immunodeficiency syndrome (AIDS) is the name given to a complex of health problems reported first in the United States in 1981. Persons with AIDS suffer a severe loss of natural immunity against disease, leaving them vulnerable to diseases that are not a threat to most persons. These diseases are often referred to as "opportunistic."

AIDS is caused by a retrovirus, known as human immunodeficiency virus (HIV). Tests for HIV antibodies are in widespread use and confirmed positive test results indicate infection by the virus. The HIV tests are sensitive and specific and should be offered to those at risk for infection and to all pregnant women. They are also used by blood banks to assure a safe blood supply.

HIV is transmitted sexually and through contact with blood such as when injecting illicit drugs or in tattooing. HIV also may be transmitted through transfusions of blood or blood components, medical contact with blood (as in surgery or in treating open wounds), and prenatally from HIV infected mothers to their infants.

Most AIDS cases have occurred among sexually active young adults age 25-44 years. Persons of all races, nationalities, ages, and sexual orientations have been affected.

Of the cases reported in the United States, the more common manifestations include severe immunosuppression (as measured by a decline in the T-helper lymphocyte count to below 200 cells per ml of blood), wasting syndrome (loss of more than 10% of body weight), *Pneumocystis carinii* pneumonia (PCP), tuberculosis (TB), bacterial pneumonias, cytomegalovirus retinitis, Kaposi's sarcoma, cryptococcal meningitis, candidiasis of the esophagus, toxoplasmosis of the central nervous system, and cryptosporidiosis (a parasitic infectious diarrhea).

### Prevention

To prevent AIDS, one must prevent contracting or transmitting HIV by

- Not having sexual contact with persons known or suspected to have HIV infection or AIDS; or at high risk for HIV infection.
- Not having sex with multiple partners or with persons who have had multiple partners (including prostitutes). The more partners you have, the greater your risk of contracting HIV infection.
- Not injecting illicit drugs. If you do inject drugs, you may lessen your risk by not sharing needles or syringes.
- Not having sex with people who inject drugs.
- Not using alcohol, drugs, or inhalant nitrites (poppers), which impair judgment and may prompt you to engage in risky behaviors you might otherwise avoid.
- Protecting yourself and your partner during sexual activity. If you are not in a long-term monogamous relationship with a partner known to be uninfected, you should:
  - Use condoms consistently and correctly.
  - Avoid sexual practices that may cause injury or bleeding.
  - Avoid direct contact with semen, vaginal fluids, and blood.
  - Note: these practices reduce, but do not eliminate, HIV transmission.

### Treatment

Although there is no cure, therapy for HIV infection and AIDS now exists. Antiviral agents have been licensed and offer promise, but no lasting method to restore lost immune function has been found. A cornerstone in the management of HIV-infected patients is the prevention of opportunistic infections, particularly PCP and TB, which should be routinely tested for and treated aggressively. Patients should be referred to a physician for initial management and long-term follow up.

## SEXUAL ASSAULT AND RAPE

Management of sexual assault and rape includes medical and legal aspects. Medical treatment should be done by specially trained providers who know how to use the forensic evidence collection kit.

Sexual assault and rape are violent acts with sex as the weapon. They occur without the consent of the victim by use of force or threat of force. Law enforcement experts call rape one of the most under-reported crimes. Rape and sexual assault know no geographic boundaries and can occur aboard a vessel at sea.

Reporting suspected sexual assault or abuse of a child is required by law; it is the responsibility of the health care provider to follow reporting requirements of the state or local child protective service agency.

The impact of sexual assault can be severe. Besides signs and symptoms of physical trauma, victims may experience a range of emotional, cognitive, and psychological symptoms. These may include: confusion, anger, rage, dependency, crying spells, poor memory and concentration, nightmares and flashbacks, problems with eating and sleeping, fatigue, fear, anxiety, depression, work problems, feelings of abandonment, and withdrawal from friends and family. Victims' feelings of guilt, shame, and confusion can be compounded when there is no weapon and they know the attacker.

Listening to a victim's traumatic details may cause health care providers to react with disbelief, disgust, fear, and/or powerlessness; these attitudes and responses add to victims' trauma. Training about sexual assault and knowing where to find help is strongly urged. Training should include communication and crisis intervention skills; knowledge of the medical, legal, and emotional issues that victims face; and, awareness of one's own feelings, beliefs, values and attitudes that affect one's ability to help sexual assault victims.

Medical and legal assistance should be provided as soon as possible after the attack, ideally within 24 hours. Decisions to tell family and/or friends should be explored. In emergencies, police may help to move the victim to a hospital. Also, prompt police reporting can help to find the attacker as soon as possible. Victims are usually unaware of medical and legal factors and require assistance with these issues and decisions.

Treatment should address physical, emotional, social, and psychological needs. Approach the victim with empathy, respect, acceptance, support, and understanding. Avoid unnecessary questions, advice, criticism, and inappropriate self-disclosure. Give emergency first aid until medical care is available**. If at all possible, victims should not bathe, clean up, douche, or change clothes before medical care and/or reports to police. Do not destroy clothes, towels, or anything that could contain evidence.** Definitive medical care will include treating the victim's injuries, performing appropriate routine exams, such as gynecological and anorectal, and assisting police or other law enforcement personnel with collection of forensic

evidence. Treatment will also include instructions for follow-up medical care and possible prophylactic treatment for venereal disease and/or pregnancy.

Frequently, sexually transmitted diseases (STD) are diagnosed at initial or follow-up medical visits following sexual assault. This can increase the victim's anxiety and emotional problems as well as delay recovery. Diagnosis of STD will be the basis of medical treatment and may also be used as forensic evidence. Treatment protocols and routines using prophylactic antimicrobials should be tailored to the victim's individual circumstances. The Centers for Disease Control and Prevention (CDC) provide guidelines for diagnosis, treatment, and follow-up of STD for victims of sexual assault. All victims should be offered HIV counseling and testing.

If at all possible, secure the expert services of a sexual assault forensic examiner and clinician. They can render emergency medical and psychological treatment and intervention, collect evidence, make appropriate follow-up referrals, and provide the court system with an expert witness if necessary. Ship to shore communication may be necessary to obtain the appropriate advice and consultation in this instance. Consult with local hospitals and the police for assistance with sexual assault protocol and forensic evidence collection kit information.

**Resources and Referrals:**

Referrals for sexual assault and crisis counseling are important to victims' recovery. Major resources include:

- Sexual Assault and Rape Crisis: local official health agencies
- Medical: STD Clinic for sexually transmitted diseases and confidential AIDS testing.
- Home Safety: local crime prevention unit
- Legal: State's Attorney Office
- Hospital, physician, or emergency room bills for collection evidence: Local department of health or crime victim compensation program.

## TATTOOING

The word tattoo comes from the Tahitian word *tatu* which means "to make a mark". The art of tattooing has existed for 14,000 years with its earliest roots in Egypt. Historically, tattoos were used to indicate social status, religious beliefs and mark criminals. Today tattoos are symbolic for many reasons including membership in a particular group, the achievement of manhood or simply as an art form. There are many reasons for getting a tattoo and there are many issues to consider before getting one.

A tattoo is created by puncturing the skin with a bundle of needles and inserting indelible (permanent) ink into the second layer of the dermis. When receiving a tattoo, a person is at risk of getting a bacterial infection and blood born infections such as HIV (human immunodeficiency virus) and hepatitis. Proper infection control

procedures are essential. New needles or properly sterilized needles must be used for each person receiving a tattoo.

The methods for removing a tattoo are surgical excision, chemical peel and laser. There are advantages and disadvantages for each of these methods. Each method is extremely expensive and with the exception of laser, leave some amount of scarring.

Tattooing has been used in the civilized world for many thousands of years and is popular in the United States. Many issues must be addressed when contemplating getting a tattoo. The United States maintains strict guidelines for tattoo artists to follow to minimize infection risks. Many states and cities require the use of autoclaves (machines to sterilize equipment) and supervision by a physician.

Most states require that individual needles be used for each patient, with an inventory system required of the facility. Many foreign locales have no such guidelines. The decision to get a tattoo must be made with a clear mind. Finding the safest tattoo artist who understands and practices good infection control is critical to reduce the health related risks associated with getting a tattoo.

# ANTHRAX (CUTANEOUS)

**Incubation Period*:*** Within 7 days (usually 2 to 5 days).

**Isolation Period:** None. Cover skin lesion until lesion is free of anthrax bacilli.

Anthrax is an acute, infectious bacterial disease that is caused by *Bacillus anthracis*. It is rare in the United States and most western countries. Primarily a disease of sheep, goats, cattle, and horses, it occurs most commonly among wool sorters, felt makers, tanners, and others who work with animals or their products. If cattle, wool, goat hair, or hides are shipped by sea, exposure to anthrax is a possibility.

When anthrax appears as a skin disease, it may look like an ordinary vesicle, boil, or carbuncle. However, the surrounding skin may become swollen. If the skin lesion ruptures, serous (straw-colored) fluid escapes, revealing a black eschar or scab at the base of the ulcer. There may be severe systemic symptoms such as fever or prostration.

It is difficult to distinguish anthrax from an ordinary boil. Someone with a severe skin reaction surrounding a boil plus other bodily symptoms should be treated with antibiotics.

### Treatment

Adults who may have been exposed to anthrax may be prophylactically treated with oral ciprofloxacin or doxycycline if the bacteria's susceptibility to penicillin is unknown. Children should be given oral amoxicillin.

Anthrax infection is treated with a combination of antibiotics.

Note: Inhalation anthrax as a bioterrorist agent is discussed in Chapter 8.

# CHICKENPOX (VARICELLA)

**Incubation period:** 14 to 21 days.

**Isolation period:** For 1 week after rash appears or until all lesions become crusted.

Chicken pox is a highly contagious viral disease that produces a typical rash. It is usually a disease of children and typically occurs in the late winter and early spring. The virus is spread by airborne respiratory secretions as well as by direct contact. It is communicable from a few days before the rash appears until all vesicles have crusted. Individuals normally have it one time and will not be infected again as adults. However, if one did not have it as a child, one can get it as an adult. The disease in adults is often more serious than in children. Adults can present with such complications as viral pneumonia and meningoencephalitis.

The disease begins with a running nose, tearing eyes, slight fever to about 101$^{o}$F (38.3$^{o}$C), occasional sore throat, loss of appetite, decreased energy, and restlessness. Within 24 hours an eruption appears, mostly on the trunk and face, and occasionally on the arms and legs. The skin lesions arise in crops of vesicles (clear fluid-filled blisters on a slightly raised red base), may become pus-filled, and crust in a few days. As healing occurs, the crusts or scabs fall off.

As mentioned above, lesions of chicken pox typically appear in crops which erupt at different stages on a given area of the body. Thus some areas have new vesicles while earlier eruptions are crusting over. This helps to distinguish chicken pox from other viral rash illnesses.

### Treatment

A vaccine is now available and is recommended for certain persons with no prior history of infection.

Oral acyclovir, started within the first 24 hrs decreases the duration and severity of illness. Its use is not recommended for otherwise healthy children (less than 12 yr.). Medical advice should be obtained prior to instituting such therapy.

Patients should be kept in bed and isolated from the rest of the crew. Care should be provided by crewmembers with a known history of chicken pox. Non-immune crew and anyone with immune deficiency should be protected from exposure. Adults should be treated with acetaminophen for fever. For persistent itching, diphenhydramine should be given by mouth. Children should receive similar therapy based on dosages appropriate for age and weight. Diet and liquids should be given

as tolerated The patient's nails should be trimmed closely and scrubbed daily to prevent bacterial contamination of the lesions by scratching. In all cases of suspected chicken pox, medical advice by radio should be obtained.

# CHOLERA

**Incubation Period:** 12 hours to 5 days (usually 1 to 3 days).

**Isolation Period:** None. However all crew members must be isolated from patients' fecal matter and vomitous to prevent spread.

Cholera is an acute disease characterized by profuse watery *diarrhea*, often with vomiting and prostration. It is caused by intestinal infection with certain strains of the bacterium *Vibrio cholerae.* In severe cases, it causes profound and sometimes fatal *dehydration*.

Cholera occurs in many parts of the developing world, sometimes causing large epidemics. Many ports in Latin America, Africa, and the Indian subcontinent have recurrent cases of cholera. Cholera is usually acquired by exposure to unclean water sources or by eating seafood exposed to such water sources. Food and beverages can also become contaminated if they are prepared by persons infected with *V. cholerae* who have not washed their hands well. Cholera is not transmitted through direct contact with an infected person, though it is readily transmitted through any fecal contamination from an infected person.

The symptoms of cholera usually begin within one to three days after exposure. Diarrhea may be the only symptom in mild cases. In more severe cases, patients have profuse watery diarrhea, vomiting, and prostration or collapse. Typical stools are almost clear water with shreds of mucus, and are described as rice-water stools. The diarrhea may be continuous, leading to tremendous loss of body fluids and dehydration. Initially the patient may feel thirsty and have a dry mouth. As the dehydration worsens, the patient may develop sunken eyes, a rapid or weak pulse, and may feel dizzy. Untreated, the dehydration may lead to death in as little as a few hours. Without appropriate treatment for dehydration, about half of patients with severe cholera will die. However, with prompt and appropriate treatment for dehydration, less than 1% of these patients die.

### Treatment

To prevent a ship-board epidemic, other crew members must not be contaminated with the patients' fecal matter. Good hygienic practices are required by all crew members. Patients with the symptoms of cholera should immediately receive treatment, as described below, without waiting for a physician or laboratory to confirm the diagnosis. Medical advice should also be obtained promptly by radio.

The most important aspect of treatment for cholera is replacing the lost fluids rapidly by way of rehydration therapy. Most patients can be treated with *oral rehydration salt* (ORS) solutions. Severe cases may require intravenous therapy. A single ORS packet is mixed with one liter of clean (boiled) water and provides the correct balance of fluids, salts and sugars required by cholera patients. All vessels should stock ORS packets. One can visit the website for information on treatment with and worldwide sources for ORS at www.rehydrate.org.

Proper administration of ORS is simple. The basic principle of rehydration therapy is to replace the fluids and salts that are lost through diarrhea and vomiting. This means giving a lot of ORS. The amount of ORS needed varies, depending on the severity of the dehydration and the amount of ongoing fluid losses. Patients need to drink more ORS than the total volume of fluid lost through diarrhea and vomiting. Patients should have ORS constantly available at the bedside and should be encouraged to drink as much as possible. Even patients with vomiting can be rehydrated with ORS taken in frequent small sips. An indication that rehydration therapy is succeeding is regular urination (every 3 to 4 hours). Patients should resume a normal diet as soon as they are able.

