



**NONRESIDENT  
TRAINING  
COURSE**



October 1999

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**Dental Technician,  
Volume 1**

**NAVEDTRA 14274**

Although the words "he," "him," and "his" are used sparingly in this course to enhance communication, they are not intended to be gender driven or to affront or discriminate against anyone.

COMMANDING OFFICER  
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PENSACOLA FL 32509-5237

10 Jun 02

ERRATA #1

Specific Instructions and Errata for  
Nonresident Training Course  
Dental Technician, Volume 1  
NAVEDTRA 14274

1. No attempt has been made to issue corrections for errors in typing, punctuation, etc., that do not affect your ability to answer the question.

2. Please delete the following questions from the NRTC assignments:

2-73

3-42

8-9

8-10





## PREFACE

By enrolling in this self-study course, you have demonstrated a desire to improve yourself and the Navy. Remember, however, this self-study course is only one part of the total Navy training program. Practical experience, schools, selected reading, and your desire to succeed are also necessary to successfully round out a fully meaningful training program.

**THE COURSE:** This self-study course is organized into subject matter areas, each containing learning objectives to help you determine what you should learn along with text and illustrations to help you understand the information. The subject matter reflects day-to-day requirements and experiences of personnel in the rating or skill area. It also reflects guidance provided by Enlisted Community Managers (ECMs) and other senior personnel, technical references, instructions, etc., and either the occupational or naval standards, which are listed in the *Manual of Navy Enlisted Manpower Personnel Classifications and Occupational Standards*, NAVPERS 18068.

**THE QUESTIONS:** The questions that appear in this course are designed to help you understand the material in the text.

**VALUE:** In completing this course, you will improve your military and professional knowledge. Importantly, it can also help you study for the Navy-wide advancement in rate examination. If you are studying and discover a reference in the text to another publication for further information, look it up.

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Published by  
NAVAL EDUCATION AND TRAINING  
PROFESSIONAL DEVELOPMENT  
AND TECHNOLOGY CENTER

**NAVSUP Logistics Tracking Number  
0504-LP-026-9050**

## **Sailor's Creed**

"I am a United States Sailor.

I will support and defend the  
Constitution of the United States of  
America and I will obey the orders  
of those appointed over me.

I represent the fighting spirit of the  
Navy and those who have gone  
before me to defend freedom and  
democracy around the world.

I proudly serve my country's Navy  
combat team with honor, courage  
and commitment.

I am committed to excellence and  
the fair treatment of all."

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# INSTRUCTIONS FOR TAKING THE COURSE

## ASSIGNMENTS

The text pages that you are to study are listed at the beginning of each assignment. Study these pages carefully before attempting to answer the questions. Pay close attention to tables and illustrations and read the learning objectives. The learning objectives state what you should be able to do after studying the material. Answering the questions correctly helps you accomplish the objectives.

## SELECTING YOUR ANSWERS

Read each question carefully, then select the BEST answer. You may refer freely to the text. The answers must be the result of your own work and decisions. You are prohibited from referring to or copying the answers of others and from giving answers to anyone else taking the course.

## SUBMITTING YOUR ASSIGNMENTS

To have your assignments graded, you must be enrolled in the course with the Nonresident Training Course Administration Branch at the Naval Education and Training Professional Development and Technology Center (NETPDTC). Following enrollment, there are two ways of having your assignments graded: (1) use the Internet to submit your assignments as you complete them, or (2) send all the assignments at one time by mail to NETPDTC.

**Grading on the Internet:** Advantages to Internet grading are:

- you may submit your answers as soon as you complete an assignment, and
- you get your results faster; usually by the next working day (approximately 24 hours).

In addition to receiving grade results for each assignment, you will receive course completion confirmation once you have completed all the

assignments. To submit your assignment answers via the Internet, go to:

<http://courses.cnet.navy.mil>

**Grading by Mail:** When you submit answer sheets by mail, send all of your assignments at one time. Do NOT submit individual answer sheets for grading. Mail all of your assignments in an envelope, which you either provide yourself or obtain from your nearest Educational Services Officer (ESO). Submit answer sheets to:

COMMANDING OFFICER  
NETPDTC N331  
6490 SAUFLEY FIELD ROAD  
PENSACOLA FL 32559-5000

**Answer Sheets:** All courses include one “scannable” answer sheet for each assignment. These answer sheets are preprinted with your SSN, name, assignment number, and course number. Explanations for completing the answer sheets are on the answer sheet.

**Do not use answer sheet reproductions:** Use only the original answer sheets that we provide—reproductions will not work with our scanning equipment and cannot be processed.

Follow the instructions for marking your answers on the answer sheet. Be sure that blocks 1, 2, and 3 are filled in correctly. This information is necessary for your course to be properly processed and for you to receive credit for your work.

## COMPLETION TIME

Courses must be completed within 12 months from the date of enrollment. This includes time required to resubmit failed assignments.

## PASS/FAIL ASSIGNMENT PROCEDURES

If your overall course score is 3.2 or higher, you will pass the course and will not be required to resubmit assignments. Once your assignments have been graded you will receive course completion confirmation.

If you receive less than a 3.2 on any assignment and your overall course score is below 3.2, you will be given the opportunity to resubmit failed assignments. **You may resubmit failed assignments only once.** Internet students will receive notification when they have failed an assignment--they may then resubmit failed assignments on the web site. Internet students may view and print results for failed assignments from the web site. Students who submit by mail will receive a failing result letter and a new answer sheet for resubmission of each failed assignment.

## COMPLETION CONFIRMATION

After successfully completing this course, you will receive a letter of completion.

## ERRATA

Errata are used to correct minor errors or delete obsolete information in a course. Errata may also be used to provide instructions to the student. If a course has an errata, it will be included as the first page(s) after the front cover. Errata for all courses can be accessed and viewed/downloaded at:

<http://www.advancement.cnet.navy.mil>

## STUDENT FEEDBACK QUESTIONS

We value your suggestions, questions, and criticisms on our courses. If you would like to communicate with us regarding this course, we encourage you, if possible, to use e-mail. If you write or fax, please use a copy of the Student Comment form that follows this page.

## For subject matter questions:

E-mail: n313.products@cnet.navy.mil  
Phone: Comm: (850) 452-1001, Ext. 2169  
DSN: 922-1001, Ext. 2169  
FAX: (850) 452-1370  
(Do not fax answer sheets.)  
Address: COMMANDING OFFICER  
NETPDTC (CODE N313)  
6490 SAUFLEY FIELD ROAD  
PENSACOLA FL 32509-5237

## For enrollment, shipping, grading, or completion letter questions

E-mail: fleetservices@cnet.navy.mil  
Phone: Toll Free: 877-264-8583  
Comm: (850) 452-1511/1181/1859  
DSN: 922-1511/1181/1859  
FAX: (850) 452-1370  
(Do not fax answer sheets.)  
Address: COMMANDING OFFICER  
NETPDTC (CODE N331)  
6490 SAUFLEY FIELD ROAD  
PENSACOLA FL 32559-5000

## NAVAL RESERVE RETIREMENT CREDIT

If you are a member of the Naval Reserve, you will receive retirement points if you are authorized to receive them under current directives governing retirement of Naval Reserve personnel. For Naval Reserve retirement, this course is evaluated at 12 points. (Refer to *Administrative Procedures for Naval Reservists on Inactive Duty*, BUPERSINST 1001.39, for more information about retirement points.)

## COURSE OBJECTIVES

In completing this nonresident training course, you will demonstrate a knowledge of the subject matter by correctly answering questions on the following subjects: general administration and orientation; technical administration and responsibilities; head and neck anatomy; oral anatomy and pathology; emergency treatment for oral diseases and injuries; oral pharmacology; nutrition and diet; infection control; sterilization and disinfection; dental

safety and equipment safety; shipboard, fleet marine force, and naval mobile construction; casualty care and CBR warfare.

## Student Comments

**Course Title:** Dental Technician, Volume 1

**NAVEDTRA:** 14274 **Date:** \_\_\_\_\_

**We need some information about you:**

Rate/Rank and Name: \_\_\_\_\_ SSN: \_\_\_\_\_ Command/Unit \_\_\_\_\_

Street Address: \_\_\_\_\_ City: \_\_\_\_\_ State/FPO: \_\_\_\_\_ Zip \_\_\_\_\_

**Your comments, suggestions, etc.:**

<p><b>Privacy Act Statement:</b> Under authority of Title 5, USC 301, information regarding your military status is requested in processing your comments and in preparing a reply. This information will not be divulged without written authorization to anyone other than those within DOD for official use in determining performance.</p>
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NETPDTC 1550/41 (Rev 4-00)





## CHAPTER 1

# GENERAL ADMINISTRATION AND ORIENTATION

The basic organization of the Department of the Navy (DON) is very important to new members of the Navy. Knowing the organizational structure will help you understand the reasons for certain policies and procedures. The *Basic Military Requirements Training Manual (BMR TRAMAN)* provides the organizational breakdown and applicable explanations for the Navy. It also includes the basic organizational shipboard elements. The information provided in this chapter complements those organizations that are explained in the BMR. It is highly recommended that you thoroughly understand these organizations before reading the rest of this chapter. With this information you will be able to clearly see how the mission, establishment of the Dental Technician (DT) rating, Navy enlisted classifications, and the organization of the Dental Corps affect your role as a dedicated and professional Navy Dental Technician.

### MISSION

The DT rating has a twofold mission. Your primary function is to assist Navy dental officers in providing dental care to personnel of the uniformed services, active duty Navy and Marine Corps, and other persons authorized by law to receive dental treatment. The objective of this dental care is to prevent or remedy diseases, disabilities, and injuries of the teeth, jaws, and related structures, which may directly or indirectly interfere with the operational readiness and the performance of military duties. During combat, mass casualty, or emergency situations at sea or ashore, DTs must, when directed, integrate with medical personnel and perform paramedical assignments. This assistance will include, but not be limited to, aid in the care, treatment, and evacuation of mass casualties in combat or a disaster. Emergency care or treatment that you may provide will include artificial respiration, treatment of shock, control of hemorrhage, bandaging and splinting, cleansing and treatment of wounds, maintenance of patient airway, and preparation of casualties for movement. DTs in an emergency care scenario will be under the direct supervision of the cognizant Navy Medical Corps officer, if present.

Details of casualty care and emergencies are discussed in later chapters.

### ORGANIZATION

The Medical Department of the Navy is composed of the Medical Corps (MC), Dental Corps (DC), Medical Service Corps (MSC), Nurse Corps (NC), the Hospital Corps (HC), and the Dental Technician (DT) rating. As members of the Navy Medical Department, Dental Technicians should be familiar with the responsibilities of the Chief of Bureau of Medicine and Surgery (BUMED).

### CHIEF OF BUREAU OF MEDICINE AND SURGERY

The Chief of BUMED is tasked with the responsibility of ensuring personnel and material readiness of shore activities as assigned by the Chief of Naval Operations (CNO). Other responsibilities include, but are not limited to; developing health care policy and providing primary and technical support of all shore-based treatment facilities and operating forces of the Navy and Marine Corps. The Chief of BUMED is located in Washington, DC, and reports to the CNO. Medical treatment facilities (MTFs) and dental treatment facilities (DTFs) throughout the Navy report to the responsible line commanders (RLCs) and BUMED.

### CHIEF OF THE DENTAL CORPS

The Chief of the Dental Corps works directly for the Chief of BUMED and develops, coordinates, evaluates, advises, monitors, and represents the Medical Department on policies, plans, and requirements affecting Navy dental officers. The Chief acts as the Medical Department's spokesperson for all dental professional matters relating to military and civilian counterparts.

### DIRECTOR OF MEDICAL DEPARTMENT ENLISTED PERSONNEL

The Director of Medical Department Enlisted Personnel is the principal advisor to the Chief of

BUMED on matters involving enlisted personnel assigned to Navy Medicine. As such, the mission of this office is to advise, assist, centralize, and coordinate policy development and guidance on dental technician matters. Such policies and guidance include career progression, training, distribution, advancement, and employment of DT personnel.

## **FORCE MASTER CHIEF OF BUMED**

The BUMED Force Master Chief is the principal enlisted advisor to the Chief of BUMED. He keeps the Surgeon General advised of existing or potential situations, procedures, and practices that affect the enlisted men and women (Dental Technicians, Hospital Corpsman, and deployable medical systems personnel [DEPMEDS]) of Navy Medicine. The Force Master Chief takes precedence over all other enlisted members within Navy Medicine.

## **NAVAL DENTAL CENTERS**

Naval dental centers (NAVDENCENs or NDCs) are established shore activities that are located throughout the world. They provide comprehensive dental services to Navy and Marine Corps personnel of the operating forces and shore activities, and other authorized personnel in the assigned geographic area as prescribed by title 10, U.S. Code, and other applicable directives. NDCs can be divided into three types based on size and function as shown in figure 1-1.