Treatment with antibiotics can shorten the duration of illness but is less important than rehydration therapy. Oral antibiotics should be used if indicated and such therapy should be under the direction of a physician. No other drugs for treatment of diarrhea or vomiting should be given. One should particularly avoid anti-diarrheal agents.

Cholera could spread in a devastating outbreak if even a tiny amount of the patient's stools or vomitous contaminated the food or water of others on board. To avoid spreading cholera, stools and vomited matter should not be released into the environment; they should be flushed into the ship's sewage treatment system or retention tank. Handwashing by all crew members after toileting and before eating is critical.

All articles soiled by the patient should be rinsed in a disinfectant such as chlorine bleach, washed with soap and very hot water, and thoroughly dried before being reused. Ironing clothing, bed linens and other items also disinfects them. The patient's room, personal effects, and any part of the ship that may have been contaminated should also be carefully disinfected. Caregivers should wash their hands thoroughly with soap and water after contact with the patient or the patient's feces or vomitous, and they should not prepare food for others. Prophylactic antibiotics for caregivers or other contacts of cholera patients are generally not recommended. While the patient is ill and for three weeks until recovery, the patient should be especially careful to wash their hands with soap after toileting. Isolation of cholera patients can be helpful. They should not have any contact with food or water used by other persons on the ship, and should not be allowed into the galley.

Cholera is an officially *notifiable disease*. When a patient who might have cholera is aboard, the Master is required to notify local health authorities as soon as possible at the next port of call, station, or stop. The Master is required to take such measures

as the local health authorities direct to prevent the spread of disease. Because cholera can be acquired from water, the ship's water system should be checked for any possible contamination. The Master and crew should be alert for more cases of cholera. Any person who has diarrhea should be reported to the Master and should take the measures described above to prevent the spread of illness. When port is reached, patients should receive medical evaluation and should submit stool specimens for culture for *V. cholerae.*

**Prevention**

With proper cholera prevention measures, merchant vessels can proceed in and out of cholera-affected areas while protecting crew members and passengers from becoming infected. The local health authorities (port, medical and American Consular) should be consulted when food and water are taken aboard. Drinking water should always be disinfected (boiled, chlorinated or chemically treated) aboard ship. If crew members go ashore in a cholera-affected port, it is preferable that they not eat or drink anything while ashore. Both ashore and aboard ship, to avoid illness, food and beverages must be selected and prepared with care. Foods from street vendors should be avoided. Raw or undercooked foods, particularly salads and seafood, should be avoided. Fruits that are peeled just before eating and carbonated drinks without ice are usually safe. The importance of bottled or boiled water sources must be stressed. The water source for refilling the ship's drinking water supply should be carefully checked in foreign ports.

Following these precautions will provide protection not only from cholera but also from other illnesses transmitted by contaminated foods, such as typhoid fever and traveler's diarrhea.

Several *cholera vaccines* exist. Their usefulness is limited because the protection that they provide is incomplete and short-lived. Cholera vaccination is not recommended for travelers, and no country currently routinely requires cholera vaccination for entry. However, vaccine may be required when going from an endemic or epidemic area to another country. In the future, new and more effective cholera vaccines may be developed; updated information can be obtained from health authorities.

# DENGUE FEVER (BREAKBONE FEVER)

**Incubation Period:** 3 to 15 days (usually 4 to 6 days).

**Isolation Period:** 5 days after onset or until fever abates, in a screened room or under a bednet.

Dengue fever is an acute viral disease that is transmitted by the bite of an infective *Aedes* mosquito. *Aedes aegypti*, a highly domesticated urban mosquito, is the principal vector. In tropical forests of Asia and Africa, other mosquito species are

involved in transmission. For the virus to be transmitted, the following sequence of events must take place:

- female mosquitoes feed on the blood of an infected person from 1 to 2 days before the person's illness began to 5 days after onset of illness
- the virus develops in the mosquito tissues for 8 to 12 days
- the female mosquito transfers the virus to susceptible persons when it feeds

*Ae. aegypti*, is a mosquito species that bites during the day. Its two peaks of biting activity are in the early morning for a few hours after daybreak and in the late afternoon for several hours before dark. It may bite all day long on overcast days, as well as in the shade and indoors, where it is frequently found.

The incidence of dengue fever has increased dramatically in the past 20 years. Its geographic distribution includes most tropical areas of the world. It is caused by four closely related viruses (DEN-1 through 4), all of which cause a similar illness ranging from mild, undifferentiated fever to severe and sometimes fatal hemorrhagic disease called dengue hemorrhagic fever (DHF).

Dengue fever is characterized by a sudden onset of fever, which may rise to 102$^{o}$ to 105$^{o}$F (38.8-40.5$^{o}$C), headache, eye pain, backache, bone and joint pain, weakness, and malaise. Nausea and vomiting are common. Some patients have a blotchy rash, flushing, conjunctivitis, taste aberrations, loss of appetite, and abdominal pain. Fever and associated symptoms may last for 3 to 5 days, followed by complete recovery. The decline in fever may be followed 1 to 3 days later by another rise in temperature and associated symptoms (saddleback fever). A second rash, varying in form, may appear with the first decline in temperature. Mild to severe bleeding may occur from the nose, gums, gastrointestinal tract, and skin. Depression and weakness may occur during convalescence. Many cases of mild or subclinical dengue occur, but dengue infection may also appear as a severe and sometimes fatal hemorrhagic disease, DHF.

Patients with DHF generally have a similar acute illness, with sudden onset of fever, headache, nausea, vomiting, myalgias, abdominal pain, and sometimes a rash. The fever may go down in 3 to 5 days and at that time, the patient may develop internal or external bleeding, or both, including bruises on the skin, "coffee grounds" vomitus, tarry stools, and nose and gum bleeding. In some cases, the only bleeding is internal, with the loss of plasma from the blood vessels. In these cases, the patient may be severely dehydrated, with a weak, rapid pulse. The patient may become restless and/or lethargic, have cold clammy skin, and, in some cases, may go into shock and die if the disease is not properly diagnosed and treated.

Although no specific therapeutic treatment exists for dengue and DHF, symptoms can be alleviated. Complete bed rest in isolation in a mosquito-proof area and good nursing care are necessary. Fluids should be forced to prevent dehydration. In severe cases, fluids should be administered intravenously.

Fever and pain can usually be controlled by acetaminophen. Aspirin should not be given because it may increase bleeding tendency. High fever should be controlled by applying cold compresses to the head and sponging the body with cool water. For severe pain, acetaminophen, 650 mg, with 30 mg of codeine sulfate should be given by mouth every 4 hours as needed. If additional codeine appears to be needed after four or five doses, obtain medical advice by radio.

Dengue infection results in long-lasting immunity to the infecting virus serotype (but not to the other serotypes). Patients can have three, possibly four, dengue infections with different serotypes in their lifetime. Differentiating dengue infections from other viral infections (such as measles, rubella, enterovirus infections, and influenza) and the early phases of some parasitic (malaria) and bacterial (typhoid, leptospirosis, scarlet fever) and rickettsial illnesses is difficult without specific laboratory tests. Obtain medical advice by radio if a person is ill with suspected dengue aboard ship.

Dengue fever may occur in epidemic and endemic (sporadic or silent transmission) form. Prevention and control of the disease is based solely on mosquito control and on preventing mosquitoes from biting both infected and noninfected persons. Currently, an experimental vaccines to prevent dengue fever is undergoing tests..

Patients should be kept under mosquito netting for at least 5 days or until the fever has abated.

Persons visiting areas where dengue occurs (most tropical areas of the world) can decrease the risk of infection by wearing clothes that cover the whole body and by using mosquito repellents on exposed skin and on clothing. The most effective repellents for use on skin contain at least 20% N,N diethylmetatoluomide (DEET), most of which are effective for about 2 hours if used properly. Repellents containing permethrin or DEET may be used on clothing. These products are usually sold as an aerosol and can be sprayed directly on the clothes.

## DIPHTHERIA

**Incubation Period:** 2 to 5 days.

**Isolation Period**: 14 days after onset.

Diphtheria is a serious acute infectious disease that is caused by the *Corynebacterium diphtheriae* bacillus. The bacteria grow in the throat, nose, or windpipe and give off a toxin (poison) that causes an illness of the entire body.

Diphtheria once was a very common cause of sickness and death among infants and children, but it is now a rare disease in the United States. It may be prevented by diphtheria toxoid injection with booster doses every ten years. Most crew members have been inoculated as children. Crew members should be checked to assure that booster doses have been maintained.

Early symptoms of diphtheria include: overall body discomfort, restlessness, weakness, loss of appetite, headache, and chills. Sore throat with fever to 103°F (39.4°C), prostration, vomiting, and convulsions may develop in some cases. Dirty gray patches of an adherent membrane form in the back of the throat and in the windpipe itself. These patches resemble dead skin and when brushed, come away with difficulty leaving tiny bleeding points in the uncovered mucous membrane. There may be a bloody nasal discharge and a "croupy" cough.

The most serious complications include suffocation, due to the mechanical blocking of the windpipe by the diphtheritic membrane, and an overwhelming systemic poisoning due to the toxin. Because of special affinity for certain nerves, the toxin may produce paralysis of the throat, eyes, or extremities; or death from heart failure. This may occur several weeks after the initial infection.

**Treatment**

If diphtheria is suspected, strict isolation and bedrest is adviced. Gargles of warm salt water may help to ease pain in the throat.

Although antibiotics are considered to have little effect on the clinical course of diphtheria, treatment with penicillin or erythromycin can kill the diphtheria bacteria. If diphtheria is confirmed, the entire crew should report to health authorities at the next port.

# GASTROENTERITIS/DIARRHEAL ILLNESSES

Diarrheal disease is often due to inflammation of the intestines and may be referred to as gastroenteritis, colitis or dysentery. Gastroenteritis is inflammation of the stomach and intestines. Inflammation of the large bowel is referred to as colitis. Dysentery usually presents with bloody diarrhea and is often of bacterial origin. These terms are often used interchangeably. Diarrheal disease is usually caused by viral, bacterial, parasitic or other agents, though it can have non-infectious causes as well. When managing these patients, emphasis should be placed on fluid support and rehydration.

Dehydration leading to coma or death may occur when extreme diarrhea is combined with vomiting or fever. This will cause a loss of water taken in and of water stored by the body. Severe dehydration may occur rapidly. In addition to the loss of water, the loss of various chemicals normally dissolved in body fluids may cause complications and death.

Useful signs in determining the cause of intestinal illness and its severity include:

- Character of stools—Are they watery? What is the color? Is there blood, odor, mucus, or pus? Are worms visible? Is it all liquid, or are there some formed pieces?
- Frequency of stools—How often does the patient pass stools?

- Signs of dehydration - Is the mouth very dry? Do the eyeballs seem unusually sunken? If you pinch the skin, does the fold return slowly to its former position?
- Other signs - Is there fever, rash on the skin, or vomiting?
- History - Prior symptoms? If so, when? For how long? Does the patient have any idea what might be causing the symptoms, i.e. eaten anything that was spoiled or that tasted odd?
- Epidemiology - Is anyone else sick? What symptoms do the patients have in common? What eating habits, especially on shore did they have in common?

Good hygiene aboard ship is necessary for the crew to meet its operations missions.

**Treatment**

Much diarrheal illness can be prevented. In foreign ports, drink bottled or boiled water, and avoid uncooked foods or foods that may not have had adequate refrigeration. Hot foods should be served hot. Cold foods should be served cold. Choose restaurants that seem to care about sanitation – the cleanliness of a restaurant's "head" can be a good indicator of the sanitation available to its food handlers. However, as a casual customer, it is often difficult to assess the cleanliness of a restaurant's galley.

Treatment of diarrheal disease is directed towards supportive care. The patient should be placed on bed rest and made as comfortable as possible. A liquid or low-residue diet should be given that includes soft drinks and broths containing salts. A "BRAT" (breads, raisins, rice, apples, tea) diet is often helpful if the patient can tolerate foods. Milk products should be avoided as the intestinal lining often is denuded and lacking the enzymes necessary to metabolize them.

Specific causes of diarrhea and some special treatments are outlined below:

**Viruses** - Many viruses present as intestinal illness. Usually, there is little or no fever. The onset of illness lasts several hours and is usually over within two or three days. The vomitus and stools are typically watery without blood or mucus. The patient often feels reasonably well in between bouts of diarrhea and vomiting.

**Bacteria -** Salmonella, shigella, campylobacter, yersinia, and cholera are some of the bacterial causes of dysentery. Clinically these infections can resemble viral gastrointestinal illness, although blood or mucus in the stool is more typical. Shigella may present with seizures. Salmonella may be carried in undercooked poultry, powdered eggs, powdered milk, or other food, as well as by livestock and pets. Pets may also be a source for campylobacter and yersinia. Diagnosis requires stool examination and culture.

**Toxin induced food poisoning** - Although staphylococcal organisms are bacteria, it is the toxin they produce that is responsible for the symptoms of food poisoning. Undercooked poultry and poorly refrigerated foods such as pastries, custards, and

mayonnaise are typical sources. Symptoms usually begin rapidly and violently within one to six hours after eating contaminated food. Profuse vomiting, diarrhea, abdominal cramps, and prostration occur.

***Campyolobacter difficille* colitis** - Referred to as *C. diff.* colitis, is another form of toxin producing colitis, and commonly follows antibiotic therapy. Antibiotics destroy normal gut flora which allows this organism to take over and multiply, producing bloody or non-bloody diarrhea. History of antibiotic use, severity of symptoms, and prolonged illness can be clues to diagnosis. Stool cultures are required to detect the toxin, and medical advice and referral are necessary.

**Amebic dysentery** - The only known human infectious cause of amebic dysentery is via the parasite *Entamaeba histolytica.* Amoebiasis tends to be a chronic diarrheal illness that may produce an acute colitis which is indistinguishable from bacterial dysentery. Diagnosis requires laboratory identification of the amoeba in the feces. Fever is usual. Abcesses may form in the liver or elsewhere, which may prove fatal in exceptional cases.

**Other** - Chronic forms of diarrheal illness can be non-ifectious such as ulcerative colitis, regional enteritis, functional/spastic colon, and malabsorption syndromes. It is beyond the scope of this text to discuss these areas. Basic medical advice should be sought by radio for any diarrheal illness that causes serious acute symptoms or persists for more than a week or two. Advice should also be sought if there is any question regarding hydration status, mentation, or lack of response to therapy. Agents that slow gut motility, such as over-the-counter or prescription anti-diarrheal medications, should be avoided unless advised medically otherwise. They cause the infectious agent to be retained in the gut and can lengthen the infection and increase its severity.

## HEPATITIS, VIRAL

Hepatitis is an inflammation of the liver that results in acute and chronic forms of disease. Many agents cause hepatitis including viruses, drugs, alcohol, and other non-viral infectious diseases. It is important to exclude non-viral causes of hepatitis since their treatment differs. This discussion will focus on viral causes of hepatitis (hepatitis A, B, C, D, and E). These viral agents have similar clinical presentations and require specific diagnostic tests to distinguish the causative agent in an individual patient. Hepatitis A and E virus transmission mainly occurs by a fecal-oral route via person-to-person transmission and foodborne outbreaks. Hepatitis B, hepatitis C, and the hepatitis delta agents are transmitted by percutaneous and mucous membrane exposures to infectious blood and other body fluids.

Acute hepatitis implies a condition lasting less than 6 months, with either complete resolution or rapid progression toward necrosis and death. The most frequent symptoms of acute viral hepatitis are fatigue, muscle pains, nausea, and absence of appetite, which typically develop 1 to 2 weeks before the onset of *jaundice*. The frequency of jaundice varies by type of viral hepatitis and age of patient. Patients

may note yellowing of the skin or eyes, dark brown urine and/or clay-colored stools. Headaches, joint pains, vomiting, and right-upper-quadrant tenderness are also common. Diarrhea often occurs in children, but is unusual in adults. Physical exam may reveal jaundice and enlargement of the liver or spleen. Lymph node enlargement is not a clinical feature and may be suggestive of other disease.

Chronic hepatitis is defined as an inflammation of the liver lasting longer than 6 months. It may be asymptomatic for years. Over time it can develop into serious liver disease or liver cancer. Patients who are chronic carriers can spread the disease to others. Hepatitis A and E are not known to cause chronic hepatitis. Hepatitis B plus or minus the hepatitis delta agent, and hepatitis C typically cause chronic hepatitis.

**HEPATITIS A (HAV)**
*(Infectious hepatitis, epidemic jaundice)*

**Incubation Period:** 15 to 50 days, depending on dose; average 28.

**Isolation Period:** None. Standard (universal) precautions for 7 days after the onset of jaundice. Note: the patient is most infectious before they are sick.

Hepatitis A virus (HAV) is transmitted mainly by the fecal-oral route, most commonly by direct person-to-person contact. HAV can survive prolonged periods in the environment, resulting in food and waterborne epidemics. Foods touched by human hands after cooking, uncooked foods and raw or undercooked shellfish are commonly associated with outbreaks.

Acute hepatitis A may be symptomatic or asymptomatic. Children are often without symptoms but they can still spread disease to others via their stool. Adults usually present with features of acute hepatitis. Severity of illness varies and most commonly presents as a mild flu-like illness lasting 1 to 2 weeks. Rarely, it may present as a severely disabling illness lasting several months. Complete recovery without complications or recurrences is typical. The case fatality rate is low (< 1%).

Because clinical signs and symptoms are similar to those of other types of viral hepatitis, serologic detection of specific antibody responses to HAV is necessary to confirm the diagnosis. Medical referral is indicated to evaluate patients suspected of HAV infection.

**Treatment**

Most patients with hepatitis A have a self-limited course of illness, and no specific treatment is indicated except supportive care with bed rest. Medications (i.e. acetaminophen) should be prescribed with caution due to risk of further liver damage and drug toxicity. Hospitalization may be necessary if the patient becomes severely dehydrated or develops fulminant hepatitis.

**Prevention**

Hepatitis A vaccine is safe and effective, and is recommended for persons at high risk of exposure. The vaccine is given in two doses, 6-12 months apart. Hepatitis A

vaccine offers long-term protection when used as pre-exposure prophylaxis. Immune globulin is sometimes indicated as well.

Hepatitis A prevention measures include good hygiene and sanitation to prevent transmission. Thorough hand washing practices and proper food preparation reduces the risk of transmission. Maximum infectivity occurs 2 weeks prior to onset of symptoms and continues for several days after the onset of jaundice. Standard (universal) precautions should be used. Patients are not usually infective more than 7 days after jaundice occurs. Crew may return to work 7 days after the onset of jaundice. Passive prophylaxis of contacts with immune globulin (IG) is no longer recommended routinely.

## HEPATITIS B (HBV)

*(Serum hepatitis, Australia antigen hepatitis)*

**Incubation Period:** 45 to 160 days, average 120 days.

**Isolation Period:** None. Standard (universal) precautions should be used. Patients may be infective weeks before onset and weeks to months following acute clinical illness. Check hepatitis B surface antigen (HBsAg). Chronic carriers will remain infective indefinitely, often life-long.

Hepatitis B virus (HBV) is transmitted primarily by percutaneous and mucous membrane exposures to blood and other infectious body fluids. Such exposures include transfusion of blood products, sharing needles during injection drug use, dialysis, acupuncture, tattooing, and needlesticks or injuries from sharp instruments sustained by health care personnel. Indirect inoculation via inanimate objects can occur since HBV can survive for prolonged periods in the environment. Sexual transmission usually results from mucous membrane exposures to blood or body fluids. HBV is not transmitted via contaminated food or water, nor by casual personal contact.

Acute hepatitis B resembles other forms of viral hepatitis and cannot be distinguished based on history or physical exam. Acute hepatitis B is symptomatic in only 10% of children and 30-50% of adults, but may lead to severe complications in these patients. The risk of developing chronic infection varies inversely with the age at infection. Chronic HBV infection occurs in only a small proportion of infected adults (3% - 10%), but more frequently in children (20% - 30%) and commonly in neonates (90%). Chronic HBV infection is often asymptomatic or may have a mild course, but may lead to cirrhosis and liver cancer over many years.

The course of acute hepatitis B is usually divided into an incubation period, pre-icteric, icteric, and convalescent phases. During the incubation period no symptoms are noted, although virus replication is occurring. The pre-icteric phase, typically lasting less than a 1 week, is characterized by the gradual onset of malaise, nausea, right-upper-quadrant pain, and lack of appetite. Fever may be absent or mild. With the onset of the icteric phase, symptoms worsen and dark urine and jaundice appear. This phase may last a few days to several months. Itching and pale stools usually

occur after the onset of jaundice. Weight loss of 2 to 10 kilograms is typical. The convalescent phase begins with the resolution of jaundice and, while complaints of fatigue may persist for months, complete recovery is typical. However, some patients become chronic life long carriers.

Patients who have symptoms or a potential history of exposure suspicious for HBV infection should be referred for appropriate medical evaluation and testing once in port, sooner via radio if medically indicated. Blood tests are available to identify hepatitis viruses and can distinguish past exposure from active infection.

### Treatment

No specific therapy exists for acute hepatitis B. There are various approved treatments for chronic hepatitis B carriers and clinical trials are testing other regimes. Standard (universal) precautions should be followed for patients with acute or chronic HBV infection.

Preexposure immunization of susceptible persons with hepatitis B vaccine is the most effective means to prevent HBV transmission. Postexposure immunoprophylaxis with hepatitis B vaccine and HBIG may protect against infection after exposure.

Detailed advice on preexposure and postexposure immunoprophylaxis is provided by the Advisory Committee on Immunization Practices (ACIP) of the U.S. Public Health Service and is on the Centers for Disease Control and Prevention website at http://www.cdc.gov/.

## DELTA HEPATITIS (HDV)

*(Viral hepatitis D, Hepatitis delta virus, Delta agent hepatitis, Delta-associated hepatitis)*

**Incubation Period:** About 2 to 8 weeks as a superinfection; requires HBV as a coinfection.

**Isolation Period:** *S*ame as that for HBV. (See above).

Hepatitis delta agent (HDA) is an incomplete virus requiring the helper function of HBV to replicate. Therefore, HDA causes hepatitis but only in conjunction with HBV. HDA can be acquired mainly via sexual transmission as a coinfection with HBV or as a superinfection of chronic HBV carriers. Delta hepatitis may be self-limiting or may progress to chronic hepatitis. Onset of HDA infection is usually abrupt with signs and symptoms resembling those of hepatitis B but the disease may be clinically more serious. No specific therapy exists for acute Hepatitis D. Coinfection with HDA and HBV can be prevented with either HBV preexposure or postexposure prophylaxis since HDA replication is dependent on HBV. No existing products prevent HDA superinfection.

## HEPATITIS C (HCV)

*(Formerly called post transfusion non-A non-B hepatitis)*

**Incubation Period:** 2 weeks to 26 weeks, average 6 to 7 weeks.

**Isolation Period:** None. Standard (universal) precautions should be used indefinitely. Hepatitis C virus (HCV) RNA persists indefinitely in more than 85% of infected persons.

Approximately 70 - 90% of parentally transmitted non-A, non-B hepatitis has been attributed to HCV. Transmission of HCV occurs by percutaneous exposure to infectious blood. Today, with testing of the blood supply, most new infection is prevented. Many people who received transfusions in the past are infected. Sharing IV needles remains a common source of infection.

Groups at high risk include injection-drug users, hemophiliacs, hemodialysis patients, persons with high-risk sexual behaviors, or those with sexual or household exposure to HCV carriers, and health care workers. Perinatal transmission of HCV can occur, but breast-feeding does not play a common role in transmission. There is no evidence that HCV is transmitted through exposures as sharing meals or eating utensils, sneezing or coughing, or other casual contact.

HCV may present asymptomatically. Mild gradual complaints typical of hepatitis may be characteristic though jaundice itself only presents in about one fourth of cases. Fulminant fatal cases rarely occur. More than 85% of people with acute HCV infection become chronically infected, and the majority of these develop chronic liver disease with persistently elevated liver enzymes.

Because clinical signs and symptoms are similar to those of other types of viral hepatitis, specific serologic tests for antibodies to HCV are required to establish a diagnosis of hepatitis C.

## HEPATITIS E (HEV)

*(Enterically transmitted or epidemic non-A non-B hepatitis, fecal-oral non-A non-B hepatitis)*

**Incubation Period:** 15 to 64 days; mean incubation ranges of 26 to 42 days have been reported.

**Isolation Period:** None. The period that HEV is shed in the stool is unknown, and the role of person-to-person contact is not well defined. Standard (universal) precautions are appropriate.

Hepatitis E is a self-limited, acute disease similar to hepatitis A in that it only presents acutely (no chronic state exists) and it is transmitted via the fecal oral route. Good sanitation and hygiene are critical in its management. No specific therapy exists. There is no vaccine against it.

### Treatment

New and experimental treatments are available, especially for chronic carriers.

## INFLUENZA (FLU)

**Incubation period:** 1 to 3 days.

**Isolation period:** None.

Influenza is an acute respiratory illness caused by influenza type A or B viruses. Typical manifestations include fever, cough, sore throat and coryza, accompanied by headache, muscle and joint aches and extreme fatigue. Influenza outbreaks usually occur during the winter months except in tropical or subtropical areas where influenza outbreaks can occur at any time of year.

Influenza is easily transmitted by airborne spread. In closed, crowded spaces, infection can spread quickly. The most severe symptoms typically occur over 2 - 4 days and frequently require bedrest. Medical complications such as pneumonia can develop, especially in debilitated patients. Even uncomplicated influenza can present a serious problem aboard ship because of the disruption of normal activities.

### Treatment

Treatment of influenza is generally symptomatic. Acetaminophen or non-steroidal anti-inflammatory agents can be used to reduce fever and aches. Aspirin therapy should be avoided. Cough suppressants are commonly used since influenza is frequently accompanied by a dry, hacking cough. Isolation of patients can reduce the spread of infection; however, patients can shed virus before the onset of symptoms, and the spread of influenza infection in closed settings can be very difficult to control.

### Prevention

Immunization with influenza vaccine is the primary method of prevention. Currently available "killed virus" influenza vaccine is administered in the fall each year and has been found to be 70-90 % effective. New vaccine is developed and administered annually since the predominant strains of virus change. Persons at highest risk who should be immunized include:

- persons age 65 yrs or older and those any age who have certain chronic health conditions
- health care providers and household contacts of persons at high risk
- military personnel to prevent disruption of activities during epidemics
- students living in dormitories because of close living conditions

Though not specifically identified in recommendations, a ship's crew should also consider vaccination due to the risk of spread when underway.

# LEGIONNAIRES' DISEASE (LEGIONELLOSIS)

**Incubation period:** 2-14 days.

**Isolation period:** None.

Legionnaires' disease is a common type of pneumonia caused by *Legionella* bacteria. The disease tends to occur in the elderly, smokers, persons with chronic disease of the lung, kidney, and heart or those who are immunosuppressed.

Symptoms often include fever, shortness of breath, cough, chest discomfort, weakness, headache, confusion, and diarrhea. Illness can range from gradual malaise, muscle aches, loss of appetite, and low grade fever to explosive high fever and respiratory failure developing within 24 hrs. The illness can be quite serious and up to 15% of cases end in death.

Legionnaires' disease is not spread from person-to-person. Most illnesses occur as a result of inhalation of aerosols or mists containing *Legionella* within water droplets. such as from air handling systems Only a small proportion of those exposed to contaminated aerosols during outbreaks develop illness.

### Treatment

Antimicrobial treatment, given early in the course of illness, can substantially reduce the risk of serious complications. Antibiotics such as fluoroquinolones (ciprofloxacin), erythromycin, or azithromycin are used for treatment.

Medical referral and hospitalization should be strongly considered in patients with pneumonia, particularly if there are signs of respiratory distress. Intravenous fluids may be required if the patient is dehydrated.

### Prevention

The potential for transmission of Legionnaires' disease can be reduced by methods which include mechanical and biocidal cleaning of cooling systems and evaporative condensers according to manufacturers' specifications, maintenance of continuous chlorine levels within potable water systems of 1-2 µg/ml (free residual chlorine), daily hyperchlorination, maintenance of continuous halogen (chlorine or bromine) levels, and filter maintenance and replacement, according to interim guidelines of the Vessel Sanitation Program of the United States Public Health Service at http://www.cdc.gov/, daily changing of water within humidifier reservoirs, and periodic hyperchlorination of fountains.