Naval dental centers will also:

- Ensure that all assigned military personnel are both aware of and properly trained for the performance of their contingency and wartime duties.
- Ensure that the clinic and its component facilities are maintained in a proper state of material and personnel readiness to fulfill wartime and contingency mission plans.
- Conduct appropriate education programs for assigned personnel to ensure both military and dental health. Care standards of conduct and performance are achieved and maintained.
- Participate as essential elements of the Navy and Triservice Regional Health Care System.
- Cooperate with military and civilian authorities in matters pertaining to public health, local disasters, and other emergencies.

Dental Technicians must be able to recognize and know the chain of command where they work. All of the positions in figure 1-1 work together as a team to efficiently and, effectively operate a naval dental center.

## **Commanding Officer**

The commanding officer (CO) of a naval dental center will be a dental corps officer. The commanding officer is responsible for the professional care and services provided to patients in the clinic and for the safety and well-being of the entire command. The CO is also vested with complete military jurisdiction within the clinic and over those branch dental clinics under his authority.

## **Executive Officer**

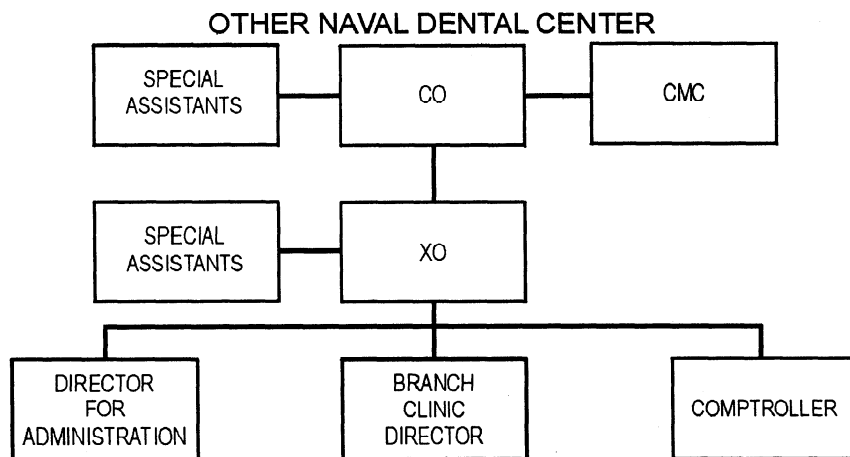
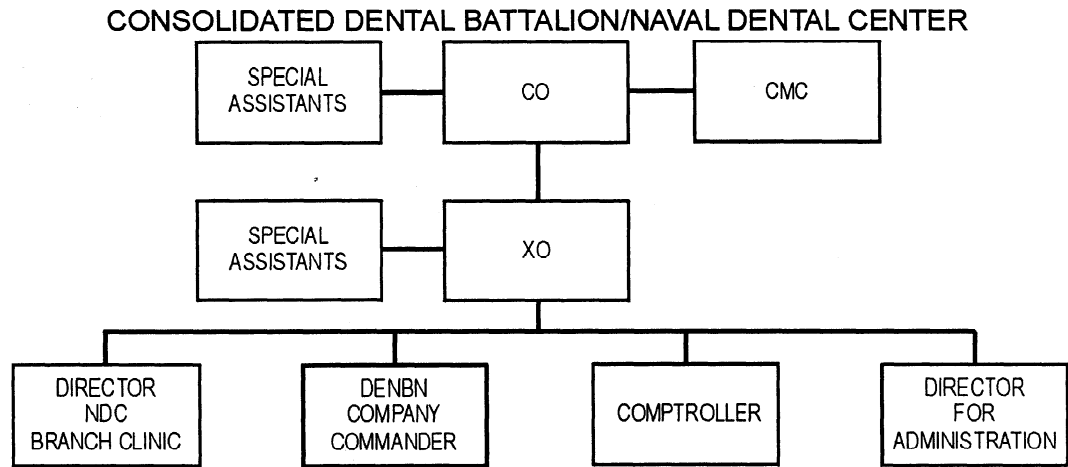
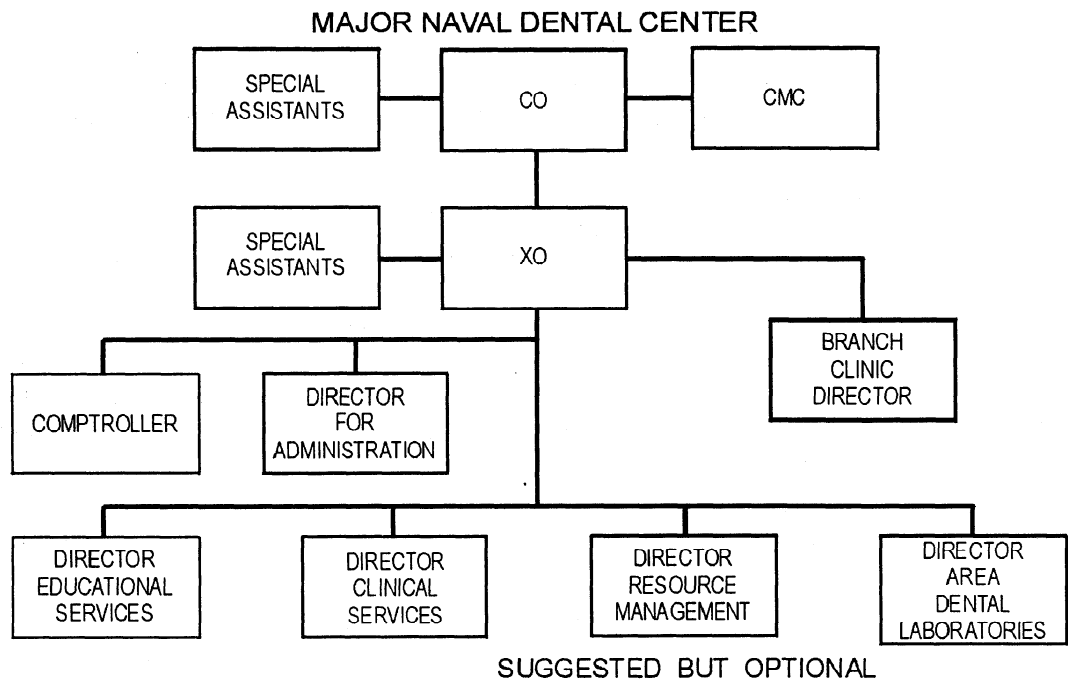
The executive officer (XO) of a naval dental center will be a dental corps officer. In the absence of the CO, the XO will assume command. The XO conforms to the policies and orders of the CO and must keep the CO informed of all significant matters pertaining to the command. The XO will be primarily responsible under the CO for the organization, performance of duty, operational readiness, provision of dental care services, training plan, and good order and discipline of the entire command.

## **Command Master Chief**

The command master chief (CM/C) is the senior enlisted advisor to the commanding officer for all matters relating to enlisted policy. The CM/C works with the executive officer in communicating and carrying out command policy. OPNAVINST 1306.2 broadly outlines the authority and responsibilities of the CM/C. General duties of the CM/C include maintaining and promoting effectiveness and efficiency of the chain of command. Serves as principal advisor to the commanding officer on all matters pertaining to welfare, health, job satisfaction, morale, utilization, training of enlisted personnel, and promoting good order and discipline.

## **Director for Dental Center Administration**

The director for dental center administration will be a medical service corps officer. The director is the principal staff advisor to the CO via the XO for the coordination and efficient operation of all functions relating to budget planning, supply, equipment,



DTBV1023

Figure 1-1.—Organizational charts of three types of naval dental centers.

material, manpower, civilian personnel matters, enlisted training, and the implementation of policy and standards pertaining to management functions.

### Director of Branch Dental Clinics

The director of a branch dental clinic is a dental officer who is the senior leader at each branch dental clinic. Each branch should have one director who is responsible for providing comprehensive, high quality outpatient oral health care to eligible beneficiaries. They are assigned by and are responsible to the commanding officer for the coordination of clinical and administrative services, via the executive officer. All orders issued by the director of a branch dental clinic will be regarded as proceeding from the commanding officer.

### ESTABLISHMENT OF THE DENTAL TECHNICIAN RATING

The DT rating was first established by the Secretary of the Navy on 12 December 1947. On 2 April 1948 the rating became effective, authorizing Dental Technicians to wear the dental rating badge. Dental Technicians and Hospital Corpsmen now make up Occupational Field XIV (14), Health Care. Figure 1-2 illustrates the dental rating badge.

DTs have earned an enviable reputation over the years. Past and present members of the DT rating have been, and continue to be, a responsive and dedicated force of professional men and women, integrally and loyally committed to operational readiness and the health and well-being of Navy and Marine Corps personnel, ashore and afloat, around the world. Your professional, technical, and contingency skills are and will continue to be an essential element in accomplishing the mission of the Navy Medical Department. The dental health care mission of the DT rating and the supportive services you provide can never be taken lightly, and are vital to the personnel you serve.

### ASSIGNMENTS

Basic Dental Assistants are assigned to assist dental officers in naval dental centers, naval hospitals, dental departments of ships and stations, naval mobile construction battalions (NMCBs), and Fleet Marine Force (FMF), and dental battalions and companies. Assignments to duty stations are made by the DT detailers and are made on the basis of billet structure,



DTBV1024

Figure 1-2.—Dental rating badge.

personnel qualifications, and the desires of each member. As a basic dental assistant, you will be qualified to perform numerous general duties.

### GENERAL DUTIES

Basic Dental Assistant's duties can vary depending on where you are assigned. You must always remember to remain flexible, meaning one day you could be a chairside assistant, assisting a dentist with patient care. Or you could be assigned to the front desk, preparing patients and dental records for dental treatment that day. Here are some of the duties of the DT rating that you must be qualified to perform:

- Assisting a dental officer in treating patients.
- Maintaining the central appointment desk, daily dental appointments, and dental office records.
- Preparing dental treatment records, including dental charts under the direction of dental officers.
- Performing oral prophylactic treatments (dental tooth polishing) and removing supragingival calculus (dental tartar above the gum line) under the supervision of a dental officer.
- Performing preventive dentistry treatments and instructing patients in oral hygiene under the supervision of a dental officer.

- Exposing, processing, and mounting dental radiographs (X-ray films) as prescribed by written or verbal order of a dental officer.
- Preparing dental materials and medications used in patient treatment.
- Sharpening, disinfecting, preparing, sterilizing instruments and equipment.
- Performing operator and preventive maintenance on dental equipment.
- Maintaining cleanliness of dental spaces.
- Rendering dental and medical aid to casualties of war or peacetime disasters.
- Performing such other duties in caring for dental patients and dental facilities as may be directed by those in authority.

The duties listed above are just a handful of assignments that you may perform. You may want to enhance your naval career by receiving additional training. Contact your career counselor if you have any questions regarding additional training. Next, we will discuss the different dental career paths you can take.

## NAVY ENLISTED CLASSIFICATIONS

The Navy Enlisted Classification (NEC) system is used to identify enlisted personnel with special skills, knowledge, or aptitude for filling billets and other management purposes. Enlisted dental personnel must be familiar with the *Manual of Enlisted Manpower and Personnel Classifications and Occupational Standards*, NAVPERS 18068.

## DENTAL TECHNICIAN NAVY ENLISTED CLASSIFICATIONS

Dental Technician NECs are used to identify personnel with special skills within the dental rating. All dental-related NECs are contained in the 8700 series. As a Dental Assistant, Basic, Class A school graduate you will receive a rating designator or a source rating of DT. Sometimes you might see the source rating of DT followed by quad zeros (for example, DT-0000). This is not an NEC, but is used when no entry or special NEC is assigned to your billet (job). The DT-0000 identifier is used by the Bureau of Naval Personnel (PERS-407, dental detailers) for job assignment identification and the Enlisted Personnel Management Center (EPMAC) for the functional placement of basic Dental Assistants to specific billets.

If you have an opportunity to be assigned with the Fleet Marine Force or a naval construction battalion, you will attend a Class C school and graduate with an NEC of DT-8707. This NEC is carried only when actually assigned to a billet with the FMF or NMCB. When you finish your tour and roll back to shore or a sea duty assignment, the NEC of DT-8707 will not be assigned. You still hold this NEC in inventory and can be activated again if serving with the FMF, NMCB, or in a billet that requires an NEC of 8707. Following is a description of the 8707 NEC.

- **DT-8707, Field Service Technician:** Assists dental officer in providing treatment in the field. Provides technical and administrative assistance to support the mission and functions of Navy and Marine Corps field units. Maintains organizational level of Authorized Dental Allowance Lists (ADALs). Prepares, reviews, and coordinates logistics requirements. Ensures the observance and the practice of field sanitary measures. Augments and assists medical personnel in providing emergency medical care to field or combat casualties to include assistance with medical evacuation procedures.