# MALARIA

**Incubation period:** 7-28 days.

**Isolation period**: None.

Malaria transmission occurs on every continent in subtropical and tropical regions. The World Health Organization estimates that malaria infection affects from 300 to

500 million people, and is responsible for over 1.5 million deaths each year. Disease in humans is caused by one of four parasites called *Plasmodium* (*falciparum, vivax, ovale and malaria*e). *Plasmodium falciparum* causes the most severe infections, and greatest number of deaths. The use of drugs and personal protective measures can prevent mosquito bites and infection. Although treatment can prevent deaths by all types of malaria, prevention is the best approach.

Transmission of malaria occurs in Central and South America, Haiti, Dominican Republic, sub-Saharan Africa, Middle East, Indian subcontinent, Southeast Asia, and Oceania. *P. falciparum* has developed resistance to chloroquine, a drug widely used to both prevent and treat malaria in many areas. *P. vivax* has developed resistance to chloroquine on the island of Papua New Guinea. Check current recommendations for specific travel areas before prescribing prophylaxis.

Infection results from a bite from an infected female *Anopheles* mosquito which injects parasites when it takes a blood meal; these enter human liver cells. After one to two weeks of development, blood stage parasites burst from liver cells, enter the blood, and invade red blood cells. Asexual reproduction occurs in red blood cells, forming many more parasites. The red blood cells rupture releasing more parasites, which then infect more red blood cells. This continuous cycle causes symptoms of malaria illness and destruction of red blood cells.

Some parasites develop into gametocytes, which a mosquito ingests during a blood meal. The gametocytes undergo sexual reproduction in the mosquito stomach, creating more parasites (sporozoites). After 1-5 wks, the sporozoites migrate to the salivary glands of the mosquito, and can be injected into a person via a bite, which continues the cycle.

Malaria infection may lead to a mild illness characterized by flu-like symptoms, or to severe, rapidly progressive, fatal disease. The most common symptom of malaria is fever. Other symptoms can include malaise, muscle aches, backaches, sweats and chills, nausea, vomiting, abdominal pain, diarrhea, loss of appetite, dry cough and shortness of breath. Untreated *P. falciparum* infection may lead to severe complications of cerebral malaria (mental disturbances, seizures, coma, and death), anemia, kidney failure and respiratory failure.

**Treatment**

Symptoms may vary with the infecting species, immunity from previous infections, and whether a drug was used to prevent infection. The wide range of symptoms can make malaria difficult to differentiate from many other diseases. Any person with fever or other symptoms of malaria who has been in an area with malaria transmission requires immediate treatment if professional medical care is not available within 24 hours. The disease, if missed and allowed to progress, can cause death despite treatment late in the course. The index of suspicion for malaria should be high. Any individual with evidence of the complications listed above should be considered as having a severe and life-threatening infection requiring immediate treatment.

Medical advice by radio should be obtained for each patient with suspected malaria. Treatment regimens vary and are dictated by the area of malaria acquisition and drug resistance. If the area of infection cannot be determined, treatment should assume chloroquine resistance.

Prophylactic medication is critical for all individuals going to areas with malaria transmission. The specific medication is geographically specific. Personal protective measures against mosquitoes are also essential.

The nocturnal feeding habits of *Anopheles* mosquitoes lead to the transmission of malaria primarily between dusk and dawn. The use of personal protective measures to avoid mosquito bites especially during this period can provide additional protection against malaria. Measures that individuals can take to provide protection against bites of *Anopheles* mosquitoes include:

- wearing clothing that covers most of the body
- using insect repellant that contains N,N diethylmethlyltoluamide (DEET) by application to clothing and exposed skin
- sleeping under mosquito netting (bednet), which if available, is more effective if treated with an insecticide (permethrin or deltamethrin)
- staying in screened or air-conditioned areas

The appropriate use of prophylactic medications and personal protection measures will reduce the malarial risk for those going to malaria-endemic areas. However, because preventive measures are not completely effective, an ill person who has been in a malaria endemic area should be evaluated for infection.

# MEASLES (RUBEOLA)

**Incubation Period:** 8 to 13 days, sometimes more.

**Isolation Period:** From diagnosis until 7 days after the rash appears.

In the U.S. measles is largely prevented by vaccination.

Measles, an acute viral disease, is among the most contagious of all communicable diseases. The virus is found in secretions of the nose, mouth, throat, and lungs of infected persons. Many adults have had the disease in childhood, and one attack provides lifelong immunity. Complications include diarrhea, pneumonia, ear infection, and inflammation of the brain (encephalitis). In unvaccinated populations in developing countries measles is a leading cause of pediatric deaths.

Symptoms begin within 2 wks of exposure. Onset is sudden with a general overall feeling of illness, sneezing, runny nose, headache, sore throat, cough, soreness of the eyes, dislike of bright light, and a rise in temperature to about 102$^{o}$F (38.8$^{o}$C). Copious tears, swollen lids, and bloodshot eyes may be present. During this early stage the disease is most contagious. On the second and third day symptoms become more marked and the face gets a puffy look. On the inner side of the

cheeks, where the back teeth meet, tiny whitish spots (Koplik's spots) may be seen. The patient now should be isolated, if not already done. After 3 - 5 days of the disease, the typical measles rash appears. The rash of a reddish hue with slightly raised irregular blotch patches starts on the forehead and behind the ears, and gradually spreads to the face, body, and limbs. The rash remains about 4 - 5 days, then fades in the same sequence that it appeared. This is followed by a fine peeling of the skin. As the rash disappears, the patient becomes non-infectious and the temperature drops to normal. The diagnosis may be confirmed by a serologic testing once in port.

**Treatment**

Because of its extremely infectious nature, measles usually spreads to crewmen who are not immune from vaccine or past infection. A patient with measles should be isolated to reduce the chance of spread. Treatment is symptomatic, as there is no specific medicine that will cure measles. Medical advice by radio should be obtained.

Fluids should be encouraged. Close attention should be paid to cleanliness of the mouth and teeth. The eyelids and margins should be cleansed several times a day with sterile isotonic eye irrigating solution. If the rash causes irritation or itching, calamine lotion may be applied. Cough should be treated symptomatically and acetaminophen (650 mg by mouth every 6 hours) or ibuprofen given for headache or fever. During convalescence one should watch for complications and secondary infections. The patient should not engage in anything but the lightest tasks for two or three weeks after the attack. At the first convenient port, he or she should be referred to a physician for a medical checkup.

# MEASLES, GERMAN (RUBELLA)

**Incubation Period:** 12 to 23 days (rash 14 to 17 days after exposure).

**Isolation Period:** 7 days after onset of rash.

German Measles usually is a mild, acute, highly infectious viral disease, sometimes called three-day measles. If a woman develops German Measles during the early months of pregnancy, there is a great risk of a spontaneous abortion, stillbirth, or the child may be born with birth defects. Since the wide use of rubella-containing vaccine, the number of cases in the United States have decreased to a couple of hundred per year, and most cases occur among unvaccinated young adults.

In the week preceding rash, older children and adults may have low-grade fever, malaise, symptoms of upper respiratory infection, and swelling and tenderness of lymph nodes in the neck, especially behind the ears. A pink rash, which begins on the face and moves to the trunk, lasts about 3 days.

While some symptoms may precede the appearance of the rash, others may accompany or follow the onset of rash. There may be a general feeling of bodily discomfort, headache, symptoms of a common cold, eye soreness, stiffness of joints,

and a slight fever, about 102°F (38.8° C). The temperature may go to 104°F (40°C). The temperature will drop to normal as the rash fades.

### Treatment

There is no specific therapy for German Measles. In most cases, rubella is a very mild illness and requires no treatment. Patients with fever and/or joint pains should be treated for symptoms with ibuprofen or acetaminophen. The patient should be encouraged to drink plenty of fluids.

### Prevention

Rubella vaccine is a live attenuated vaccine commonly given in combination with the measles and mumps vaccines (MMR). It is contraindicated to give this vaccine during pregnancy and with significant immunosuppression. (Patients with HIV may be vaccinated if the benefits do outweigh the risks.) The vaccine is contraindicated for those sensitive to neomycin. Side effects of low-grade fever, rash and arthralgias are common when this vaccine is give to adults who are nonimmune.

## MENINGOCOCCAL DISEASE

**Incubation Period:** 1 to 10 days, most commonly less than 4 days.

**Isolation Period:** Routine isolation for the first 24 hrs of therapy and prophylaxis of household contacts as described below.

Infections caused by the gram-negative bacterial pathogen *Neisseria meningitidis*. *Neisseria meningitidis* causes a variety of clinical syndromes but is most often associated with meningitis and a distinctive, severe sepsis called meningococcemia. Transmission of disease is person-to-person via respiratory secretions.

Fever, headache, and stiff neck are the most common symptoms in patients presenting with meningococcal meningitis; alteration in mental status may also occur, and patients may have a rash. Acute onset of fever, rash, and prostration are the principal manifestations of meningococcemia. Onset of rash may be quite abrupt and the patient appear quite toxic. The rash itself may be petechial (pink dots), purpuric (look like diffuse bruises or blueberry muffin), or macular (larger pink rash difficult to distinguish from other viral rashes). Meningeal inflammation may be manifested by Kernig's sign and/or Brudzinski's sign. Kernig's sign is resistance to passive extension of the leg when the hip is flexed while supine. Brudzinski's sign is spontaneous flexion of hips and knees with passive flexion of the neck.

Elevation of white blood count with a predominance of polymorphonuclear leukocytes on differential count is the most common abnormality on routine laboratory evaluation. Signs and symptoms of meningococcal meningitis are indistinguishable from those of acute meningitis caused by *Haemophilus influenzae* and *Streptococcus pneumoniae*. For a definitive diagnosis, the patient must be taken to a health center for a lumbar puncture. It is critical that a lumbar puncture only be

performed with full sterile technique, and that the cerebral spinal fluid specimen that is collected be sent to a reputable laboratory. Further, a lumbar puncture generally should NOT be done if there is evidence of increased intracranial pressure on physical exam, i.e. papilledema on fundoscopic examination.

The lumbar puncture should be performed to obtain cerebrospinal fluid for culture (blood cultures will also often be positive and therefore should be done if possible), antigen detection, Gram's stain, cell count with differential, protein, and glucose to confirm the diagnosis and identify the cause. Cerebrospinal fluid in patients with meningococcal meningitis generally shows abundant white blood cells (1000-5000/$mm^3$) with a differential of predominantly polymorphonuclear leukocytes ($\geq$ 80%), elevated protein (100-500 mg/dl), and decreased glucose ($\leq$ 40 mg/dl); however, these findings may vary, particularly in patients with partially treated meningitis.

## Treatment

Meningococcal disease is life-threatening. Get immediate shore advice on specific antibiotic regiments.

Since survival of patients with meningococcal disease depends on timely recognition and appropriate treatment, antibiotics should be administered promptly based on clinical suspicion. Appropriate diagnostic procedures should be performed, but treatment should not be delayed.

Choice of antibiotic is based on the most likely causative bacteria. A strong, broad-spectrum agent is used until the causative bacteria have been identified. High dose penicillin G should be administered intravenously (20 to 24 million units per day in adults) every 4 to 6 hours; some of the newer intravenous cephalosporins, notably ceftriaxone, cefuroxime, and cefotaxime have also been shown to be effective in treating meningococcal meningitis. High-level penicillin resistance due to β-lactamase production has been reported among strains from Spain and Southern Africa. If penicillin resistance is suspected, other antibiotics should be used. Respiratory isolation is indicated for 24 hours after initiation of effective therapy. Seven to 10 days of treatment is usually sufficient.

## Prevention

The risk of meningococcal disease in close contacts of patients with meningococcal disease is 500 to 1000 times the risk in the general population. Antibiotic prophylaxis is recommended as soon as possible for close contacts of patients, including shipmates, household members, day care center contacts, and anyone directly exposed to the patient's oral secretions. Casual contacts and hospital personnel providing routine care are not at increased risk and do not require prophylaxis. Contact a shore physician for the best specific antibiotic and dose for your situation.

Vaccination is the main public health tool available to control outbreaks. The currently licensed meningococcal vaccine provides protection against disease

caused by *N. meningitidis* serogroups A, C, Y, and W135, but not serogroup B. The vaccine is also recommended for asplenic persons and persons with complement deficiencies. Travelers to areas with high endemic rates or areas susceptible to epidemics may benefit from vaccination prior to travel. Except for military personnel, meningococcal vaccine is not routinely recommended in the United States because about half the meningococcal disease is caused by serogroup B, for which no vaccine is currently available. Further, in the U.S., more than half the cases occur in children under age 4, in whom the duration of protection conferred by available vaccines is limited.

# MONONUCLEOSIS, INFECTIOUS

**Incubation period:** 21 to 42 days.

**Isolation period:** None.

Infectious mononucleosis is an acute viral disease, caused by Epstein-Barr virus (EBV), and characterized by fever, sore throat (often with exudative pharyngitis), and lymphadenopathy. It occurs among children and young adults and may be a diagnostic challenge if the typical syndrome is not present, which is often the case. It occurs sporadically and is common among college and high school students. One should have a low threshold of suspicion when testing for “mono,” i.e. anyone with a prolonged sore throat not responsive to medical intervention should probably be screened. Because it is spread by contact with upper respiratory secretions, it has been called the "kissing disease".

The first symptoms are similar to any upper respiratory infection: with fever, chills, headache, cough, and general malaise. The patient may have complaints of fatigue, loss of appetite, sleeplessness, and a sore throat. After two to three days, swollen lymph glands may appear on the sides and back of the neck, in the armpits, and the groin. A mild reddish skin rash like that of Rubella (German Measles) may occur in about 10% of the cases, but particularly those treated with a penicillin-related drug. Enlargement of the spleen is noted in 50% of young adults, and jaundice (yellow color) of the skin and eyes in about 4%.

The diagnosis is aided by finding lymphocytosis of greater than 50% with 10% or more atypical lymphocytes on a peripheral blood smear. It is serologically confirmed by heterophile and Epstein-Barr virus blood tests.

### Treatment

Medical advice by radio should be obtained for acutely ill patients. There is no specific treatment for infectious mononucleosis except bed rest during the acute phase. Bed rest should be extended in cases with prolonged fever and those that resemble hepatitis. Robust exercise should be avoided by any cases with abdominal pain or tenderness, which may be associated with enlargement of the spleen, to reduce the possibilities of rupture. Symptoms such as fever, headache, and itching

of the skin, should be treated as they arise. The disease may run its course in a week, in a few weeks, or more rarely, in months.

A normal diet may be given, but taking fluids by mouth should be encouraged. For fever and pain, acetaminophen may be given orally. Complications should be treated as recommended by radio medical advice.

# MUMPS (EPIDEMIC PAROTITIS)

**Incubation Period:** 12 to 26 days.

**Isolation Period:** 9 days from onset of parotitis (swelling of salivary glands).

Mumps is an acute, contagious, viral disease identified by tenderness and swelling of one or more of the salivary glands. Usually the parotid glands are affected. The virus may be spread by direct or indirect contact with nose and throat discharges from an infected person.

Mumps is most prevalent in the winter and spring. It is most apt to occur in camps, training stations, and among new members of a ship's company recruited from rural districts and never vaccinated or previously exposed to mumps. One attack usually gives immunity for life.

The disease begins with malaise, headache, a slight rise in temperature, and possibly nausea. In severe cases the temperature may reach 104°F (40°C) and last as long as a week. On the second day the swelling usually begins on one side of the jaw or cheek and increases greatly. In a couple of days, there is considerable enlargement at the side of the neck, posterior part of the cheek, and underneath the side of the jawbone. The patient complains of pain and stiffness on moving the lower jaw. The opposite side of the face usually becomes affected in a few days, though infection may occur unilaterally. The swelling lasts about 10 days.

In the average case in childhood, the patient has little trouble beyond stiffness of the jaw, discomfort from swelling, and pain on opening the mouth. However, in young adult males, the infection may spread to one or both testicles to produce a painful inflammation and swelling called orchitis. Some degree of testicular atrophy is common, but sterility is rare.

**Treatment**

The patient should have bed rest with strict isolation nursing technique. There is no specific medicine for the cure of mumps and symptoms should be treated as they arise. Analgesics-antipyretics such as acetaminophen relieve pain caused by salivary gland inflammation and reduce fever. Warm or cold packs applied to the inflamed areas may relieve discomfort. Fluids should be encouraged with a soft diet.

If the testicles become involved, bedrest, narcotic analgesics, support of the inflamed testes, and ice packs may relieve discomfort. When the patient is allowed up, he should wear a suspensory. *Medical advice by radio should be obtained promptly.*

# PLAGUE

**Incubation Period:** 2 to 6 days.

**Isolation period:** Until declared free from infection by a physician.

Plague is an acute, sometimes fulminating disease caused by the Gram-negative bacillus, *Yersinia pestis*. Plague is primarily a disease of rodents and is most often transmitted to humans by the bite of infective rodent fleas. Plague in the past has been a maritime disease because of rat infestation of ships.

Federal regulations require that vessels be maintained free of rodent infestation through the use of traps, poisons, and other accepted methods of rodent control. Ships must be inspected periodically by the U.S. Public Health Service and a certificate of non-rat infestation given.

Plague remains endemic in limited areas in Asia, Africa, and the Americas and occasionally results in outbreaks of disease. Outbreaks of human plague are usually associated with outbreaks (epizootics) of the disease in rats or other rodents.

Three principal clinical forms of human plague occur: the bubonic type that affects the lymph glands, the pneumonic type that affects the lungs, and the septicemic type that occurs when *Y. pestis* multiplies freely in the blood.

All three forms are usually characterized by rapid onset of severe illness with high fever, chills, and prostration. Signs of general toxicity may be accompanied by neurologic signs such as incoherent speech, clouding of consciousness, and incoordination. Plague meningitis can sometimes occur.

## BUBONIC PLAGUE

Bubonic plague, by far the most common form, is usually acquired by the bite of an infected rodent flea. Transmission occurs when the plague bacillus is regurgitated by the flea into the bite wound at the time of taking a blood meal. The disease may also be transmitted by direct contact with tissues or body fluids of an infected animal. Persons with cuts or abrasions on their hands are especially at risk of infection when handling infected animals. Once introduced through the skin, the bacteria lodge and multiply within the lymph nodes draining the site of introduction.

The onset of illness is usually heralded by fever, intense headache, fatigue, and profound weakness. The fever often rises to 102$^{o}$ F (38.9$^{o}$ C) or higher on the first day of illness, then fluctuates. The pulse is rapid, sweating and chills may occur, and the patient may experience extreme thirst. The patient often becomes anxious or agitated, and delirium and convulsions may develop. The characteristic buboes (swollen, extremely tender lymph nodes) usually develop on the second or third day of illness, most often in the inguinal (groin) area. Buboes may also form in the axillary (armpit) area and in the cervical (neck) region. The affected glands often swell to a size of 2 or more inches (5 cm) in diameter and are surrounded by edema of the soft tissues. The overlying skin is usually reddened and warm. The patient

often guards the affected region and draws away from examination because of the extreme tenderness of the node.

Untreated, more than 50% of bubonic plague patients will die. In cases that receive proper treatment, the patient usually begins to show significant improvement within 2 or 3 days of antibiotic therapy.

## PNEUMONIC PLAGUE

Primary pneumonic plague, spread by respiratory droplets exhaled by coughing, talking, or sneezing, is the least common, but most serious form of the disease. The disease is probably always fatal, unless the patient is treated early with the appropriate antibiotic regimen (within 18-24 hours after onset of symptoms). Symptoms are as described above with the additional problems of cough, rapid respirations, difficulty in breathing, and cyanosis that may occur as the pneumonia advances. The sputum may be scant and blood-tinged, or may be profuse, watery, and bloody. The sputum usually contains large numbers of the plague bacillus. Patients may simultaneously develop respiratory failure, toxic shock, and clotting problems as evidenced by bleeding. Patients must be managed with isolation and full respiratory precautions. Caregivers working closely with the patient should receive antibiotic prophylaxis.

## SEPTICEMIC PLAGUE

Primary septicemic plague (infection of the bloodstream) occurs in 10% or less of all cases. It usually arises from direct handling of infected tissue and fluids of infected animals. Septicemia secondary to bubonic or pneumonic plague is not uncommon, however. The patient is rapidly prostrated and may develop irreversible septic shock. Clotting problems as evidenced by bleeding are common. If not treated promptly, death often occurs in 2 to 4 days, frequently preceded by delirium, stupor, and coma.

### Prevention of Spread

If the ship is proceeding to a port where plague is present, it may be advisable to protect the crew with prophylactic antibiotics. Specific advice should be obtained from the port authorities as to regulations about entering and leaving the port.

Plague is a Class 1 quarantinable disease. Should a crew member develop plague, federal regulations require that the Master, as soon as practical, shall notify the health authority at the next port of call, station, or stop, and take such measures to prevent the spread of the disease as the health authorities direct.

If *bubonic plague* occurs on shipboard, the patient should be placed in isolation. The sickroom and the crew quarters should be treated with an insecticide to kill any fleas, and general insecticiding of the ship performed. Dead rats found aboard ship should not be handled with bare hands. The dead rats should be sprayed with an insecticide to kill any fleas; then they should be picked up with a shovel or tongs, placed in a sealed plastic bag and incinerated. Efforts to rid the ship of live rats by

trapping or poisoning should not be undertaken until complete flea control has been accomplished by professional application of insecticides.

Discharges from buboes could be infectious. Disposable surgical supplies such as gauze used on the buboes should be burned or sterilized prior to disposal. Attendants should wear gowns and gloves, and wash and disinfect their hands each time after giving care.

In *pneumonic plague*, which is spread by the patient's respiratory secretions, isolation nursing technique must be strictly observed. Attendants should wear a mask, cap, gown, and gloves; these articles must be kept in the sickroom after use and disinfected at the termination of the illness. The medical attendant's hands must be washed thoroughly before leaving the sickroom. Discharges from the patient's mouth must be caught in tissue and disposed of in an appropriate manner for infectious waste material by autoclaving or incineration and articles which cannot be sterilized as per above must be boiled or chemically disinfected. At the end of the illness, the room must be disinfected.

### Treatment

Radio notification of the diagnosis should be made at the first suggestion of symptoms of plague. Plans should be made to evacuate the patient to a medical facility ashore at the first opportunity after consultation with the port's health authorities.

Seek medical consultation for the specific antibiotic treatment regimen.

## POLIOMYELITIS

**Incubation Period:** Commonly 7 to 14 days, with a range from 3 to 35 days.

**Isolation Period:** Enteric precautions should be used in the hospital. These are of less value under home or ship conditions because most contacts may have been infected prior to diagnosis.

Poliomyelitis is an acute viral disease that occurs chiefly in children. Adults usually are immune. It is spread by respiratory and fecal routes. Today polio is wholly preventable with two types of vaccine available: the injectable Salk vaccine (IPV) and the oral Sabin vaccine (OPV).

Polio may start with no recognizable symptoms or it may resemble a head cold with fever, vomiting, and irritability. The symptoms last about three days, and the temperature may rise to 104$^{o}$F (40$^{o}$C).

From the fourth to the tenth day the condition will seem to be clearing. However, the symptoms return with a feeling of apprehension, headache, stiff neck and back, and deep muscle pains. Varying degrees of paralysis follow. Thereafter improvement is gradual either with complete recovery or paralysis to some degree.

### Treatment

No specific treatment is effective. When poliomyelitis is suspected, medical advice by radio should be obtained. The patient should be put to bed and isolation nursing technique observed. For spinal paralysis of body parts, hot moist heat may be applied, coupled with gentle, active or passive motion as soon as the patient can tolerate it. Physical therapy is used to attain maximum function after paralytic poliomyelitis and can prevent many deformities that are late manifestations of the illness.

If urine is retained, a catheter should be inserted and medical advice sought by radio. All stools are infectious, so bedpans should be disinfected.

### Prevention

Both injectable and oral polio vaccines are available, though their side effect profiles differ. See current CDC recommendations at http://www.cdc.gov/.

## RABIES (HYDROPHOBIA)

**Incubation Period:** 10 days to more than 12 months (usually under 4 months). Patients bitten about the head and those with extensive bites may have shorter incubation periods.

**Isolation Period:** Duration of the illness.

Rabies is an acute infectious viral disease that is almost always fatal. When a rabid mammal bites a human or other animals, its saliva transmits the infection into the wound where it spreads to the central nervous system. Rabies occurs worldwide, except in isolated regions where it has never been established, such as portions of Pacific Oceania, or in areas that have achieved secondary eradication, such as the United Kingdom. In developed countries that have controlled canine rabies, the disease is primarily an infection of wild animals such as skunks, coyotes, foxes, raccoons, mongooses and bats. In developing countries, the domestic dog is the predominant reservoir, particularly in portions of Latin America, Africa and Asia. Other domestic animals can be also infected.

Human rabies may begin with fever, nausea, headache, loss of appetite, and sore throat. The body temperature may rise to $103^0$F ($39.4^0$C). Because these symptoms are common to other viral infections, the condition may be misdiagnosed if the patient's history does not indicate a recent bite by an animal. At the bite wound, there may be a tingling or burning feeling. As the infection progresses, extensive portions of the brain and central nervous system become involved. Paralysis and muscle spasms occur, with spasms of muscles in the mouth and throat that control swallowing. The term hydrophobia (fear of water) derives from the patient's inability to drink, regardless of thirst. Patients become very weak and their mental outlook changes. They become apprehensive, irrational, even maniacal. They may suffer from widespread muscular twitching and convulsive seizures provoked by any

stimulus, especially by attempts to drink or even air currents. The voice becomes hoarse. Thick ropy saliva may drip from the lips. Eventually there are breathing difficulties, coma, and general paralysis. The patient should be isolated and kept comfortable. Measures should be in place to prevent contact with the patient's bodily fluids, such as saliva. Little else can be done once symptoms of rabies develop. Death is virtually certain. Thus, prevention of the disease is of the utmost importance.

Circumstances surrounding the animal attack frequently furnish vital information on whether or not the use of rabies treatment is indicated. Most bites by domestic dogs and cats are provoked. If the history indicates this, usually rabies treatment can be withheld, if the animal is available for observation, and appears to be healthy over a 10 day period. However, the dog or cat that bites without apparent provocation may be considered rabid. Each case must be analyzed carefully before a conclusion can be reached on whether or not to proceed with treatment.

Domestic dogs and cats that bite a person should be captured and observed for signs of rabies for the 10 days. If signs are not present, the animal may be assumed to be nonrabid. If the animal dies or is killed, the animal's head, undamaged, should be sent promptly under refrigeration (*but not frozen*) to a public health laboratory. Observation periods do not pertain to wildlife, because the period of virus shedding is unknown. Any wild mammalian carnivore or bat that bites or scratches a person should be humanely killed at once, taking care not to damage the brain, and the head kept under refrigeration during transportation to a public health laboratory.

Rubber gloves should be worn by the attendant for protection against infectious saliva when the head is being prepared for laboratory examination. The gloves should be washed thoroughly with disinfectant solution and boiled in a sterilizer for five minutes before discarding. Finally the attendant's hands should be washed with disinfectant solution.

**Treatment**

Treatment of the bite wound includes both rabies-specific treatment and general wound care. Since the supplies for rabies specific treatment can be difficult to obtain, even on shore, immediate consultation with shore medical facilities are indicated. This consultation will help to assess the seriousness and likelihood of rabies risk and also begin acquiring specific treatment products if warranted. If the risk is high, immediate transport to shore of the person and animal (or refrigerated head or carcass of the animal) are essential. Laboratory evaluation of the animal and prompt treatment of the patient can be life-saving.

Immediate shipside wound care includes cleansing and irrigation to remove as many microorganisms (including rabies virus) as possible. Soap and water, or saline solution, can be used. Suturing is rarely appropriate for bite or puncture wounds since it can increase the risk of infection.

Tetanus toxoid or prophylactic antibiotics may be indicated depending upon the patient's vaccine history and the extent of the bite.

Rabies specific treatment would be done at the shore facility. The specific treatment is dependent upon the patient's rabies vaccine history and other clinical features. A series of rabies vaccine doses is frequently given.

# RHEUMATIC FEVER

**Incubation Period:** 7-14 days.

**Isolation Period:** None.

Rheumatic fever typically occurs in children and young adults. A recent history history of pharyngitis is typical though the patient may have been asymptomatic. Migratory joint aches and salmon colored rash is common. Although less common, patients may present with heart problems, such as a new heart murmur, or abnormal body movements (chorea).

Epidemiologic risk factors include lower standards of living and crowding. Incidence has declined remarkably over the past fifty years in industrialized countries but still poses a significant public health problem in developing countries. An abnormal immune response to the streptococcal infection by the host is thought to be the mechanism by which disease develops.