If you possess the necessary qualifications as listed in the *Catalog of Navy Training Courses* (CANTRAC), you may request specialized training at a Dental Technician, Class C School. Upon graduation you will be assigned an NEC in the 8700 series, which we will look at next. Specialized training is highly competitive and is available to dental personnel in the many areas of dentistry.

## CLOSED-LOOPED NECS

*Closed-looped* means that once you earn that NEC you will be assigned to that NEC and billet requirement. The following are closed-looped NECs that are currently available to basic Dental Technicians. Full descriptions for these NECs and requirements can be found in the *Enlisted Manpower and Personnel Occupational Standards and Classifications*, NAVPERS 18068.

- **DT-8703, Dental Administrative Technician:** Assists the dental officer in organizing and managing a dental clinic or facility. Performs advanced dental administrative, logistical, and financial duties. Provides technical assistance in organizing and conducting dental health education programs and enlisted training. Assists in planning and coordinating fleet (operational) medical and dental support.

- **DT-8708, Dental Hygienist:** An out-of-service 2-year accredited training program that produces an

Associate of Arts (AA) degree. Possesses knowledge and clinical competence required to provide current, comprehensive dental hygiene services under the direction and supervision of a dental officer. Dental hygiene includes but is not limited to: clinical infection control procedures; data gathering; exposing and processing radiographs; dental hygiene assessment and treatment planning; oral health education including health promotion, disease prevention, behavior modification and nutritional counseling; cleaning removable appliances and prostheses; polishing restorations; provision of therapeutic dental hygiene services including, but not limited to, periodontal scaling and root planning, application of pit and fissure sealants and anticariogenic agents (fluorides); application of chemotherapeutic agents; pain control and other patient services as identified by the dental officer.

- **DT-8732, Dental Equipment Repair Technician:** Handles the maintenance, repair, and installation of dental equipment and diagnostic devices. Monitors dental equipment safety programs. Provides technical advice and assistance for dental clinic or facility design, alteration, and equipage. Administers the Dental Equipment Maintenance and Repair Program.

- **DT-8752, Dental Laboratory Technician, Basic:** Performs basic and intermediate level prosthetic laboratory procedures. Fabricates and finishes dental prostheses such as complete dentures, removable partial dentures, and other prescribed protective and restorative intraoral appliances. Repairs, reconstructs, and relines dental prostheses. Conducts routine and prescribed equipment maintenance.

- **DT-8753, Dental Laboratory Technician, Advanced:** Performs and supervises procedures and techniques in the construction of complex and precision dental prostheses such as fixed partial dentures, porcelain fused to metal systems, dental ceramic arts, precision attachment prostheses, and the arrangement of artificial teeth for aesthetic, phonetic, and functional requirements. Coordinates technical and clinical applications and dental technology training.

- **DT-8765, Dental Laboratory Technician, Maxillofacial:** Assists the maxillofacial prosthodontist in the clinical and technical procedures required to fabricate prostheses and appliances for oral, craniofacial, and other anatomical defects. Constructs and finishes ocular, extraoral, intraoral, and somato prostheses of silicone and other related materials. Designs and constructs stone, metal, or silicone molds for prosthetic rehabilitation procedures. Performs other intermediate and advanced level prosthetic laboratory techniques and procedures as prescribed. Consults with and assists other medical and dental specialists in related disciplines.

- **DT-8783, Dental Surgical Technologist:** Assists dental officers in carrying out surgical techniques. Provides perioperative nursing care, safety, and support to patients before, during, and after surgery. Selects, sterilizes, and prepares instruments and materials in an aseptic environment necessary for surgery. Maintains surgical equipment and records. Assists with instruction, supervision, and evaluation of students and other DTs or HMs and assigned duties relating to maxillofacial surgery. Maintains dental central sterilization facilities in medical treatment facilities (MTFs), dental treatment facilities (DTFs), and operational units.

## CHAPTER 2

# TECHNICIAN ADMINISTRATION AND RESPONSIBILITIES

The efficient operation of a dental clinic depends upon its administration and its personnel. In this chapter we discuss some of the administrative responsibilities that a basic dental assistant is expected to perform. Such duties include:

- Performing as a dental receptionist
- Performing as a dental assistant in a clerical assignment
- Answering the telephone
- Receiving patients entering the dental clinic
- Preparing and maintaining files and dental treatment records
- Assisting patients in completing dental treatment forms
- Maintaining central dental appointment desk operations
- Maintaining dental recall
- Maintaining the call list system

Other duties could involve the use of a computer to enter patient and dental information to update records or to generate required dental reports and correspondence and to keep track of dental supplies and equipment for your command.

To perform the above duties, you must develop good communication skills. You will be required to receive, record, and relay information to others. You should be able to express yourself clearly and listen effectively.

### PATIENT MANAGEMENT

As a health care provider, you will be assisting patients coming into the dental clinic for treatment. The most important aspect of dental care that your patients receive is quality dental care. You must always ask yourself the following questions concerning the care you give:

- Was the care competent?
- Was the care effective?

- Was it of the highest quality?

Remember, as a member of the Navy and the dental health team, your commitment to professional excellence should always be your primary goal.

### PATIENT CONTACT POINT

Patient contact is when two people interact, one requesting a service and the other providing the service. Three factors are involved at this contact point:

- The patient
- The health care provider
- The physical spaces in the dental clinic

### The Patient

The most important concern is the patient. The receptionist is the first person in the dental clinic to come in contact with the patient. First impressions are lasting impressions and affect our attitude. They also affect the patient's attitude. If the first impression is favorable, there is a good chance that the patient's attitude will be positive. No two patients are the same. Each patient is cared for individually. Most of your patients have been treated at dental clinics before and will exhibit normal behavior. They are on time for the appointments and are cooperative during each treatment. On the other hand, there are patients who look at a visit to the dentist as an unpleasant experience. This behavior or attitude may have come from various factors that include:

- Previous dental care received
- Current situations in life outside the dental clinic
- Anxieties, stress, tension, conflicts
- Fear of pain
- Being dental phobic (an overwhelming feeling of panic and terror)

The dental officer and you, as the assistant, must always be aware of the patient's responses. Be

prepared to deal with these negative feelings and work to put the patient at ease.

### **The Health Care Provider**

The second factor in the contact point is the health care provider. Your appearance, attitude, and behavior will influence the patient's attitude and the ultimate outcome of the dental visit. You must always recognize your obligation to give the best care that you are capable of giving to every patient you see. This care must reflect a belief in the worth and dignity of every patient as a human being. Courteous, efficient, attention to detail, and conscientious service are the mark of an outstanding Dental Technician. Respect for patients' right to privacy must always be honored, particularly when it involves privileged information to you. Such information should never be repeated to any unauthorized person. Your patients' welfare is of the utmost importance.

### **Physical Spaces**

The third factor at the contact point is physical spaces of the dental clinic. Always keep all areas clean, comfortable, and pleasantly decorated. Reception areas should be supplied with current literature and recorded music or a television. This will help a patient to relax.

## **RECORDS AND RECEPTION**

The records and reception area (front desk) is a vital part of the dental treatment facility. To a very large extent, this department is directly responsible for the image of the dental service provided. It can determine how the patients view the dental service, its personnel, and the overall clinic operation. First impressions are critically important, and it is in this area of the clinic that patients most often have initial contact, either in person or by telephone. The basic functions of this area are to receive patients, decide their treatment eligibility, schedule dental appointments, and prepare and keep dental records.

## **COMMUNICATION**

Communication skills that are efficient and effective is one of the most important parts of your job. You must be a good communicator with others. When communicating with patients, do not use technical terms, rather use simple laymen terms that the patient is familiar with and can understand. Avoid words that

might upset or frighten the patient. The table below lists words to avoid, and suggestions for more appropriate words.

Spit	Saliva, Remove fluid
Shot	Anesthetic
Extract or Pull	Remove
Pain or Hurt	Discomfort
Tooth Filling	Restoration
Fake or False Teeth	Dentures
Suction	Evacuate or Remove
Drill	Preparation
Waiting Room or Lobby	Reception Area

Be an effective listener, allow the patient to explain the problem. Don't jump to conclusions without examining all the facts. Take special care with patients who have hearing or speech disabilities. You should speak slowly, distinctly, and loud enough at the contact point to be heard easily. Eye contact is a must. If you are talking to a patient and looking at something else, this will relay to the patient that you are not giving them your attention in the communication.

### **Body Language**

Body language is another important form of communication. It is nonverbal, but still can send messages to the patient. It includes how you carry yourself and move around the dental clinic. Gestures, facial expressions, posture, attitudes, and tone of your voice reflect your body language. If your patient is grasping the arms of the dental chair, this might be an indication that your patient may be tense. Facial expression, such as wincing of the eyes, are also indicators that your patient may be uncomfortable. When treating a patient, always watch for body language and let the dental officer know if you see anything peculiar. You should also be aware of your own body language. In the dental operatory, your mouth will be covered with a face mask and the patient will not see any expression from your mouth. If all of a sudden, you open your eyes too wide, this might send a message to the patient that something is wrong. Remember your patient usually is looking at you and the dentist when being treated. Pay attention to body language so you do not convey a negative reaction to your patient.



## Telephone Courtesy

Other than face-to-face conversation, the telephone is the most frequent means of personal communication. In fact, it is one of the most important pieces of equipment in the clinic. All elements of desired human relations already covered apply to telephone conversation; however, since the person to whom you speak on the telephone cannot see you, this can lead to certain difficulties. Here are some general principles to remember that will be helpful in overcoming or preventing these difficulties:

- When you speak on the telephone, you are representing the dental treatment facility (DTF). The opinion the patient has of the entire medical facility may often depend on this first telephone contact.
- Use a sincere, pleasant, easy-to-understand voice. Since the person on the other end cannot see you smile, put a smile in your voice. Develop this habit to the point that you do it unconsciously.
- Answer promptly. A good rule is try to answer by the third ring.
- Be clear, concise, and accurate. Double check all specific information given or taken on the telephone. If you make the call, plan what you will say ahead of time. The other person's time is also valuable.
- State your name, rank, and duty station, such as: "Naval Dental Clinic, Pensacola, DT3 Frost, May I help you?"
- Know the local policies. Most clinics have certain limitations as to the information that can be given over the telephone. Be sure you know the policies and have all the necessary information at your finger tips, especially information about appointments.
- **Never** diagnose on the telephone. Diagnosis is not your function. The patient, however, does not know your qualifications; if the information required by the caller is out of your area of responsibility, contact the proper authority or set up an appropriate appointment in accordance with local policies.
- **Never** prescribe on the telephone (e.g., just take four aspirins and come to sick call). Obtain accurate information if the dentist is busy, and

decide whether the nature of the call is administrative or professional.

- Record calls. If the telephone message is for someone who is not available at the time, or if it requires information that needs further investigation, be certain that the information is accurately recorded. A convenient form (SF 63, Memorandum of Call) is available for this purpose.

## TREATMENT ELIGIBILITY

Who is authorized dental care? If a person in civilian clothes came to your clinic requesting treatment, what would you do? How would you decide the patient's eligibility for treatment? The easiest way is to look at the person's identification card. It will tell you whether the person is active duty, guard, reserve, family member, retired, or civilian, and if the card has expired. All of these categories of patients are authorized some type of treatment. To decide a patient's treatment eligibility, you must verify the eligibility through the Defense Enrollment Eligibility Reporting System (DEERS) and know the types of dental care available and priority care authorized.

### Verification of the Defense Enrollment Eligibility Reporting System (DEERS)

DEERS is a computer-based enrollment and eligibility verification system. It assists with elimination of waste, fraud, and abuse by unauthorized personnel seeking health care.

Normally the reception desk is responsible for DEERS verification. Some clinics have online computer terminals. Other clinics communicate with the main computer by telephone. The DEERS verification process is outlined in OPNAVINST 1750.2.

### Types of Dental Care

There are several types of dental care including routine, emergency, and elective. The person's eligibility will determine the type of treatment that can be provided.

**ROUTINE DENTAL CARE.**—This treatment includes all the medical, surgical, and restorative treatment of oral disease, injuries, and deficiencies that come within the field of dentistry as commonly

practiced by the dental profession. This service is preventive and corrective and includes:

- Dental examinations and advice on dental health.
- Restoration of lost tooth structure.
- Treatment of periodontal conditions.
- Surgical procedures.
- Replacement of missing teeth essential to personal appearance, the performance of military duty, or the proper mastication of food.

**EMERGENCY DENTAL CARE.**—This is treatment necessary to relieve pain, control bleeding, and manage acute septic conditions or injuries to the oral-facial structures. Emergency dental care is authorized worldwide for personnel of all categories.