Evidence of a recent strep throat infection is of course supportive. A positive throat culture, a rapid antigen detection test and/or elevated or rising ASO (strep antibody) titers would be tests which would be supportive, were one to have access to such studies. Diagnosis is a clinical one, based on criteria referred to as the Jones criteria. Generally one would suspect diagnosis and seek medical assistance by radio based on the following constellation of (or some of) the following symptoms:

- migratory joint pains or
- heart problems such as chest discomfort that suggest swelling,
- a new murmur, rapid heart rate, skin nodules
- migratory rash
- fever

### Treatment

For adults with symptoms of acute arthritis high dose aspirin is recommended if the patient has no history of liver or kidney disease. Corticosteroid therapy has been shown to be effective but should be reserved for extreme cases under physician advisement. Antibiotic therapy should be started immediately. Penicillin is the drug of choice, either oral or IM. For penicillin allergic patients, erythromycin is an alternative.

# RELAPSING FEVER (TICK-AND LOUSE-BORNE RELAPSING FEVER)

**Incubation Period:** 5 to 15 days (usually 8 days).

**Isolation Period:** None. (For louse-borne relapsing fever, the patient's clothing, immediate environment, and all household contacts should be deloused).

Relapsing fever is an acute infectious disease caused by spirochetes of the genus *Borrelia*. It is transmitted by lice and ticks. The disease is characterized by rapid onset of fever, chills, dizziness, headache, muscle and joint pains, vomiting, and at times delirium. The fever remains high for two to nine days, then ends suddenly by crisis, in which there is a further rise in fever accompanied by rigors, followed by a rapid fall in body temperature and drenching sweats. This is followed by several days of fair health without symptoms, after which a relapse usually occurs, plus jaundice in some cases. There may be three, four, or more recurrent attacks, each decreasing in severity, as immunity develops.

A sick member of the crew should be suspected of having the disease if the ship has recently been in an area where relapsing fever is prevalent, or the disease has been diagnosed in any of the crew by a shore physician. The only major focus of louse-borne relapsing fever is in Africa, primarily in the highlands of Ethiopia, but the disease also occurs in refugee populations in surrounding countries. With known relapsing fever suspects aboard, a thorough search should be made for body lice. If these are found, the crew's quarters and clothing should be treated with an insecticide, and clothing and bed coverings regularly washed.

Lice are infected when they feed on patients during the fever stage. After the lice are crushed on a person's body, the spirochetes can enter any breaks in the skin or be carried by contaminated hands that rub the eyes. Ticks become infected when they feed on rodents that carry the disease.

### Treatment

Medical advice by radio should be obtained. Tick-borne relapsing fever is usually treated with tetracycline hydrochloride. Louse-borne relapsing fever is treated with erythromycin, tetracycline, or doxycycline.

# SCARLET FEVER

**Incubation period:** 1-4 days.

**Isolation period:** None.

Scarlet fever consists of a streptococcal infection, usually a strep throat, accompanied by a characteristic rash. The symptoms of scarlet fever include those of a strep throat: mild to severe sore throat (sometimes asymptomatic), fever, chills, malaise, abdominal complaints/vomiting. The throat may look normal or

erythematous with a purulent exudate over the tonsils. Enlarged, tender anterior cervical lymph nodes may be palpable accompanying the infection.

The scarlet fever rash typically has a sandpaper-like quality and begins on the first or second day of illness. It spreads over the trunk to the extremities but spares the palms and soles. The rash may also be accentuated in areas of the skin folds (Pastia's lines). The tongue may have a strawberry-like appearance (strawberry tongue). The rash usually subsides within a week and is often followed within several days by desquamation of the palms and soles. It is one of few rashes affecting the palms of the hands and soles of the feet.

**Treatment**

Therapy is the same as for streptococcal pharyngitis: intramuscular benzathine penicillin G or a complete 10 day course of oral penicillin V, or erythromycin for those with penicillin allergy.

## SHINGLES

Herpes Zoster, commonly known as shingles, is caused by the same virus that causes chicken pox. It develops in patients who have a remote history of chicken pox. Illness arises when the body is sick or stressed. The rash of shingles follows a dermatome pattern and is typically quite painful. Others can catch chicken pox from someone who has shingles. Anti-viral and pain medications are used with varying success. Medical advice by radio should be sought if the rash involves the face or if there is any concern regarding possible superinfection.

## TETANUS (LOCKJAW)

**Incubation Period:** 3 - 21 days or more (depending on character, location, and extent of wound).

**Isolation Period:** None.

Tetanus can be prevented with vaccine – current vaccination is critical.

Tetanus is caused by a toxin produced by the bacillus *Clostridium tetani*, a bacterium that grows in the absence of air at the site of an injury. Tetanus bacteria are found in the intestines and manure of horses, cows, and other animals. The soil becomes seeded with spores that are hard to kill, survive for years, and are transplanted into humans or other favorable environments for growth. Tetanus bacteria commonly enter the body through wounds contaminated by debris or foreign bodies.

The wound may not show any change when initial symptoms develop; in fact it may seem to be healed. The toxin produced is carried to the central nervous system thereby producing symptoms. Early symptoms are aches and pains in the muscles, general fatigue, and headache. Soon the characteristic signs appear - stiffness of the neck and jaw that gradually extends to the muscles of the back and the

extremities. The jaw may become clenched tightly (lockjaw). The body is held rigidly straight or arched so that the patient's back may touch the bed only with his head and heels. There is such extreme nerve sensitivity that the slightest jar, touch, or noise may cause diffuse muscle spasms with agonizing pain. The temperature varies; usually it is high during the state of convulsions, rising to 103°F (39.4°C).

### Treatment

If the medical attendant suspects that a patient has tetanus, immediate medical advice by radio should be obtained, therapy given as directed, and evacuation arranged. (Early contact with shore facility is necessary to arrange for this). Constant nursing care and utmost quiet must be provided to prevent the exhausting painful spasms. Sedatives and muscle relaxants such as diazepam should be given as directed. During convulsions the jaws should be separated with a pencil wrapped in gauze to keep the patient from biting his tongue. Fluids should be encouraged if so directed medically. Regulations require that the Master, as soon as practical, notify the local health authority at the next port of call, station, or stop that a tetanus case is aboard ship. The Master should take such measures as directed by the local health authority.

### Prevention

Vaccination against tetanus is essential. This vaccine is often combined with diphtheria toxoid (tetanus and diphtheria toxoids for adult use). Every seaman should obtain his or her primary vaccinations, with booster shot every 10 years. An additional vaccination may be indicated immediately following a severe dirty laceration or wound.

## TUBERCULOSIS

**Incubation Period:** Variable, from 10 weeks to years.

**Isolation period:** Isolation should be discontinued only after the patient has been evaluated, treated, and declared noninfectious by a physician.

Tuberculosis (TB) is an infectious disease caused by bacteria called *Mycobacterium tuberculosis*. TB can attack any part of the body, but most commonly causes lung disease. Bacteria are expelled into the air by a person with active TB and patients are most infectious when they have a cough. A healthy body is usually able to control the tubercle bacilli. Therefore most persons who become infected with *M. tuberculosis* do not develop active TB, remaining latently infected throughout their lives. As long as persons with latent TB do not have any clinical signs and symptoms of active TB, they do not pose any threat to others and are not infectious.

Some people develop TB disease soon after infection, before the immune system can control the bacteria. The risk of disease progression is highest within the year after infection occurs. There are some groups of people who have a higher than normal risk of developing active TB. These include persons with human immunodeficiency virus (HIV) infection or other immune suppressing conditions

(transplant recipients); persons with other medical conditions such as diabetes, silicosis, and malnutrition; or those in the extremes of ages (infants and elderly).

General symptoms include a persistent cough, weight loss, fever, night sweats, chills, loss of appetite, and fatigue. The most reliable signs of TB are a cough that persists for more than 2 weeks, often with blood tinged sputum, and chest pain. Anyone *with these symptoms should be isolated immediately and, as soon as it is possible, seen by a physician.*

**Treatment**

While at sea, isolation and medical referral is advised. Once in port, the patient should be given a chest X-ray and a medical evaluation by a physician. Appropriate anti-TB medicines should be started and the patient isolated until considered noninfectious by the doctor. TB therapy consists of several drugs, which must be taken for an extended period, usually for at least 6 months. Some of the drugs used include isoniazid, pyridoxine and rifampin. Susceptibility to TB drugs should be tested. Patients are usually considered infectious until sputum samples on three consecutive days show no acid-fast bacilli. *Multidrug-resistant tuberculosis, requires prompt expert medical advice*. When active disease is found on board, the local health authority in the nearest port city should investigate the persons who were close contacts of the patient on the ship. However, this public health function is not available worldwide. If the service is unavailable in the nearest port city, U.S. health officials should be contacted. An investigation can begin underway and should be completed immediately upon return to a U.S. port.

# TYPHOID FEVER (ENTERIC FEVER)

**Incubation Period:** Usually 1-3 wks, depending upon size of infectious dose and vaccine status.

**Isolation Period:** Isolation not required.

Typhoid fever is caused by the bacterium *Salmonella typhi*. The disease occurs worldwide, but is much more common in areas where sanitation is poor. A high fever with a slow pulse rate, lasting more than a week, plus headache and abdominal pain, may be presenting signs. Onset of fever is gradual and may rise in a stepwise fashion over 2 - 3 days, peaking at 103-104$^{o}$F (38.8 - 40$^{o}$C). Chills, mental cloudiness, malaise, constipation, abdominal pain, nausea, and loss of appetite may present early on. Diarrhea and vomiting are less common. One-third will have a dry cough.

Within the first week, a sparse rash may appear on the chest and/or abdomen which typically consists of a few red, flat, nontender lesions ("*rose spots*"), 1-2 mm in diameter. The abdomen may be slightly distended with a varying degree of tenderness. Bleeding and perforation of the bowels are two of the most common complications of typhoid fever; typically occurring 2-3 weeks after the onset of the

illness. When typhoid fever is suspected, Immediate evacuation to the closest medical facility is indicated.

### Treatment

As soon as typhoid fever is suspected, medical advice should be obtained by radio. If persons with typhoid fever are left untreated, symptoms may persist for weeks to months; and 10-20% may die. When given appropriate antibiotics, recovery within 2 – 3 days is usual with few deaths (< 1%). Chloramphenicol had been used worldwide, but resistance has developed to it. Trimethoprim/sulfamethoxazole and ciprofloxacin are alternatives. Rehydration with oral fluids and/or intravenous therapy may be required. Obtain medical advice. Acetaminophen may be given for pain and fever.

### Prevention

Poor sanitation and the prevalence of asymptomatic carriers are major factors of transmission. Personal hygiene and protection of water sources, particularly aboard ship, is of utmost importance. Care should be taken when getting water in foreign ports. Vaccines are available but a large dose of the bacteria can overcome such protection. Patients may continue to excrete typhoid bacteria in stools or urine for weeks to months after recovery and 2 - 5% of patients become long-term carriers. Patients and carriers cannot be allowed to handle or prepare food for others until they are cleared to do so by a physician (requires three negative stool cultures at one-month intervals). Persons caring for typhoid fever patients must wash their hands carefully. Linens should be disinfected routinely. The ship's water system must be disinfected. Public health authorities should be alerted of cases of typhoid fever as they arise.

## TYPHUS FEVER

**Incubation period:** 10 to 20 days.

**Isolation period:** Until declared free from infection by a physician.

Typhus fever is a term applied to several worldwide forms of disease that are caused by obligate intracellular bacteria of the family Rickettsiaceae. Each form of this disease is characterized by sudden onset of nonspecific symptoms that often include fever, headache, chills, muscle aches, joint pains, and rash. Malaise may progress to prostration. Anorexia, cough, and photophobia (pain from bright lights) may also occur. Each species of rickettsia is transmitted via a particular arthropod vector, including ticks, lice, fleas, and mites. Humans who engage in activities that bring them in close contact with vectors, reservoirs, or both, are at increased risk for these zoonotic diseases.

The most serious of the typhus fevers is Rocky Mountain spotted fever (RMSF). This disease is carried by a tickborne vector and is the most commonly encountered rickettsia in the United States. Persons who have frequent outdoor exposures to

ticks, including campers, hikers, fisherman, and hunters, are at increased risk for infection. Other tickborne typhus fevers are named for the geographic region where they are found.

Louse-borne typhus is transmitted within populations living at high altitudes or cold climates where pediculosis is common and bathing and laundering of clothing are infrequent. The disruption of community services, such as electricity and water supplies, that often accompanies armed conflict and natural disasters, provides a potential setting for epidemics.

Brill-Zinsser disease occurs as a milder recurrence (recrudescence) among persons who have been inadequately treated in the past for their louse-borne typhus (or among those who have recovered from louse-borne typhus whose immune status has diminished).

Fleaborne typhus has a worldwide distribution but is uncommonly reported in the U.S. It is prevalent among populations that live in close association with rodents and their fleas. Persons who have occupational exposure to rodents (e.g., agricultural workers) are at risk.

Miteborne typhus (scrub typhus) is widespread throughout Asia and the Pacific Islands. Edge or scrub vegetation provides habitat for rodent hosts of vector mites, and human populations that frequent these areas, including military personnel and agricultural workers, have increased risk.

With all the typhus fevers, infection occurs when rickettsiae are introduced through the skin by the bite of a tick or a mite, or by the rubbing of infectious feces from lice or fleas into the skin. A necrotic lesion (a skin lesion with dead or dying tissue) occasionally occurs at the site of inoculation in some patients with tick typhus or rickettsialpox. Such a lesion is common in patients with miteborne typhus.

Multi-organ failure may result. This may be manifested most commonly by confusion or stupor, severe difficulty breathing, kidney and liver failure, as well as shock. Heart problems may occur. Clotting problems may cause gangrene. Typhus fever can be a fatal disease.

### Treatment

If the medical attendant suspects that a patient has typhus, immediate medical advice by radio should be obtained on diagnosis and treatment.

The patient with one of the typhus fevers must be isolated in a vermin-free room. The patient cannot directly transmit the disease to others. However, if the patient harbors infected lice or other insect vermin disease can be transmitted. Begin measures to kill any lice present.

Prompt antibiotic therapy is necessary to prevent serious complications. Patients with fulminant, life-threatening typhus fevers, including RMSF and louse-borne typhus, may die before serologic confirmation can be made. Hence, treatment

should be initiated on clinical grounds, on the basis of symptoms and signs, and a history that suggests possible exposure to habitats where the vectors reside.

Tetracycline, doxycycline, and chloramphenicol are the drugs most suitable for treatment of the typhus fevers and antibiotics are highly effective when administered in appropriate dosage early in the course of illness. Patients often show improvement within 24 hours of initiating antibiotics, and they frequently recover markedly within 72 hours. However a full course of antibiotics is indicated.The patient should also receive symptomatic treatment as needed. Sedatives may be required but should be given based on medical advice rendered. For pain, oral codeine sulfate may be given.