Dental officers must be available at all times to provide emergency care. All dental commands have duty Dental Technicians and a duty dentist either on board or on call that evaluate all patients requesting care after normal duty hours. These evaluations may be accomplished by the dental officer over the telephone; however, the duty dental officer must provide care for all true dental emergencies.

**ELECTIVE DENTAL CARE.**—This type of care a dentist may authorize but may also defer. Each case should be evaluated individually based on Navy policy. Examples of elective dental are malocclusion, orthodontics, replacing amalgam fillings with gold crowns, etc.

### Priority of Care

Naval Dental Treatment Facilities (DTFs) will provide care to all eligible beneficiaries subject to the capabilities of the professional staff and the availability of space and facilities.

In those instances when care cannot be rendered to all eligible beneficiaries, the priorities in the following chart must prevail. No distinction as to the sponsoring uniformed service will be made when providing care or deciding priorities.

### Priority Category

The following priority categories should be assigned as appropriate:

- 1A Members of the uniformed services on active duty.

- 1B Members of a Reserve Component of the Armed Forces and National Guard personnel.
- 2 Family member of active duty members of the uniformed services; family members of persons who died while in such a status.
- 3 Members of the Senior Reserve Officers' Training Corps.
- 4 Retired members of the uniformed services and their family members (including family members of deceased retired members.)
- 5 Civilian employees of the Federal Government.
- 6 All others.

The rendering of emergency dental treatment to any person when such treatment is necessary and demanded by the laws of humanity or the principles of international courtesy will always apply. Receipt of payment (in any form) is prohibited by any dental officer or Dental Technician or from anyone for any dental service in a naval dental activity.

### SCHEDULING PATIENTS

Once you know the patient's eligibility and the type of dental care to provide, you can schedule an appointment. Dental procedures can vary from clinic to clinic, as well as, the type of appointment system and the method of scheduling appointments.

In most cases, appointments are based on fixed, non-variable lengths, such as 45, 60, or 90 minute lengths, or as an incremental time method using 10, 15, or 20 minute units of time. The increment method is often the best use of treatment time because the patient is appointed only for the time needed to complete the procedure.

Whatever type of appointment system is used when you schedule appointments, make sure you do so accurately. Enter the information in the appointment book or computer system first, and then complete the patient's appointment card. If you complete the patient's appointment card with the date and time of the appointment first, and then enter the information in the appointment book or computer-based system (CHCS-Composite Health Care System), you risk having more than one patient scheduled for an appointment time. This can happen easily if you are interrupted and fail to record the information into the appointment book or system.

A policy can be adopted of reappointing patients to the same operator for all subsequent treatment if needed. This policy is particularly applicable to operative dentistry patients. On the other hand, a policy of reappointing patients to the next available open time may be preferable. Another alternate is to keep a few appointments open, thus permitting some flexibility in the dentists' schedules, allowing them to take care of unforeseen situations that may arise from time to time. Next we will discuss the patient register, dental appointment book, and appointment cards.

### **Patient Register**

The patient register or log is maintained at the appointment desk and shows the date, name, rank/rate, and reason for the visit. It is usually a log-type book, which lists every patient who was seen at the DTF on a particular day.

### **Dental Appointment, Daily, NAVMED 6600/5**

At most DTFs, dental appointments are scheduled at the Central Appointment Desk. This department usually takes care of the appointment schedule(s) for the entire DTF. The appointment book consists of a series of NAVMED 6600/5 Forms (fig. 2-1) or local forms that resemble the 6000/5.

### **Dental Appointment Card, NAVMED 6600/6**

A NAVMED 6600/6 (fig. 2-2) is given to each patient scheduled for a dental appointment. Other dental appointment card types can also be used depending on your DTF's policy. Figure 2-3 illustrates a Dental Appointment Slip that has carbon copies and comes in 3 parts.

### **Appointment Failures or "No Shows"**

Appointment failures result in the loss of man-hours for providers and should be kept to a minimum. There is no single best way to handle appointment failures. The DTF's commanding officer (CO) or officer in charge (OIC) should consider procedures and methods to keep lost time to a minimum. An active liaison between the DTF and the organizational units will also help minimize the problem.

You can help eliminate appointment failures by impressing upon patients the importance of keeping them. If time permits, you could contact patients by telephone before their appointments to remind them of

the date and time. If you have a broken appointment or cancellation, you should notify the appointment desk. It may be possible to fill the appointment time with a sick-call patient or a patient waiting for treatment. Another method of minimizing lost time is the patient call list, which is discussed next.

### **Patient Call List**

The Patient Call List is used for patients requiring extensive treatment, or need to be seen sooner than the next available scheduled appointment time. The list of patients usually live or work a short distance from the DTF, or are available on short notice in case of a broken appointment or cancellation.. A call list log should contain the patient's name, rank/rate, home/office telephone number, and dental treatment to be performed.

### **DENTAL COMPUTERIZED RECALL**

The computerized dental recall system is used to schedule military patient's return to the DTF on a 3-, 6-, or 12-month basis for routine or specialized treatment (e.g., examinations, perio).

The system uses twelve separate lists or file sections (one for each month). It is continuously updated, month by month. Most DTFs have a recall list that operates with custom computer software programs installed on personal computers (PCs) such as the Dental Management Information System (DENMIS).

### **DENTAL MANAGEMENT INFORMATION SYSTEM**

The Dental Management Information System (DENMIS) was developed for use by DTFs who submit data to the Bureau of Medicine and Surgery (BUMED). Functional support is provided by Naval Medical Information Management Center (NMIMC), Bethesda, MD. Technical support is provided by Space and Naval Warfare System Center (SPAWARSYSCEN), Chesapeake, VA. DENMIS has the capability to process the following types of information:

- Dental Workload reports.
- Unit and individual Operational Dental Readiness reports.
- Provider Treatment Time reports.
- Patient and Unit Dental Treatment Needs reports (also referred to as ad hoc reports).

DENTAL APPOINTMENTS, DAILY NAVMED 6600/5 (12-73) (Formerly NAVMED 1298) S/N 0105-210-6650		ACTIVITY		USS WASP		DATE		DATE	
TREATMENT ROOM 1. Dr. Brush		TREATMENT ROOM 2. Dr. Smith		TREATMENT ROOM 3. Dr. Jones		31 JAN 99		31 JAN 99	
TIME	NAME, GRADE/RATE AND REMARKS	PHONE	TIME	NAME, GRADE/RATE AND REMARKS	PHONE	TIME	NAME, GRADE/RATE AND REMARKS	PHONE	DATE
0800	Williams, W. D., CAPT Oper #14 + 15	234-5678	0800	Seaman, A. B., SN Oper #4,5,6,13,14	234-5678	0800	Christmas, M. D., LT O. S. Ext #16	234-5678	
0900	Rose, J. A., ENS R.C. Tr. #19	222-5555	0900			0900	Rose, J. A., ENS O. S. Ext #1 + 16	222-5555	
1000			1000	Johnson, T. T., LCDR Perio Surgery	555-6666	1000			
1100	James, M. C., BM1 Oper. #25 + 26	333-1010	1100			1100	James, J. O., SM1 O. S. Ext 1,16,17,32	444-7777	
1200			1200			1200			
1300			1300			1300			
1400	Collins, C. A., VN2 Perio Scaling	313-9999	1400	Peters, R. A., MM2 Review	888-4000	1400	Campbell, L. L., ENS Arrange consultation with prosthodontist	622-6262	
1500	Adams, L. D., SR Crown Prep	678-0000	1500	Adams, L. D., SR Radiograph	678-0000	1500			
1600			1600			1600			

Figure 2-1.—Dental Appointments, Daily, NAVMED 6600/5

DTB:10201

NAME SEAMAN, A. B.		GRADE/RATE SN		
DENTAL OFFICER DR. SMITH		ROOM NUMBER #2		
DAY	DATE	HOUR	ARRIVED	DEPARTED
Wed	HFE899	1300		
DENTAL APPOINTMENT, NAVMED 6600/6 (REV. 2-74) FRONT S/N 0105-LF-210-6660 (Over)				

( FRONT )

NAVMED 6600/6 (REV. 2-74) BACK	
<ol style="list-style-type: none"> <li>1. Bring this card with you.</li> <li>2. Brush your teeth before reporting.</li> <li>3. Bring your dental chart if it is not at this activity.</li> <li>4. Telephone <u>26531-26129-26854</u> if you are unable to keep this appointment.</li> </ol>	

( BACK )

DTB1f0202

Figure 2-2.—Dental Appointment Card, NAVMED 6600/6.

DENTAL APPOINTMENT SLIP			
INSTRUCTIONS			
<ol style="list-style-type: none"> <li>1. Please meet the appointment (s) made for you promptly.</li> <li>2. Bring this slip with you and give it to the appointment clerk.</li> <li>3. If you are unable to keep this appointment, cancel at least <u>24 hours</u> in advance.</li> <li>4. Distribution: a. original - member copy b. duplicate - member's command / department / division c. triplicate - patient's record</li> </ol>			
PHONE NUMBERS			
NTTC CORRY STATION: Active Duty Lines: 452-6531 / 6129 / 6854			
Name: Last name, first, middle initial SEAMAN, Abel B.		Grade - rate SN	
Organization USS WASP	Duty phone 234-5678	Date issued 09 FEB 99	
APPOINTMENT DATA			
DAY	DATE	HOUR	DOCTOR
1. WED	11 FEB 99	1300	SMITH
2.			
3.			
4.			
5.			
REMARKS			
Appointment Slip, Dental - NTTC Corry Station, 6600/6B (Rev. 5/97)			

DTB1f0203

Figure 2-3.—Dental Appointment Slip.

- For class 3 or 4 patients that require operative or prophylaxis, and so forth.

The current version of the DENMIS User's Guide will provide dental personnel with the information necessary to effectively use DENMIS. The manual contains sign-on, data entry, screen format, and sign-off procedures. The structure of this manual is designed to assist the user in reporting provider productivity through the Dental Information Retrieval System (DIRS) in a timely manner.

## DENTAL INFORMATION RETRIEVAL SYSTEM

The Daily DIRS record (formally known as NAVMED 6600/11) is designed to give providers a record of treatment performed daily, as well as time involved in patient care and nonpatient care functions. Every provider in a DTF keeps track of the clinical or laboratory procedures he or she does. These procedures are recorded on a daily DIRS form and turned in at the end of the workday. Figure 2-4 illustrates a blank daily DIRS form that is used by a dentist for operative or general dentistry. Your command will have other specialized forms depending on where you are assigned. For example, if you were assigned in the X-ray department, your daily DIRS form would have descriptions and codes to identify X-ray procedures you perform. The daily DIRS forms are produced locally for each DTF. Each provider's procedures are compiled at the end of each month and submitted via DENMIS.

## HEALTH CARE RELATIONS PROGRAM

The delivery of quality health care has always been a driving force in the operational and managed care environment of Dental Treatment Facilities (DTFs). The Navy's Health Care Relations Program, BUMED Instruction 6300.10, provides general guidance to the establishment of this program. The program has three parts, which are Internal, External and Patient Relations.

## PATIENT CONTACT PROGRAM

All Navy dental and medical treatment facilities have in place and use what is called the "Patient Contact Point Program." It is through this program, administered in each Navy Dental Clinic's in-house instructions that all patients and beneficiaries are able

Provider's Name:		Daily DIRS - General Dentistry Branch Dental Clinic, Pensacola, FL										Sheet # ___ of ___		Direct Patient Care: _____ hrs										
Provider's signature:		Date m / d / y		Class In	Class Out	Ben	1	2	3	4	5	6	7	8	9	10	11	12	ADA Codes	Beneficiary Codes				
Time		Pt. Name, Rate, SSN, Unit																		1	2	5	9	11
In	1			DISINFECTION	15														15					
				NEW RECORD	110														110					
Out				T-2 EXAM	120														120					
				T-3 EXAM	140														140					
In	2			T-1 EXAM	150														150					
				PULP TEST	460														460					
Out				DX CASTS	470														470					
				DX PHOTOS	471														471					
In	3			NUTRITIONAL COUNS	1310														1310					
				TOBACCO COUNS	1320														1320					
Out				PCI/OHI	1330														1330					
				SEALANT	1351														1351					
In	4			AM-1 SURFACE	2140														2140					
				AM-2 SURFACE	2150														2150					
Out				AM-3 SURFACE	2160														2160					
				AM-4+ SURFACE	2161														2161					
In	5			RES- 1 SURF ANT	2330														2330					
				RES- 2 SURF ANT	2331														2331					
Out				RES- 3 SURF ANT	2332														2332					
				RES- 4+ SURF ANT	2335														2335					
In	6			RES- 1SURF POST	2385														2385					
				RES- 2 SURF POST	2386														2386					
Out				RES- 3+ SURF POST	2387														2387					
				RECEMENT CROWN	2920														2920					
In	7			SEDATIVE FILLING	2940														2940					
				VENEER- COMPOSITE	2960														2960					
Out				CROWN REPAIR	2970														2970					
				PULP CAP DIRECT	3110														3110					
In	8			PULP CAP INDIRECT	3120														3120					
				PULPOTOMY	3220														3220					
Out				BLEACH TOOTH	3960														3960					
				REPAIR CD BASE	5510														5510					
In	9			REPLACE TOOTH CD	5520														5520					
				REPLACE TOOTH RPD	5640														5640					
Out				FLUORIDE GEL CARRIER	5986														5986					
				RECEMENT FPD	6930														6930					
In	10			EXT SINGLE TOOTH	7110														7110					
				I & D SOFT TISSUE	7510														7510					
Out				PERICORONITIS TX	7903														7903					
				PALLATIVE EMERG TX	9110														9110					
In	11			LOCAL ANES	9215														9215					
				CONSULTATION	9310														9310					
Out				OBSERVATION VISIT	9430														9430					
				AFTER HOURS VISIT	9440														9440					
In	12			OTHER DRUGS/MEDS	9630														9630					
				DESENSITIZING MEDS	9910														9910					
Out				BEHAVIOR MGT	9920														9920					
				POST SURG TX (COMP)	9930														9930					
Scratch box to calculate time values:				OCCLUSAL GUARDS	9940														9940					
				ATHLETIC MOUTHGRD	9941														9941					
				OC ADJ LIMITED	9951														9951					
				PT SEATING	9973														9973					

Figure 2-4.—Daily DIRS form.

to voice and document how they are treated and are able to report any unsatisfactory or satisfactory complaints or compliments concerning the treatment they have received.