Typhus is an official notifiable disease. Federal and international regulations require that the Master, as soon as practical, notify the local health authority at the next port of call, station, or stop. To prevent the spread of the disease the Master should take such measures as the local health authority directs.

## UNDULENT FEVER (BRUCELLOSIS, MALTA FEVER OR MEDITERRANEAN FEVER)

**Incubation period**: Less than 5 days to several months, most cases occur 2 - 8 wks after exposure.

**Isolation period:** Unless the patient has a draining wound, no special precautions are required.

Brucellosis is acquired by direct contact with secretions and excretions of infected animals and by ingestion of the milk of cows, sheep, or goats or the products of their milk (butter and cheese) containing the Brucella organisms. The disease is only rarely transmitted from person to person. Brucellosis is more common in rural areas and is commonly an occupational disease of meat packers, veterinarians, farmers, and livestock producers. Distribution of brucellosis is worldwide, though the disease is more common in the Middle East, Southwest Asia, Africa, and parts of Latin America.

The disease is characterized by an acute febrile stage and by a chronic stage with relapses of fever, weakness, sweats, and general aches and pains. The diagnosis is difficult since the presentation is often vague and nonspecific. Intermittent fevers, often associated with drenching perspiration, are common. Duration of disease ranges from several days to months, or even years.

A definitive diagnosis is based on isolation of the organism, usually from the blood or less often from other affected tissues. Serologic testing for brucella antibody may be helpful. The patient should be referred for proper medical evaluation once in port. Even with serologic testing diagnosis may have to be based on history of exposure, epidemiologic data, and characteristic clinical findings.

### Treatment

If brucellosis is suspected an extended couse of doxycycline is recommended. Tetracycline should be avoided in children under 7 years of age and cotrimoxasole should be considered for this group. Severe musculoskeletal pains, especially over the spine, may require codeine. Activity should be restricted in acute cases, with bed rest recommended during febrile periods.

### Prevention

Prevention of brucellosis is based on reducing exposure to the organism. Restricting exposure to infected animals and prevention of exposure to *Brucella sp.* containing foodstuffs by drinking only pasteurized milk and dairy products is recommended. Persons handling animals or carcasses of potentially infected animals should wear goggles (or glasses) and rubber gloves and should protect skin breaks from bacterial invasion.

## WHOOPING COUGH (PERTUSSIS)

**Incubation Period:** 7 to 14 days.

**Isolation Period:** For 4 weeks (after the cough begins.)

Whooping cough is a highly communicable bacterial disease that is caused by the bacillus *Bordetella pertussis*. Historically, lack of compliance with recommended vaccination protocols has been associated with outbreaks of pertussis in the U.S. The disease should be suspected if the patient had been exposed to a case of whooping cough one to three weeks previously, develops a cold followed by cough. The coughing spasms often result in vomiting and are associated with the typical "whoop." The disease is spread by the patient's respiratory secretions through coughing, sneezing, and close contact.

The characteristic whooping type of cough reaches its worst stage about two or three weeks after symptoms begin. The convalescent stage occurs when coughing reduces in frequency and severity, and vomiting decreases.

Rarely, a few patients develop serious complications such as pneumonia, middle ear infection, chronic bronchitis, or encephalitis.

### Treatment

*Medical advice by radio should be obtained, particularly for recommendations regarding prophylaxis of shipmates and other close contacts.*

The patient should be isolated for at least five days after initiation of erythromycin, or until 4 weeks after the onset of cough. The spread of whooping cough can be limited by treating the patient with antibiotics and by protecting close contacts. To reduce infectivity as quickly as possible, a course of oral erythromycin or sometimes clarithromycin or azithromycin, is recommended for patients with clinical pertussis. Antibiotics should be given for 14 days.

Symptomatic therapy with codeine sulfate should be given if needed. It is important to maintain the patient's intake of fluids and soft foods.

Erythromycin, clarithromycin, or azithromycin prophylaxis should be administered for 14 days to all household and other close contacts (shipmates) of persons with whooping cough, regardless of age and vaccination status. This may prevent or minimize transmission of the disease to others.

# YAWS

**Incubation Period:** 9 to 90 days; generally 21 to 42 days.

**Isolation Period:** None. Avoid intimate contact and contamination of the environment prior to treatment and until 48 to 72 hrs after penicillin treatment.

Yaws is a highly infectious, nonvenereal, bacterial tropical disease caused by *Treponema pallidum*, subspecies *pertenue*, a species of spirochete similar to that of syphilis. Yaws is limited to tropical and remote regions of Africa, South America, the Caribbean, Southeast Asia and Indonesia. In urban areas of these tropical regions, the lesions of yaws are difficult to distinguish from those of syphilis. Although the disease strikes all age groups, it is mainly a disease of children. The organism that causes yaws can enter the body through a slight scratch or other break in the skin. The disease may be spread through physical contact with sores of infected patients or their clothes; or by insects contaminated by discharges from the patient's skin.

About a month after a person becomes infected, the first symptom appears as a painless inflamed raspberry-red elevation of the skin. This is called the "mother yaw" that enlarges and forms an ulcer in its center. The primary lesion may heal in a few weeks or persist for months if left untreated.

Two to eight weeks after the appearance of the "mother yaw," open oozing sores occur on the face, scalp, trunk, hands, or feet. The patient may show a slight rise in temperature, general malaise, headache, and pains in bones and joints. There may be a fine peeling of the skin. Wart-like lesions may run together in masses that project about a half inch above the surface of the skin. In two or three weeks as the discharges lessen, the lesions get smaller and finally heal. Ulcers on the soles of the feet may be very painful and resist healing. Skin lesions may disappear in untreated cases. After several years lesions may recur. They can cause cause disfigurement of the nose and facial tissue and deformities of the hands and feet.

### Treatment

Medical advice on treating yaws should be obtained by radio. The patient should be isolated and the lesions covered with a simple dry dressing. Soiled dressings should be discarded carefully. The infection rarely is fatal and antibiotic treatment should be withheld if the patient will reach port soon. This will not jeopardize the general health of the patient. If treatment aboard ship is necessary, an intramuscular injection penicillin G procaine should be administered, unless it is contraindicated by allergy.

# YELLOW FEVER

**Incubation Period:** 2 to 6 days.

**Isolation Period:** About 6 days. Screen the patient's room, use a bednet, and spray quarters with insecticide that has a residual effect.

Yellow fever is a generalized often fatal viral disease that is transmitted by the bite of an infective female *Aedes aegypti* mosquito, the same mosquito vector that transmits Dengue fever. In tropical forests several other species of mosquitoes also transmit it. Yellow fever occurs only in Africa and South America.

To spread the disease a female mosquito must feed on the blood of an infected person about two days prior to onset through the third or fourth day of the attack. The virus develops in the mosquito for 9 to 12 days during which time she cannot transmit the disease. Thereafter for the rest of the female mosquito's life, she can give yellow fever to any nonimmunized person that she bites.

The disease has a swift severe onset with chills and high fever, intense headache, plus pains in the limbs and back. There is nausea, vomiting, and prostration. The face appears flushed. The eyes are watery with the lining of the eyelids an inflamed red. The fever usually reaches a maximum $104^0$F ($40^0$C) within 24 hours. Muscle pains worsen and the patient is restless, anxious, and sleepless. The tongue is bright red along the edges with a furred coating in the middle. As the disease progresses and the temperature increases, the pulse rate may show a drop from a rate of 120 per minute to 50-60 per minute. In three to five days the fever may go down and there will be a lull of a few hours to a day or two. The patient feels better and may begin to recover. In severe cases, however, the lull is followed by a return of the vomiting and fever. Three characteristic clinical symptoms appear

- marked jaundice (yellow color) of the eyes and skin about the third day because the virus destroys liver cells
- albumin in the urine because the kidneys are affected
- "coffee grounds vomitus" from blood that has seeped through mucous membranes into the stomach and is partially digested.

Other signs of hemorrhage are tarry stools; nosebleed; blood from tongue, lips, and gums; and purple spots in the skin. The urine flow lessens and may contain blood. Interference with kidney and liver function can lead to delirium, convulsions, coma, and death in some cases. Alternatively, these symptoms may subside and the patient may recover.

An attack of yellow fever may be very mild, with only slight backache, headache, and a fever that lasts about two days. It may be severe as just described, or there may be a sudden violent attack with rapid development of the worst symptoms. The death rate ranges from 10% to 85%. One attack provides immunity thereafter. If a patient is suspected of having yellow fever, ask about vaccine history. If a person

has had a yellow fever vaccination within the last 10 years, other diagnoses should be considered.

### Treatment

There is no specific treatment for yellow fever. Complete bedrest in isolation in a mosquito-proof area with the best of nursing care are necessary. Forced fluids are needed to prevent dehydration; intravenous fluids may be indicated. For fever, an ice cap or cold compresses should be applied. It is best to avoid sedatives. For severe pain and fever, in a patient without evidence of liver disease, acetaminophen or ibuprofen should be given by mouth every four to six hours as needed. Aspirin may worsen bleeding. To relieve mouth dryness, cracked ice may be given. When tolerated, a diet high in carbohydrates (breads, potatoes, cereals) and low in protein and fats should be given.

### Prevention

In combating yellow fever the emphasis must be on prevention rather than cure. Crews of ships bound for yellow fever areas should be immunized. One inoculation will produce immunity that will last for ten years. All countries in yellow fever areas require that persons entering ports of that country be immunized before entry. Crew members should keep proof of vaccination in their yellow International Certificates of Vaccination. Some countries require proof of vaccination for persons arriving from a yellow fever endemic area. All measures described under malaria for the control of mosquito-borne diseases should be carried out when the ship is in a port where yellow fever prevails.

Federal regulations require that the Master, as soon as practical, shall notify local health authorities at the next port of call, station, or stop that he has a suspected case of yellow fever aboard. The Master shall take such measures to prevent the spread of the disease as the local health authorities direct.

In the days of the great sailing ships, yellow fever was transmitted on board mosquito infested ships. If a case occurs aboard ship, the patient must be isolated and mosquito netting must be placed over the patient's bunk for at least six days after onset. Nonimmune crew who report mosquito bites should be isolated to the extent possible and inspected daily for symptoms. Yellow fever cannot be transmitted by direct contact with a patient’s blood, vomitus, or body fluids. However, other potentially serious viral infections resembling yellow fever can be transmitted by such contact. Persons caring for the patient should wear gloves and avoid exposure to patient blood and fluids. The ship must be freed from mosquitoes by the use of residual insecticide sprays or other means of control. *Yellow fever is potentially fatal. Immediate medical advice by radio should be obtained.*

# APPENDIX I

# MEDICAL REFERENCE RECOMMENDATIONS


| | |
|---|---|
| Introduction | I-1 |
| Clinical Medical References | I-1 |
| Pharmacy References | I-4 |
| Dental References | I-5 |
| Environmental Health References | I-5 |
| Website Recommendations | I-8 |

APPENDIX

I

# MEDICAL REFERENCE RECOMMENDATIONS

## INTRODUCTION

A medical library-or reference book collection- is essential for every medic. The specific books are dependent upon the possible scope of medical problems underway. The references should be updated as new editions become available. The websites listed also provide current information on a range of topics. The websites listed in the section are primarily sponsored by the US government and large medical groups. They have been found to be reliable. Use caution with some other websites as they may not be as reliable and information may not be accurate.

## CLINICAL MEDICAL REFERENCES

**"Mosby's Primary Care Consultant"**
ISBN # 0815129505
Harcourt Health Sciences
11830 Westline Industrial Drive
St. Louis, MO 63146-9988.
Phone: 800-325-4177
Mosby's Primary Care Consultant focuses on content for primary care practitioners on approximately 300 disorders commonly encountered in the adult patient. This reference features an easy-to-access format to help locate information quickly. Disorders are arranged alphabetically; information is organized under six consistent column headings: overview, assessment, interventions, evaluation, for your information, and pharmacotherapeutics. The content under each disorder is streamlined and bulleted for easy referral, and each disorder is covered in a two-page spread. Although the focus is on the adult patient, the book also includes variations for children and older patients when appropriate.

**"Merck Manual"**
ISBN # 0911910107
Merck Publishing Group
Merck & Company, Inc
P.O. Box 2000, WBD-120
Rahway, NJ 07065
Phone: 800-819-9546

All relevant diseases in all specialties are presented with a practical and up-to-date approach for clinical management and diagnosis. Each section starts with a diagnostic approach to the specialty field followed by a full content of that chapter. The appendix does cover search or trigger words/chief complaints/diagnoses, etc., which makes the book easy to use.

**"Clinical Procedures For Medical Assistants"**
ISBN #0721684068
Harcourt Health Sciences
11830 Westline Industrial Drive
Saint Louis, MO 63146-9988
Phone: 800-325-4177

A textbook for medical assisting students that provides instruction in the clinical skills performed by medical assistants in the medical office. The organization of the book allows for individualized instruction as well as convenient reference use.

The new edition is expanded to include additional clinical procedures. Additional information about OSHA Bloodborne Pathogens Standards, CLIA regulations, emergency medical procedures, and other current topics is included. Numerous illustrations accompany the theory section to help the student relate the new knowledge to each skill. Each procedure is presented in a step-by-step format, with underlying principles and illustrations accompanying the techniques. Documentation examples provide the student with a guideline for charting his or her own procedures.

**"Health & Physical Assessment"**
ISBN # 0323012140
Harcourt Health Sciences
11830 Westline Industrial Drive
St. Louis, MO 63146-9988.
Phone: 800-325-4177

Health and Physical Assessment presents holistic health assessment in a unique narrative format that is practical and consistent. Health assessment is presented as the systematic collection of data that nurses can use to make decisions about how they will intervene to promote, maintain, or restore health. Core assessment content is organized by body system (Chapters 11-22); these chapters include three main sections on Anatomy and Physiology, Examination, and Variations from Health. Special boxes highlight important information such as Risk Factors, Cultural Considerations, and Helpful Hints. At the end of each chapter are Sample Documentation and Diagnoses and Critical Thinking Questions that apply the chapter content to clinical scenarios.

**"Dorlands Pocket Medical Dictionary"**
ISBN # 0721682812
Harcourt Health Sciences
11830 Westline Industrial Drive

St. Louis, MO 63146-9988.
Phone: 800-325-4177

Pocket-sized, abridged version from Dorland's Illustrated Medical Dictionary. Based on the "gold standard" of the medical community, covers the must-know vocabulary, including 2800 new terms. All anatomy terms reflect the new Terminologia Anatomica and 500 new drug terms reflect the 2000 editions of the USP and PDR. It also provides full color illustrations and helpful charts and tables so all terminology is easy to understand.