### **PATIENT CONTACT REPRESENTATIVE**

In all Navy dental clinics, a patient contact representative is appointed in writing by the commanding officer. This person's picture is posted in the front desk or reception area and should be visible for all patients to see. All patient complaints or compliments are channeled through the patient contact representative and then up the chain of command for action. Validated patient compliments and complaints are incorporated into the command's annual assessment for the Quality Assurance (QA) Program. Follow BUMEDINST 6010.13 and your clinic's instruction for follow-up actions and reporting instructions.

### **PATIENTS' BILL OF RIGHTS AND RESPONSIBILITIES**

Post the Patients' Bill of Rights and Responsibilities next to the Patient Contact Representative's picture in the reception area. Figure 2-5 illustrates the Patients' Bill of Rights and responsibilities.

### **PATIENT SURVEYS**

Patient survey forms should also be located at the front desk area. These forms are originated at each clinic and ask the patients different questions regarding their visit. These forms will also ask for any suggestions that might improve the services provided. Completed forms are turned into the front desk personnel or may be placed in a suggestion box located in the reception area. Surveys are compiled and submitted with the command's annual assessment of the QA Program per BUMEDINST 6010.13.

### **DENTAL TREATMENT RECORDS**

An essential part of the receptionist or clerical duties of a dental assistant is preparing and maintaining the dental record jacket and associated forms. Please note that the old Dental Treatment Record (NAVMED 6150/10-19) is being replaced by the new dental record jacket (NAVMED 6150/21-30). Instructions for completing the NAVMED 6150/21-30

can be found in the Dental Treatment Record Manual dated December 1997. This manual will eventually be incorporated into MANMED, Chapter 6.

### **PREPARATION OF THE DENTAL RECORD JACKET**

A Dental Record Jacket, (NAVMED 6150/21-30) should be established for every individual receiving dental care in a Navy DTF, except when dental care is limited to participation in a group preventive dentistry program. Dental records prepared for eligible beneficiaries should be placed in the custody of the DTF responsible for the individual's dental treatment. The following procedures for establishing dental records apply to all eligible beneficiaries receiving outpatient dental care. Figure 2-6 is a sample of the front cover of a dental record jacket (NAVMED 6150/21-30). Refer to figure 2-6 for guidance for preparing dental records using the specific instructions discussed next.

Use an indelible, black, felt-tip pen, black ink, or pencil, as indicated to record all patient identifying data sections.

#### **Social Security Number (SSN)**

The second to the last digit of the SSN is preprinted on the dental record jacket. The preprinted digit also matches the last digit of the form number (e.g., the preprinted digit on NAVMED 6150/26 is a 6). The color of the treatment record jacket corresponds to the preprinted digit as follows:

<u>Preprinted Digit</u>	<u>Jacket Color</u>
1	Green
2	Yellow
3	Gray
4	Tan
5	Blue
6	White
7	Almond
8	Pink
9	Red
0	Orange

#### **Jacket Selection and Entries**

Select a prenumbered NAVMED 6150/21-30 jacket matching the second to last number of the

# Patients' Bill of Rights and Responsibilities

## RIGHTS

1. **Medical Care and Dental Care.** The right to quality care and treatment consistent with available resources and generally accepted standards. The patient has the right also to refuse treatment to the extent permitted by law and Government regulations, and to be informed of the consequences of his or her refusal. When concerned about the care received, the patient has a right to request review of the adequacy of care.
2. **Respectful Treatment.** The right to considerate and respectful care, with recognition of his or her personal dignity.
3. **Privacy and Confidentiality.** The right, within law and military regulations, to privacy and confidentiality concerning medical care.
4. **Identity.** The right to know, at all times, the identity, professional status, and professional credentials of health care personnel, as well as the name of the health care provider primarily responsible for his or her care.
5. **Explanation of Care.** The right to an explanation concerning his or her diagnosis, treatment, procedures, and prognosis of illness in terms the patient can be expected to understand. When it is not medically advisable to give such information to the patient, the information should be provided to appropriate family members or, in their absence, another appropriate person.
6. **Informed Consent.** The right to be advised in non-clinical terms of information needed to make knowledgeable decisions on consent or refusal for treatments. Such information should include significant complications, risks, benefits, and alternative treatments available.
7. **Research Projects.** The right to be advised if the facility proposes to engage in or perform research associated with his or her care or treatment. The patient has the right to refuse to participate in any research projects.
8. **Safe Environment.** The right to care and treatment in a safe environment.
9. **Medical Treatment Facility (MTF) or Dental Treatment Facility (DTF) Rules and Regulations.** The right to be informed of the facilities' rules and regulations that relate to patient or visitor conduct. The patient should be informed about smoking rules and should expect compliance with those rules from other individuals. Patients are **entitled** to information about the **MTF or DTF mechanism** for the initiation, review, and resolution of patient complaints.

## RESPONSIBILITIES

1. **Providing Information.** The responsibility to provide, to the best of his or her knowledge, accurate and complete information about complaints, past illness, hospitalizations, medications, and other matters relating to his or her health. A patient has the responsibility to let his or her primary health care provider know whether he or she understands the treatment and what is expected of him or her.
2. **Respect and Consideration.** The responsibility for being considerate of the rights of other patients and MTF or DTF health care personnel and for assisting in the control of noise, smoking, and the number of visitors. The patient is responsible for being respectful of the property of other persons and of the facility.
3. **Compliance with Medical Care.** The responsibility for complying with the medical and nursing treatment plan, including followup care, recommended by health care providers. This includes keeping appointments on time and notifying the MTF or DTF when appointments cannot be kept.
4. **Medical Records.** The responsibility for ensuring that medical records are promptly returned to the medical facility for appropriate filing and maintenance when records are transported by the patients for the purpose of medical appointment or consultation, etc. All medical records documenting care provided by any MTF or DTF are the property of the U.S. Government.
5. **MTF and DTF Rules and Regulations.** The responsibility for following the MTF or DTF rules and regulations affecting patient care conduct. Regulations regarding smoking should be followed by all patients.
6. **Reporting of Patient Complaints.** The responsibility for helping the MTF or DTF commander provide the best possible care to all beneficiaries. Patients' recommendations, questions, or complaints should be reported to the patient contact representative.

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Figure 2-5.—Patients' Bill of Rights and Responsibilities.



The diagram shows the front cover of a Dental Record Jacket (NAVMED 6150/21-30). At the top, there is a row of boxes for the Social Security Number (SSN), with callout 3 pointing to the last digit (4) and callout 5 pointing to the sponsor's SSN (6). Callout 2 points to the 'PERSONAL DATA' section, which includes 'COMMAND' and 'TITLE'. Callout 1 points to the 'Service and Status' section, which includes checkboxes for 'Outpatient Treatment Record', 'Dental Treatment Record', 'Military', 'Retired', 'Family Member', 'Civilian', 'Personal Reliability Program', 'Blood Type', 'Flight Status', 'Food Handler', 'Radiation Exposure', 'Asbestos Surveillance', and 'Medical Condition'. Callout 6 points to the 'PATIENT'S FULL NAME' section, which includes 'LAST', 'FIRST', and 'MIDDLE' fields. Callout 7 points to the 'Center page; Privacy Act Statement (front), Disclosure Record (back)'. Callout 8 points to the 'Back page; Place black tape on last digit of SSN, Forensic Examination (front)'. Callout 9 points to the 'Alert' box, which includes checkboxes for 'Allergies' and 'Sensitivities'. Callout 10 points to the 'Annual verification (ignore)' section, which is a vertical column of years from 1996 to 2014.

- 1 Service and Status
- 2 Pencil Entries
- 3 Place black tape on last digit of SSN
- 4 Patient's Family Member Prefix Code
- 5 Sponsor's SSN
- 6 Patient's Full Name
- 7 Center page; Privacy Act Statement (front), Disclosure Record (back)
- 8 Back page; Place black tape on last digit of SSN, Forensic Examination (front)
- 9 Alert box
- 10 Annual verification (ignore)

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Figure 2-6.—Sample front cover of a Dental Record Jacket (NAVMED 6150/21-30).

sponsor's SSN. Enter the first seven digits and the ninth digit of the sponsor's SSN on the top right portion of the jacket. Using a 1-inch long, 1/2-inch wide strip of black tape, tape over the number that corresponds to the last digit of the SSN in each of the two number scales. The tape must completely blacken out the number and extend around the edge of the jacket to the back.

### Patients Without SSNs

For patients who do not have an SSN (e.g., foreign personnel and their family members), create a

“substitute” SSN by coding the first three digits with 800 and the last six digits as the month, day, and year of the patient's birth (i.e., MM-DD-YY). As an example for a patient who was born on July 10, 1945, assign SSN 800-07-1045. For patients with the same birth date, assign the first three digits sequentially starting with 801, followed by the birth date. Select a prenumbered NAVMED 6150/21-30 jacket, matching the second to the last number of the patient's “substitute” SSN, and complete the jacket from the instructions in this section.

## Family Member Prefix (FMP) Codes

Enter the patient's FMP code in the two diamonds preceding the SSN using Table 1-1.

## DATA ON FRONT COVER OF THE DENTAL RECORD JACKET

All entries on the front cover, except "Pencil Entries" are made with black felt-tip pen. Use the following instructions to complete the next sections.

### Name

Enter the patient's name in the upper-right corner in the following sequence: last, first, middle. Indicate no middle name by the abbreviation "NMN." The name should be written on the line provided. For all

retired flag and general officers (i.e., 0-7 and above), enter the phrase "FLAG OFFICER" or "GENERAL OFFICER," as appropriate, in the lower portion of the patient's identification box.

### Alert

Immediately below the instruction box, indicate in the alert box whether the patient has sensitivities or allergies by entering an "X" in the appropriate boxes (if none, leave blank).

### Pencil Entries

Enter the patient's command and grade or rate for active duty. For all others enter their preferred form of address.

Table 1-1.—Family Member Prefix Codes

<u>Relationship to Sponsor</u>	<u>FMP Code</u>
Sponsor's oldest child (including stepchildren)	01
Sponsor's next oldest child	02
Sponsor's third oldest child, etc.	03
Sponsor (active duty, retired, and Reserve uniformed services personnel of Army, Air Force, Marine Corps, Coast Guard, Public Health Service, and National Oceanic and Atmospheric Administration)	20
* Sponsor's current spouse	30
* Sponsor's eligible former spouses	31-39
Sponsor's family member mother/stepmother	40-44
Sponsor's family member mother-in-law	50-54
Sponsor's family member father-in-law	55-59
Other authorized sponsor's family members	60-69
Beneficiaries authorized by statute (SECNAV designees, etc.)	90
Non-beneficiary emergencies	98
All other authorized personnel (foreign national, etc.)	99

\* The spouse of a deceased sponsor will continue to use the sponsor's SSN. If the sponsor had no SSN, use the sponsor's military serial or service number preceded by leading zeros to complete a 9-digit number.

## Record Category

Below the pencil entries box, indicate the record category by entering an “X” in the box marked “Dental Treatment Record.”

## Service and Status

Immediately below the record category box, indicate the sponsor’s branch of military service by entering an “X” in the appropriate box. If the sponsor is not an active duty Navy or Marine Corps member, enter an “X” in the “Other” box and write the service and rank/rate on the line provided. Check remaining boxes in this section as applicable with additional comments as follows:

- Retired. Check box if applicable and indicate service and rank/rate on line provided.
- Family Member. Check box if applicable and indicate relationship to sponsor.
- Family Member Insurance. Check “Yes” or “No” regarding dental insurance the family member may have. (e.g. United Concordia Companies, Inc. (UCCI), DELTA, HUMANA, etc.)
- Blood Type. Indicate blood type of patient.

## Annual Verification

The annual verification section is located on the right-hand side of the jacket and starts with the year 1996-2014. Leave this section blank. This block should not be completed for dental records.

## DATA ON INSIDE FRONT COVER OF THE DENTAL RECORD JACKET

The format printed on the inside of the jacket front cover (fig. 2-7) should be completed in pencil only. This information should be entered at the time of record check-in (receipt) and should be kept current at all times by erasing previous, outdated entries. Have member complete blocks that are applicable. Most blocks are self-explanatory.

### Imprint of DD 2005, Privacy Act Statement

The Imprint of DD 2005, Privacy Act Statement form (fig. 2-8) is preprinted and located in front of the center page in the dental record jacket. It must be signed in black ink by the patient, the parent, or the guardian must sign if the patient is a minor.

### Disclosure Accounting Record

The Disclosure Accounting Record (fig. 2-9) is preprinted and located on the back of the center page of the dental record jacket. It is self-explanatory and will be filled out as needed.

### Forensic Examination

The Forensic Examination form is preprinted and located on the inside back cover of the dental record jacket. The instructions for completing the Forensic Examination Form are discussed in *Dental Technician, Volume 2, Chapter 2, “Dental Examinations.”*

### Record Retirement Tape

For records of non-military patients, a tentative record retirement date (retirement year) should be indicated on all dental records by attaching a colored tape in the box marked “Retired Year Tape” on the

PENCIL ENTRIES ONLY!		
ARRIVAL DATE	PROJECTED ROTATION DATE	
LOCAL HOME ADDRESS (OR MAILING ADDRESS)		LOCAL HOME TELEPHONE
COMMAND UIC (OPTIONAL)	WORK TELEPHONE	IF A FAMILY MEMBER, SPONSOR'S WORK TELEPHONE

DTB1f207

Figure 2-7.—Data on inside front cover of the dental record jacket.

**PRIVACY ACT STATEMENT - HEALTH CARE RECORDS**

***THIS FORM IS NOT A CONSENT FORM TO RELEASE OR USE HEALTH CARE INFORMATION PERTAINING TO YOU.***

**1. AUTHORITY FOR COLLECTION OF INFORMATION INCLUDING SOCIAL SECURITY NUMBER (SSN)**

Sections 133, 1071-87, 3012, 5031 and 8012, title 10, United States Code and Executive Order 9397.

**2. PRINCIPAL PURPOSES FOR WHICH INFORMATION IS INTENDED TO BE USED**

This form provides you with the advice required by The Privacy Act of 1974. The personal information will facilitate and document your health care. The Social Security Number (SSN) of member or sponsor is required to identify and retrieve health care records.

**3. ROUTINE USES**

The primary use of this information is to provide, plan and coordinate health care. As prior to enactment of the Privacy Act, other possible uses are to: Aid in preventive health and communicable disease control programs and report medical conditions required by law to federal, state and local agencies; compile statistical data; conduct research; teach; determine suitability of persons for service or assignments; adjudicate claims and determine benefits; other lawful purposes, including law enforcement and litigation; conduct authorized investigations; evaluate care rendered; determine professional certification and hospital accreditation; provide physical qualifications of patients to agencies of federal, state, or local government upon request in the pursuit of their official duties.

**4. WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION**

In the case of military personnel, the requested information is mandatory because of the need to document all active duty medical incidents in view of future rights and benefits. In the case of all other personnel/beneficiaries, the requested information is voluntary. If the requested information is not furnished, comprehensive health care may not be possible, but CARE WILL NOT BE DENIED.

This all inclusive Privacy Act Statement will apply to all requests for personal information made by health care treatment personnel or for medical/dental treatment purposes and will become a permanent part of your health care record.

Your signature merely acknowledges that you have been advised of the foregoing. If requested, a copy of this form will be furnished to you.

SIGNATURE OF PATIENT OR SPONSOR

SSN OF MEMBER OR SPONSOR

DATE

**DD** FORM 1 FEB 76 **2005**

**PREVIOUS EDITION IS OBSOLETE**

DTB110208

Figure 2-8.—DD 2005, Privacy Act Statement.



CATEGORY TAPE” box, according to the following categories listed below:

<u>Record Category</u>	<u>Color Tape</u>
Active duty military (This includes reserves on active duty over 30 days)	Blue
Reserve military, not on active duty	Red
Family member(s)	Yellow
Retired	Green
All others	Black

## DENTAL CLASSIFICATION TAPE

Color-coded dental classification tapes are no longer used on the upper right-hand corner on the inside back cover of the Dental Record Jacket.

## IDENTIFICATION OF FORMS

It is imperative that all forms documenting patient care contain adequate data to identify the patient and permit filing of the forms in the dental record. All data elements in the dental examination and treatment forms should be completely filled out. All other forms filed in the dental records should, at a minimum, contain the following data in the identification block:

- Patient’s FMP and sponsor’s SSN.
- Patient’s name (last, first, middle initial).
- Sponsor’s branch of service (e.g., Army, Navy, or Air Force) and patient’s status (e.g., family member or retired).

## ARRANGEMENT OF FORMS

Prescribed forms will be filed in the dental record in the following order. The forms will be arranged in top to bottom sequence; like-numbered forms will be grouped together with the most recent form placed on top of each previous form, unless otherwise specified below.

## INSIDE FRONT COVER OF DENTAL RECORD JACKET

Forms should be filed in the inside front cover of the dental record jacket as follows:

1. Unmounted radiographs in envelopes.
2. Sequential bitewing radiograph.

3. Panoramic or full-mouth radiographs.

## Front of Dental Record Jacket Center Page

Forms should be filed in the front of the dental record jacket center page as discussed in the following paragraphs:

(NAVMED 6600/3)—Dental officers, civilian dentists, and auxiliary personnel providing direct patient care must ensure that each patient has a completed, current Dental Health Questionnaire, in his/her dental treatment record before performing an examination or providing dental treatment. The NAVMED 6600/3 (fig. 2-10) must be filled out and signed by each patient. This must be reviewed, dated, and signed by the first dentist who conducts the examination or dental treatment. For minors, i.e., under the age of consent or majority in the applicable jurisdiction, the parent or guardian must fill out the form and sign in the patient’s signature block of the question, using his or her name and not the child’s name.

Each dental care provider must indicate, in the dental treatment section of the EZ603A that the questionnaire has been reviewed and updated by the patient. Dentist must also annotate on the EZ603 in the “O” objective block, sections marked “HQ dated,” “Reviewed,” and “HQR Finding.”

During annual dental exams, patients need only to review, date, and sign the current questionnaire if health status has not changed. Whenever a significant change in medical history or health status occurs, a new questionnaire must be filled out, dated, and signed.

The initial and all later Dental Health Questionnaires are permanently maintained in the Dental Treatment Record. For conditions that require medical clarification, use the SF 513 (Consultation Sheet). Document the consultation on the EZ603-Dental Exam Form and in the Summary of Pertinent Findings section of the NAVMED 6600/3. BUMED Instruction 6600.12 provides guidance for the Dental Health Questionnaire.

## BACK OF DENTAL RECORD JACKET CENTER PAGE

On this page of the dental record jacket, place all Dental Exam Forms, EZ603s (Plan “P” side up) in reverse chronological order.

<b>DENTAL HEALTH QUESTIONNAIRE</b>				Personal Data - Privacy Act of 1974				BUMEDINST 6600.12			
My Chief Complaint or Reason for this Examination Is: _____											
<b>HAVE YOU EVER HAD OR HAVE YOU NOW: (Please check at the Right of each item)</b>											
<b>(Check each item)</b>	YES	NO	DON'T KNOW	<b>(Check each item)</b>	YES	NO	DON'T KNOW	<b>(Check each item)</b>	YES	NO	DON'T KNOW
Epilepsy or Seizures				Hemophilia				Ulcers			
Fainting or Dizziness				Bruise or Bleed easily				Kidney problems			
Nervousness				Heart problems or Angina				Veneral disease			
Stroke				Hypertension				Diabetes			
Glaucoma				Rheumatic fever				Thyroid disease			
Cold sores (Herpes)				Heart murmur				HIV +			
Persistent cough				Mitral valve prolapse				Arthritis			
Emphysema				Congenital heart lesions				Painful joints (incl. jaw)			
Tuberculosis/PPD positive				Heart surgery				Prosthetic joint(s)			
Asthma				Prosthetic heart valve(s)				Hives			
Hay fever				Pacemaker				Steroid medication(s)			
Sinus problems				Blood transfusion(s)				Drug addiction			
Anemia				Liver disease				Alcoholism			
Sickle cell disease				Yellow jaundice				Unexplained weight change			
G-6PD deficiency				Hepatitis- type: _____				Cancer/radiation			
1. Have you ever been told that you should not donate blood? _____											
2. Have you ever been told that you need antibiotics before dental treatment? _____											
3. Females: Are you taking birth control pills (BCPs)? _____											
Are you or might you be pregnant? (Estimated delivery) _____											
Are you breast feeding at the present time? _____											
4. Do you have a disease, condition, or problem not listed above? _____											
If Yes, Please Describe: _____											
<b>INSTRUCTIONS: Please answer the following questions by circling, and if applicable by entering the appropriate response: If yes, describe - If no, please write "no/none"</b>											
1. Are You In: Flight Status? . . Yes No / Personnel Reliability Program?								YES	NO		
2. Are You Presently Ill Or Under The Care Of A Physician								YES	NO		
If Yes, Please Describe: _____											
History Of Hospitalizations: _____											
(Including Cancer Treatment) _____											
3. Any Allergies? (Including Rubber) _____											
4. Medications Presently Taking: _____											
(including aspirin, etc.) _____											
<b>Any Family History Of: (Circle)</b>				<b>Your Social History:</b>				<b>Occupation/Jobs: _____</b>			
Heart Disease		Cancer		● Type and frequency of:		● Tobacco use: (age started?)		● Alcohol consumption:			
Diabetes		Seizures									
_____ Patient's Signature						_____ Dental Officer's Signature					
_____ Date						_____ Date					
_____ Patient's Signature						_____ Dental Officer's Signature					
_____ Date						_____ Date					
_____ Patient's Signature						_____ Dental Officer's Signature					
_____ Date						_____ Date					
<b>SUMMARY OF PERTINENT FINDINGS/RECOMMENDED TREATMENT MODIFICATIONS: (Dentist's use only)</b>											
_____											
_____											
<b>PATIENT'S IDENTIFICATION (Use Space for Mechanical Imprint)</b>				<b>Patient's Name (Last, First, Middle initial)</b>				<b>SEX</b>			
<b>DATE OF BIRTH</b>			<b>RELATIONSHIP TO SPONSOR</b>			<b>COMPONENT/STATUS</b>			<b>DEPART/SERVICE</b>		
<b>SPONSOR'S NAME</b>								<b>Rank/Grade</b>			
<b>SSN OR IDENTIFICATION NO.</b>						<b>ORGANIZATION</b>					

NAVMED 6600/3 (Rev. 1-92)

S/N 0105-LF-013-7700

**Figure 2-10.—NAVMED 6600/3, Dental Health Questionnaire.**

## **INSIDE BACK COVER OF DENTAL RECORD JACKET**

On this page of the dental record jacket, place all dental forms listed below in the order given.

1. Record Identifier for Personnel Reliability Program, NAVPERS 5510/1 (if applicable).
2. Current Status Form.
3. Reserve Dental Assessment and Certification Form, NAVMED 6600/12 (if applicable).
4. Most current Dental Treatment Form, EZ603A.
5. Previous Dental Treatment Forms (EZ603As, Old SF603s and 603As) in reverse chronological order.
6. Consultation Sheet, SF 513 (when related to dental treatment).
7. Narrative Summary, SF 502 (when related to dental treatment).
8. Doctor's Progress Notes, SF 509 (when related to dental treatment).
9. Tissue Examination, SF 515 (if required).
10. Request for the Administration of Anesthesia and for Performance of Operations and Other Procedures, SF 522 (if required).

### **ADDITIONAL FORMS**

Under the following conditions, additional dental treatment forms are approved for inclusion in the dental record.

Other health care treatment forms (e.g., Veterans Affairs (VA), Office of Personnel Management (OPM), Compensation Act (CA), Standard Forms (SF), and optional forms (OF), and civilian practitioner forms) not prescribed may be incorporated in the dental record when considered necessary to document care and treatment. The forms shall be filed in the inside back cover of the dental record jacket at the bottom of the last authorized form listed above (e.g., SF 522), numbered forms grouped together with the most recent form placed on top of each previous form.