**Brady's "Emergency Care" 9th Edition**
ISBN # 0835950891
Prentice Hall Ordering Department
200 Old Tappan Rd.
Old Tappan, NJ 07675
Phone: 800-922-0579

Extensive textbook for emergency medical technical-basic students. Includes alternative methods to allow for state-to-state differences in curriculum. Based on the 1994 U.S. DOT EMT Basic National Standard Curriculum. New features include a CD-ROM containing case studies and activities, brief anecdotes, and special notes.

**Brady's "Paramedic Emergency Care"**
ISBN # 0835949877
Prentice Hall Ordering Department
200 Old Tappan Rd.
Old Tappan, NJ 07675
Phone: 800-922-0579

Guide to pre-hospital care. National Paramedic Training Curriculm. A major text on emergency care for paramedic and emergency medical technician students. Covers pre-hospital environment, trauma/medical/gynecological emergencies, etc.

**"Current Emergency Diagnosis & Treatment" (Lange)**
ISBN # 0838513476
McGraw-Hill Order Services
Blacklick, OH 43004-0545
Phone: 800-262-4729

Designed for all who provide emergency care, CEDT provides ready information needed to both diagnose and treat life-threatening conditions rapidly. Includes new or expanded material on heart emergencies, pediatrics emergencies, and more. Includes common problems, both trauma and non-trauma. Illustrated.

"Current Diagnosis & Treatment In Orthopedics" (Lange)
ISBN # 0838503632
McGraw-Hill Order Services
Blacklick, OH 43004-0545
Phone: 800-262-4729

This orthopedic surgery book reviews both basic science and treatment. Provides treatment care for common disorders including low back pain, cervical spine pain, as well as repetitive motion syndromes. New: more epidemiologic information; emphasis on cost-effective treatment; new insight on the prevention of surgical infection-plus a chapter on pediatric orthopedics. Includes current data on disorders and diseases treated by orthopedic surgeons and related physicians. Halftone illustrations.

# PHARMACY REFERENCES

"**Physician's Desk Reference"**
ISBN # 1563634465
Medical Economics Company, Inc
Montvale, NJ 07645-1742
Phone; 800-232-7379

Contains FDA-approved labeling for prescription medications as well as content and brief descriptions of select nonprescription medications and dietary supplements. Monographs include indications, dosages routes, methods and frequency/duration of administration, warnings, side effects, and contraindications.

**"Dreisbach's Handbook Of Poisoning, Diagnosis And Treatment**"
ISBN # 1850700389
McGraw-Hill Order Services
Blacklick, OH 43004-0545
Phone: 800-262-4729
This Book To Be Placed In Poison Antidote Locker

Dreisbach's Handbook of Poisoning is long established as the definitive handbook of poisoning for all physicians, nurses, crisis and hotline workers, paramedics, and students. This ready-reference guide provides antidotes, antivenins, and more for a vast number of substances. It covers medical toxicology - including prevention and management of exposures, poisonings, adverse effects, abuse and withdrawal from pharmaceuticals - and household, environmental, and natural hazards. The book begins by providing general information about the prevention, diagnosis, and treatment of poisoning. Then it considers the important medicolegal aspects of poisoning. The remainder of the book focuses on specific poisons, organized into agricultural, industrial, household, medicinal, and natural hazards. Chemically- and pharmacologically-related agents have been grouped together wherever possible. For optimal care of critical or unusual poisonings, the book also contains guidelines for consultations with medical toxicologists and regional poison information centers. A concise summary of the diagnosis and treatment of poisoning, Dreisbach's Handbook of Poisoning provides an extraordinary amount of practical information in a compact format.

**Mosby's "Nursing Drug Reference"**
ISBN # 0323009824
Harcourt Health Sciences
11830 Westline Industrial Drive
St. Louis, MO 63146-9988
Phone: 800-325-4177
Required Edition: Most current or previous years edition only.

This portable, up-to-date drug reference contains all of the essential data for administering the most common prescription and over-the-counter drugs, including more than 1,300 generic and 4,500 trade names. Thoroughly revised and updated, it features more than a thousand new drug facts, including revised nursing considerations and patient/family teaching guidelines, plus hundreds of newly researched side effects, adverse reactions, precautions, interactions, contraindications, and IV therapy facts. Also includes a guide to vaccines and immunizations.

# DENTAL REFERENCE

**"Delmar's Dental Assisting-A Comprehensive Approach"**
ISBN # 0827390734
Thomson Learning,
P.O. Box 6904
Florence, KY 41022
Phone: 800-354-9706

Textbook for students in dental assisting. Sections cover: basic dental science, preclinical dental skills, clinical dental procedures, dental specialties, restorative and laboratory materials and techniques, expanded functions, and dental practice management. Includes a diskette containing over 1,500 review questions. Colorful format.

# ENVIRONMENTAL HEALTH REFERENCES

**"Environmental Engineering and Sanitation"**
ISBN # 0471523771
John Wiley & Sons Inc.,
Attn: Wiley-InterScience Coordinator,
Subscription Department
605 Third Street
New York, NY 10158
Phone: 800-825-7550

Updated to cover new laws and standards, including Federal Safe Drinking Act, the Resource Conservation and Recovery Act, and the Clean Air Act of 1990. Applies sanitation and engineering theory and principles to environmental control in urban,

suburban and rural communities. Engineering design, construction, operation and maintenance details are provided throughout as they relate to plants and structures. Topics include: disease control, water supply, wastewater treatment and disposal, air pollution and noise control, radiation uses and protection, recreation areas, solid waste management and much more.

**"Control of Communicable Diseases Manual"**
Edited by Chin, J.,
ISBN # 087553242X
American Public Health Association
Publication Sales
PO Box 753
Waldorf, MD 20604-0753
Phone: 301-893-1894

Pocket-sized manual, in outline format, providing current information and recommendations for communicable disease prevention. Trim size: 7 x 4.5 inches.

**"Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices" (updated annually)**
American Conference of Governmental Industrial Hygenists
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Phone: 513-742-2020

The ACGIH booklet is a perfect adjunct to reference materials which provides a distinct measure of safety when evaluating environmental risk factors for potential exposures. This is a "must" for all H&S professionals. Easy to use formatting and portability (pocket-size) are additional pluses.

## CHEMICAL HAZARD RESPONSE INFORMATION SYSTEM (CHRIS)

Accurate and current knowledge about chemicals, especially when at sea, can be critical. Various seafaring missions can result in exposure to chemicals that have a potential to cause harm if correct procedures are not used. Thus, safety and other information about various chemicals is critical.

One good source of information is the Coast Guard's Chemical Hazard Response Information System (CHRIS). This 3000 page manual contains information of all types for 1300 chemicals – generally the most common chemicals found aboard ship. Not only does it contain information about the physical properties, chemical properties, and thermodynamic properties for each chemical but it also has information on what to do if people are exposed. CHRIS contains the following types of medical information:

1. Personal protective equipment: How to avoid exposure in the first instance.

2. Symptoms following exposure: What to expect after coming in contact with the chemical.

3. Treatment of exposure: What to do after the injury.

4. Gas and liquid irritation characteristics: What to expect with less severe exposures.

Other health information includes threshold limit values, IDLH's, experimental toxicity data, OSHA limits, and EPA limits. These are useful in determining how much exposure is dangerous.

CHRIS is very helpful in other ways – it contains information that will help to prevent exposure and injury. It has information on fire fighting, on chemical storage, and on chemical reactivity. With this type of information the ship's officers can reduce the chances of exposure and injury. CHRIS is something every ship should have.

CHRIS is on the internet at http://www.chrismanual.com/ at no charge.

CHRIS is also available on a CD-ROM at no charge. For a copy, contact aschneider@comdt.uscg.mil or Commandant (G-MSO-3) at 202-267-1217.

Should you want a paper copy, the U.S. Coast Guard has arranged for the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 to sell the document. (The telephone number is 202 512-1800 (the telefax number is 202 512-2250). When ordering please use the Stock number 050-012-00406-4. The price is currently $104 post paid (plus 25% foreign postage). This is for the pages only; they are punched for ordinary three ring binders.)

**"Emergency Care for Hazardous Materials Exposure"**
ISBN # 0801678137
Harcourt Health Sciences
11830 Westline Industrial Drive
St. Louis, MO 63146-9988
Phone: 800-325-4177

This book provides ready access to current vital information for emergency care of patients who have been exposed to or contaminated by hazardous materials. It includes chemical indexes by Department of Transportation hazard class, detailed hazard class and specific chemical guidelines, American Heart Association treatment and medication protocols, and procedures for EMS/hazardous materials response personnel.

# WEBSITE RECOMMENDATIONS

**Virtual Naval Hospital:** http://www.vnh.org/

A digital health sciences library designed to deliver expert medical information to providers and patients at the point-of-care in order to help providers take better care of their patients and help patients live healthier lives.

**Virtual Naval Hospital, Manual of Naval Preventive Medicine:**
http://www.vnh.org/PreventiveMedicine/PreventiveMedicine.html

This manual includes chapters on Food Safety, Sanitation of Living Spaces, Ventilation and Thermal Stress, Water Supply, and Wastewater Treatment and Disposal.

**U.S. Navy Shipboard Pest Management Manual:**
http://www.vnh.org/PestControl/

This manual provides current and effective guidance for the surveillance, exclusion and control of disease vectors and invasive pest species, which may threaten the health and safety of personnel aboard vessels, or be transported between U.S. and foreign shores.

**Occupational Safety and Health Administration:** http://www.osha.gov

Government site for issues related to occupational health and safety laws, regulation, and rules. Available information is pertinent to employers as well as employees. Site provides access to OSHA documents, news releases, events, and provides information on all OSHA offices/programs.

**National Institute of Safety and Occupational Health:**
http://www.cdc.gov/niosh

The Federal agency responsible for conducting research and making recommendations for the prevention of work-related disease and injury. NIOSH is responsible for conducting research on the full scope of occupational disease and injury ranging from lung disease in miners to carpal tunnel syndrome in computer users. Areas of possible interest at the site includes Publications, Databases, and Safety and Health.

**Code of Federal Regulations:** http://www.access.gpo.gov/nara/cfr/index.html

The *Code of Federal Regulations* (CFR) is a codification of the general and permanent rules published in the *Federal Register* by the Executive departments and agencies of the Federal Government. The CFR online is a joint project authorized by the publisher, the National Archives and Records Administration's Office of the Federal Register, and the Government Printing Office (GPO) to provide the public with enhanced access to Government information. The CFR is divided into 50 titles which represent broad areas subject to Federal regulation. Each title is divided into chapters which usually bear the name of the issuing

agency. Each chapter is further subdivided into parts covering specific regulatory areas. Large parts may be subdivided into subparts. All parts are organized in sections, and most citations to the CFR will be provided at the section level.

**Environmental Protection Agency:** http://www.epa.gov

Government site for issued related to the environment. EPA provides leadership in the nation's environmental science, research, education and assessment efforts. EPA works closely with other federal agencies, state and local governments, and Indian tribes to develop and enforce regulations under existing environmental laws. Topics cover wide range of subjects, from Air and Cleanup to Wastes and Water.

**Food and Drug Administration:** http://www.fda.gov

An agency of the Department of Health and Human Services. The site has information related to food and drug safety for both providers and consumers. FDA's mission is to promote and protect the public health by helping safe and effective products reach the market in a timely way, and monitoring products for continued safety after they are in use. Their work is a blending of law and science aimed at protecting consumers.

**Centers for Disease Control and Prevention:** http://www.cdc.gov

An agency of the Department of Health and Human Services, The Centers for Disease Control and Prevention (CDC) is recognized as the lead federal agency for protecting the health and safety of people - at home and abroad, providing credible information to enhance health decisions, and promoting health through strong partnerships. Key areas on the site include In the News, Traveler's Health, Health Topics A-Z and CDC Publications. Also provides a link to the Morbidity and Mortality Weekly Report.

**Centers for Disease Control and Prevention, Bioterrorism Information Site:** http://www.bt.cdc.gov/

CDC site dedicated to public health emergency preparedness and response.

**Centers for Disease Control and Prevention - National Immunization Program: (ACIP):** http://www.cdc.gov/nip

As a disease-prevention program, NIP provides leadership for the planning, coordination, and conduct of immunization activities nationwide. The site provides information on immunization recommendations, vaccines, side effects, etc. for use by the general public. Also includes a Health Care Professional tab for health care providers that provides more comprehensive and in-depth information on all aspects of immunization/vaccine administration and safety, and adverse event reporting.

**The Merck Manual of Diagnosis and Therapy:** http://www.merck.com/pubs/mmanual/

Searchable web version of the publication enables providers to obtain diagnosis and therapy information using various topics (symptoms/specific disease states/organ system).

**Rx List: The Internet Drug Index:** http://www.rxlist.com/

Listing of over 4500 popular medications with consumer level information written in plain English. Many are also available in Spanish. Site includes access to Taber's Medical Encyclopedia.

**PDR.net:** http://www.pdr.net

On-line home of the Physicians' Desk Reference. Provides drug information for health care providers and consumers. Also provides links to various medically related magazines and journals.

**Harvard Health Publications, Harvard Medical School:**
http://www.health.harvard.edu/

Topical medical information of interest to the public. Provides access to newsletters related to Health & Wellness, Heart Health, Mental Health, Men's Health, and Women's Health.

**Family Doctor, American Academy of Family Physicians:** http://familydoctor.org/

Offer health information for the whole family. All of the information within this site is written and reviewed by physicians and patient education professionals at the American Academy of Family Physicians. The information is regularly reviewed and updated. Health topics include Q & A about staying healthy and common health concerns, facts on common medicines, including possible interactions, facts on common herbal remedies and dietary supplements, and advice on what you can treat at home and when to call your doctor.

**Medical Library:** http://www.medem.com/MedLB/medlib_entry.cfm

Medem's Medical Library represents a full range of patient education information from their partner medical societies and other trusted sources. Subject areas include Life Stages, Diseases and Conditions, Therapies and Health Strategies, and Health and Society.

**Lab Tests Online:** http://www.labtestsonline.org/

A public resource on clinical lab testing from the laboratory professionals who do the testing. The site is to help a patient or caregiver better understand the many clinical lab tests. Information is available on specific tests, tests related specific conditions and diseases, and those related screening tests.