Pertinent health care information, necessary to document treatment, but not available on authorized forms as listed above, may be filed in the treatment record. When feasible, attach the form to the appropriate approved form (e.g., attach summaries of

reports from civilian practitioners to EZ603 or old SF 603) in the proper sequential order.

## **MAINTENANCE OF THE DENTAL RECORD**

In the previous section, we discussed the NAVMED 6150/21-30 and the various forms associated with the record. Part of your duties as dental receptionist and Dental Technician are to properly maintain the dental treatment records and know how to file and retrieve them. To accomplish this, you must understand the following:

- SSN Number Groups
- Terminal Digit Filing System (TDFS)
- Internal Chargeout Control
- Records review

### **SSN Number Groups**

The nine digits of the SSN are divided into three number groups for ease in reading. This reduces the chance of transposing numbers. For example the SSN 123-45-6789 is visually grouped and read from right to left as follows:

<u>Primary Group</u>	<u>Second Group</u>	<u>Third Group</u>
89	67	123-45

### **Terminal Digit Filing System**

File dental records by SSN, according to a terminal digit, color-coded, and blocked filing system. Under this system, the central files are divided into approximately 100 equal sections, which are identified by a maximum of 100 file guides bearing the 100 primary numbers, 00 consecutively through 99.

Each of these 100 sections contain all records whose terminal primary digits (last two numbers) correspond to the section's primary number. For example, every record with the SSN ending in 89, is filed in section 89.

Within each of these 100 sections, dental records are filed in numerical sequence according to the second group of numbers. For example, SSNs ending with 6789, 5489, and 8889 would be filed in the order 5489, 6789 and 8889.

Centralized files having records based upon more than 200 SSNs, or a file of more that 200 records, may need to use the third group of numbers in filing if



records having the same primary and second group of numbers exist. For example, SSNs ending with 45-6789, 50-6789, and 46-6789 would be filed in the order 45-6789, 46-6789, and 50-6789.

In a properly developed and maintained terminal digit, color-coded and blocked filing system, it is almost impossible to misfile a record. A folder misfiled with respect to the left digit of its primary number, for example an 89 that has been inserted among the 95's, will attract attention because of its different folder color. A folder misfiled with respect to the right digit of its primary number, for example an 89 that has been inserted among the 82's, causes a break in the diagonal pattern formed by the blocking of the black tape that corresponds to the last digit of the SSN in each of the two number scales on the top and sides of the dental record jacket.

When filing dependent records, you will have a "group" of records with the same SSN. In this instance, arrange the records in ascending number order by family prefix code (e.g., 01-, 02-, 03-, 30-).

### Internal Chargeout Control

One of the largest problems a dental command can encounter with dental treatment records are misfiled, lost, or missing records. The personnel who are responsible for the maintenance and upkeep of the records can greatly reduce this incident from occurring by filing the records in the correct order and by using a chargeout form and chargeout guide, which are discussed next.

**CHARGEOUT FORM.**—NAVMED 6150/7, Health Record Receipt (fig. 2-11), should be used for chargeout control of dental records. A receipt is prepared for each dental record established and should be filed in the record. The following should be recorded in each health record receipt when the treatment record is received:

- Patient's name (last, first, middle).
- Sponsor's grade or rate.
- Patient's FMP code and sponsor's SSN.

Ship or station to which sponsor is assigned. Use home address for retired personnel and their family members and for those family members of active duty personnel when the sponsor is assigned duty out of the area.

When a patient checks his or her record out, ensure the date block is filled out and that the member signs

HEALTH RECORD RECEIPT FILE CHARGEOUT AND DISPOSITION RECORD NAVMED 6150/7 (2-74)	
NAME (Last)	(First)
GRADE/RATE	SSN
SHIP/STATION	
RECEIVED FROM	DATE
TRANSFERRED TO	DATE
REMARKS:	
<b>INSTRUCTIONS</b>	
<i>This form is designed for use as a permanent record of receipt and disposition of the HEALTH RECORD.</i>	
(A) For each HEALTH RECORD received, complete lines 1 through 4 and file in the HEALTH RECORD.	
(B) Upon transfer complete line 5 and retain form in permanent files.	
(C) Whenever HEALTH RECORD is temporarily removed from files enter information provided for below and retain form in HEALTH RECORD files.	
<b>FILE CHARGE-OUT</b>	
DATE	RECEIVED BY AND/OR LOCATION
S/N 0105-LF-209-5071 U.S. Government Printing Office: 1986 - 704-002/42121	

Figure 2-11.—NAVMED 6150/7, Health Record Receipt.

his or her name and to what location they are taking the record. The completed chargeout form should be retained in the terminal digit file until the record is returned. Records charged out from the file should be returned as soon as possible after the patient's visit, but not more than 5 working days. Addressees shall develop local procedures for the recovery of delinquent treatment records.

**CHARGEOUT GUIDE.**—If open-shelf filing is used for dental records, a chargeout guide may be used in conjunction with the chargeout form. A chargeout guide is a plastic "folder" with a "pocket." The chargeout form should be placed in the pocket and the chargeout guide placed in the file in place of the

patient's record until the record is returned. By using different colored chargeout guides to denote the day or week that a record is charged out from the file, a quick reference is provided.

## Records Review

Also included in your duties for the upkeep of dental records is records review. You may be responsible to identify inactive records, verify records, and to process dental records that are illegible or contaminated.

**INACTIVE RECORDS.**—Dental records become eligible for retirement because of inactivity. However, allowances will be made for longer sponsor tours of duty, extensions of the sponsor's projected rotation date, and back-to-back tours of duty in the same area. Problems arise as a result of premature retirement of a dental record of a patient who has not requested treatment during the previous 2-year period. Dental records are not retired without an attempt to verify the sponsor's duty status and location. To retire records, you should use MANMED, Article 16-20.

**VERIFICATION OF RECORDS.**—Dental records should be verified for accuracy when transferred, retired, or at other times as directed by the director of the DTF. At these times, records should be reviewed for proper identification, placement of forms, and completion of the record jacket according to MANMED, Chapter 6. Listed below are some of the specifics of record verification procedures that you will look at:

Verify the record with the patient present, if possible.

Cross-check the military patient's name or sponsor's name against a current roster of the patient's or sponsor's last known unit. **This is essential.**

- Verify that the Privacy Act statement has been signed.
- Verify that pencil entries are complete and accurate.
- Verify the treatment plan is current (i.e., the treatment plan is not over 12 months old).
- Appoint the patient for treatment if the patient is dental class 3. Appoint the patient for a T-2 examination if the patient is dental class 1 or 2 and 12 months or more have elapsed since the last T-2 examination.

**ILLEGIBLE OR CONTAMINATED DENTAL RECORDS.**—For individual records, duplicate dental record forms whenever they approach a state of illegibility or deterioration or become contaminated, and the future use or value as permanent records is endangered. The duplicate forms must be a reproduction of the original as much as possible. Enter the designation **DUPLICATE RECORD** on the front of the NAVMED 6150/21-30 above the block Dental Treatment Record when the entire contents of a dental record is duplicated. Use bold writing to make it stand out. When only part of the dental record is duplicated, identify the individual forms as **DUPLICATE** at the bottom of each form. MANMED, Article 16-19 provides further guidance on illegible or contaminated dental records.

**REQUEST FOR MEDICAL/DENTAL RECORDS INFORMATION.**—Occasionally, dental records may be left behind at a members previous duty station. Some commands may elect to mail dental records to the next duty station for personnel who transfer. Whatever the case may be, the Request for Medical/Dental Records or Information Form, DD 877, is used as shown in figure 2-12. The requesting DTF will complete blocks 1 through 10, (except 8b) and block 19. The DTF who receives the DD 877 will retrieve and verify the requested dental record(s) and will complete blocks 8b and blocks 11 through 14 or 15 through 18. The requesting DTF will keep the top copy and the DTF who retrieves the dental record will keep the second copy. Files are set up for the DD 877 and arranged in alphabetical order. The DD 877 is sent via U.S. Mail.


## TRANSFER OF THE DENTAL RECORD

The following procedures are designed to protect against loss or misfiling of the dental record during transfer between treatment facilities without jeopardizing the interest of the individual or the federal government.

### Temporary Transfers, Active Duty

When a dental record is transferred temporarily to another activity (e.g., for consultation or specialty treatment), follow the procedures discussed in the internal chargeout control section in this chapter.

**HANDCARRYING PERSONAL DENTAL RECORD.**—Patients frequently handcarry their dental records when they have an appointment external to the record keeping DTF. If resources and time

REQUEST FOR MEDICAL/DENTAL RECORDS OR INFORMATION		REQUESTING ACTIVITY - Complete Items 1 through 10 (Except 8b); also complete Item 19.	DATE																																												
1. PATIENT (Last Name - First Name - Middle Name)		ADDRESSEE - Complete Items 8b, 11 to 14 or 15 to 18, as appropriate, final referrer shall return to requester.																																													
2. ORGANIZATION AND PLACE OF TREATMENT		3. STATUS <input type="checkbox"/> MILITARY <input type="checkbox"/> VA BENEFICIARY <input type="checkbox"/> DEPENDENT <input type="checkbox"/> FEDERAL EMPLOYEE <input type="checkbox"/> OTHER (Specify)																																													
		3a. NAME OF SPONSOR (If dependent)																																													
4. TO (Include ZIP Code)		5. IDENTIFYING INFORMATION																																													
		a. SERVICE NUMBER																																													
		b. GRADE/RATE																																													
		c. SOCIAL SECURITY ACCOUNT NO.																																													
		d. VA CLAIM NUMBER																																													
		e. DATE OF BIRTH (If Federal employee)																																													
6. DATES OF TREATMENT (Inclusive)		7. DISEASE OR INJURY																																													
8. a. RECORDS REQUESTED		9. REMARKS																																													
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**DD FORM 877**  
1 SEPT 67

REPLACES EDITION OF 1 JAN. 50.  
WHICH MAY BE USED.

S/N 0102-LF-008-6601

DTB1f0212

Figure 2-12.—Request for Medical/Dental Records or Information, DD Form 877.

permit, however, the record should be delivered to the consulting provider with instructions to return it the same way. Do not jeopardize patient care or unnecessarily inconvenience the patient.

**HANDCARRYING FAMILY MEMBER'S DENTAL RECORD.**—When an adult patient's dental record is handcarried by someone other than the patient (spouse or an adult family member), release of the record must be authorized by the patient. Dental records of minor children may be released to the parent, sponsor, spouse, other adult family member, or the child's legal guardian. In divorce cases, a child's dental record may only be released to the parent who has been awarded custody of the child by a court order.

**COPIES OF DENTAL RECORDS.**—Excerpts from or copies of dental records for the patient may be approved by the treating dentist or DTF director.

### **Permanent Transfer to Ships or Stations**

At the time of patient checkout from the DTF, personnel that are responsible for the release of dental records will ensure the following steps are completed. Further guidance for permanent transfers is found in MANMED, chapter 16.

- If no dental record exists, construct a new dental record following the instructions in this chapter and MANMED. Have a dentist perform a T-2 dental examination.
- Verify dental record.
- Ensure patient has been processed for transfer.
- Complete dental record chargeout.
- Allow active duty members to handcarry their dental record, unless the DTF or member's command determines it is not in the Navy's or members's interest to do so. If the dental record is not to be handcarried, forward it via certified mail along with a DD Form 877, Request for Medical/Dental Records Information, or place dental record in the custody of authorized personnel.

### **Temporary Dental Records**

In certain cases, a DTF may require the establishment of a temporary dental record, in addition to the patient's permanent dental record. Temporary records are required to ensure the timely availability of information that documents a current course of treatment for a patient being seen in the DTF. An

example is a military member on temporary additional duty (TAD) without his or her dental record who requires emergency dental treatment.

**CUSTODY OF TEMPORARY DENTAL RECORD.**—The temporary dental record is maintained by the DTF providing the current course of treatment. When the treatment is complete or when the patient returns to the location of the permanent dental record, the patient may handcarry the record or the custodian of the temporary record must forward it to the custodian of the permanent record.

**CONSTRUCTION OF TEMPORARY DENTAL RECORD.**—The temporary dental record must, at a minimum contain the following:

- Privacy Act Statement, DD 2005
- Dental Health Questionnaire, NAVMED 6600/3
- Dental Treatment Form, EZ603A

If a dental record jacket is not used, care must be taken to securely fasten any radiographs to the forms comprising the temporary dental record.

**DISPOSITION OF TEMPORARY DENTAL RECORD.**—As soon as possible, the temporary dental record must be merged with the permanent dental record including all forms except the Privacy Act Statement. An entry must be made in the permanent dental record's most current dental treatment form that the merger has occurred.

**LOOSE TREATMENT FORMS.**—When loose treatment forms are discovered, every effort should be made to determine the present location of the dental record. If reasonable search efforts do not locate the dental record, retain loose treatment forms for a period of 1 year. Upon expiration of the retention period, destroy the forms locally according to paragraph six of the standard identification code 6150 contained in SECNAVINST 5212.5.

### **RETIREMENT OF THE DENTAL RECORD**

Dental records should be verified and retired as instructed in the section "Inactive Records" in this chapter. Records should be retired to the National Personnel Records Center, Military Personnel Records, St. Louis, Missouri.

### **RELEASE OF INFORMATION**

Information in the dental record is personal and is considered privileged. Treatment records should not

be released to any person or organization in a manner that will compromise the interest of the individual or the government. All record disclosures should be documented with entries in the Disclosure Accounting Record imprinted on the back of the center page of the NAVMED 6150/21-30.

### **SUPPLY PROCEDURES**

A competent dental assistant can increase the efficiency, productivity, and reduce the operational cost in a dental treatment room (DTR) by using proper supply procedures. It costs time and money to run out of necessary supplies. It is also wasteful and expensive to order and store items that are never used.

You will use a supply catalog to order supplies. Some facilities make up a catalog for local use, listing frequently ordered items. To order an item, look it up in the catalog and fill out the appropriate “request for issue” form. These forms may vary slightly in format but they all require the same basic information. It is important that you fill out the form accurately and completely. It is important to know the nomenclature, identification, and distribution data.

When your supplies arrive, check the items against your order form to ensure you receive the items and quantities that you ordered. Also check broken seals or loose parts. If you discover anything out of the ordinary, notify your supervisor. After supplies have been checked, store them in a manner consistent with the manufacturer’s instructions to prevent spoilage or damage.



# HEAD AND NECK ANATOMY

Basic knowledge of the skull, facial bones, jaws, and muscles of the head and neck region are fundamental for a Dental Technician. It is important to understand the relationship of the bones and muscles as they work together to provide support for the dentition (teeth) and movement for mastication (chewing).

## STRUCTURE OF BONE

The bones of the human skeleton provide rigid support for muscles and skin, and serve to protect the easily injured organ systems of the body. Bone itself is a living, highly vascular tissue, which is made up of both inorganic (minerals) and organic (cells & connective tissue fiber) elements. The inorganic component of bone serves as a warehouse for calcium and phosphorous, two essential minerals for the body.

Bone consists of a hard outer shell called cortical or compact bone and an inner spongy, porous portion referred to as cancellous bone (fig. 3-1). Within this cancellous area are the bone marrow spaces responsible for manufacturing blood cells. The majority of blood cells are made by the bone marrow found in the long bones, such as the femur or thigh bone.

A thin layer of connective tissue, called periosteum, surrounds each bone and provides nourishment through many vascular vessels. The periosteum also contains many nerve endings that respond to trauma with the sensation of pain. When a bone breaks, it is the periosteum that hurts, not the bone itself. When new bone is required, such as when a break occurs, it is the periosteum which provides the cells that make the new bone.

Bone can be classified as to how it develops, its location, and its shape. Membraneous bone forms from the periosteum in successive layers and is usually flat such as those of the skull. The long bones of the arms and legs are cartilaginous bones, which develop from cartilage.

## BONES OF THE SKULL

The skull consists of 28 bones that form the framework of the head and provide protection for the

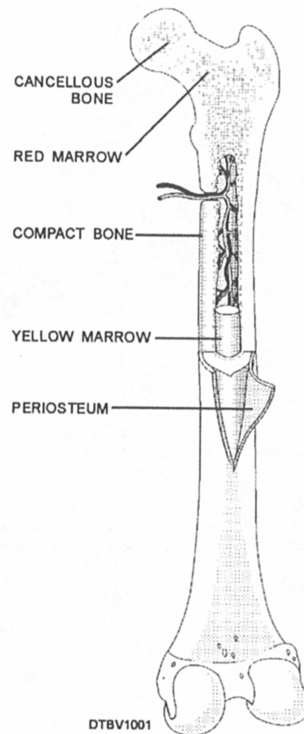


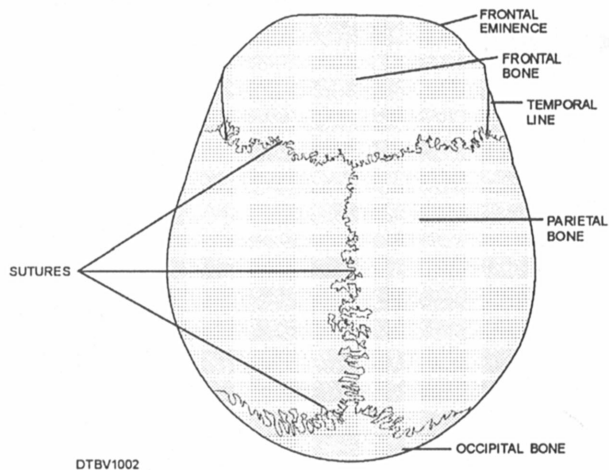
Figure 3-1.—Structure of a typical flat bone.

brain, eyes, and ears. It can be divided into two parts: the cranium and the bones of the face. The cranium is primarily involved in housing and protecting the brain. The bones of the face are a complex framework that helps to form facial features, the upper jaw (maxilla) and lower jaw (mandible). With the exception of the mandible and the bones of the inner ear, all skull bones are joined together firmly along seams called sutures. An example of sutures is shown in figure 3-2. Sutures are sometimes considered immovable; however, they do permit a small amount of movement and provide mechanical protection for the brain by absorbing much of the force if a blow to the head occurs.

The cranium is formed by eight cranial bones, which form the foundation for attachment of many of the muscles necessary for head movements and chewing. Figure 3-3 show the cranial bones, and Table 3-1 lists them as either single or paired bones.

## Frontal Bone

The frontal bone forms the front part of the skull above the eyes, which includes the forehead and part of



**Figure 3-2.—Sutures of a skull.**

**Table 3-1.—Bones of the Cranium**

Single Bones	Paired Bones
Occipital	Parietal
Frontal	Temporal
Sphenoid	
Ethmoid	

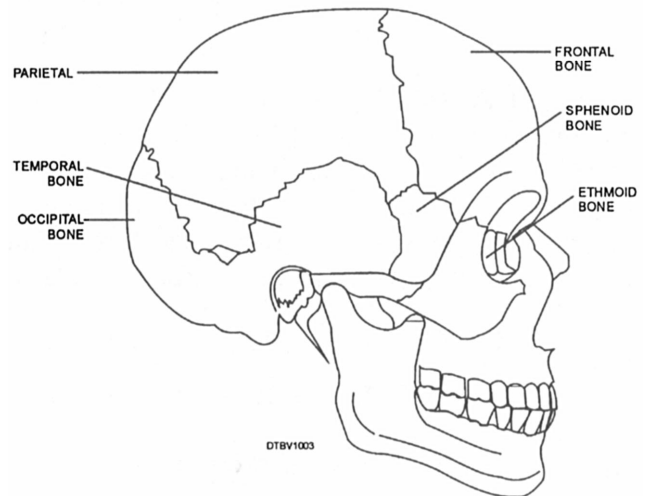
the nasal cavity. In children, the frontal bone develops as two parts. They are usually fused together by age 5 or 6. The two frontal sinuses (air spaces in the bone) are located above each eye socket.

### Parietal Bones

The two parietal bones are located behind the frontal bone. These bones form the greater part of the right and left sides and the roof of the skull. They each have four borders and are shaped like a curved plate.

### Temporal Bones

The temporal bones form the sides and part of the base of the skull in the area of the ear. One temporal bone is located on each side of the head. It is readily recognized as “fan-shaped.” Each encloses the internal ear structures and have depressions called glenoid fossae that forms the articulation with the mandible.

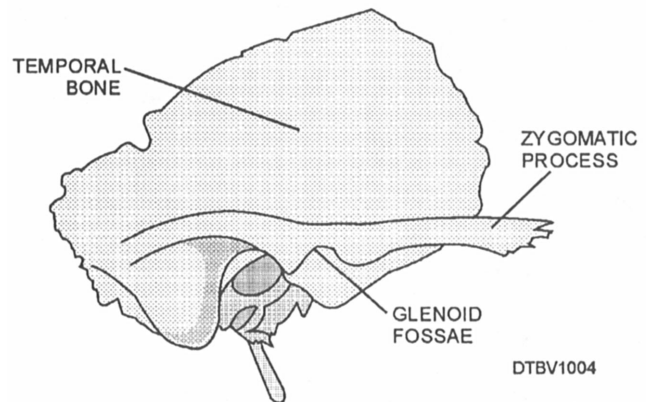


**Figure 3-3.—Cranial bones.**

The zygomatic process of the temporal bone projects out into the zygomatic bone of the face and forms the lateral part of the zygomatic arch. Both the glenoid fossae and zygomatic process can be seen in figure 3-4.

### Occipital Bone

The occipital bone forms the back part of the skull and the base of the cranium. It joins with the parietal and temporal bones. In the center, underside (inferior) portion of the cranium, there is a large opening called the foramen magnum (fig. 3-5), through which nerve fibers from the brain pass and enter into the spinal cord.



**Figure 3-4.—Temporal bone.**



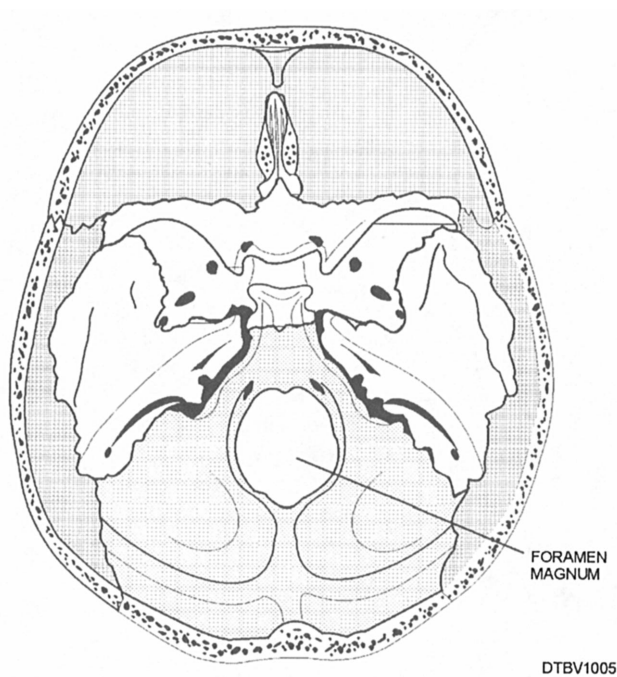


Figure 3-5.—Foramen magnum of cranial cavity viewed from above.

The occipital bone is an irregular, four-sided bone that is somewhat curved upon itself.

### Sphenoid Bone

The sphenoid bone has a wing-like shape and is internally wedged between several other bones in the front part of the cranium (fig. 3-6). This bone assists with the formation of the base of the cranium, the sides of the skull, and the floors and sides of the orbits.

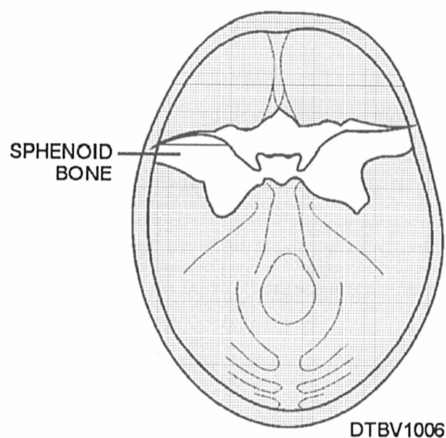


Figure 3-6.—Sphenoid bone viewed from above.

### Ethmoid Bone

The ethmoid bone is situated in front of the sphenoid bone in the front part of the cranium (fig. 3-7). Through small openings in this bone pass nerves to the roof of the mouth that are responsible for sense of smell.

### BONES OF THE FACE

The facial skeleton consists of 14 stationary bones and a mobile lower jawbone (mandible). These 14 bones (table 3-2) form the basic shape of the face, and are responsible for providing attachments for muscles that make the jaw move and control facial expressions. Figures 3-8 and 3-9 show the bones of the face.

### Maxillae Bones

The maxillae bones are the largest bones of the face and together form the upper jaw. The maxilla (singular) consists of a body and four processes: zygomatic, frontal, alveolar and palatine. The maxilla forms the hard palate, floor of the nose, part of the orbits (eye sockets), and the tooth sockets of the upper teeth. Above the roots of the upper teeth and below the

Table 3-2.—Bones of the Face

Single bones	Paired bones
Vomer	Maxillary
Mandible	Palatine
	Zygomatic
	Lacrimal
	Nasal
	Inferior nasal conchae

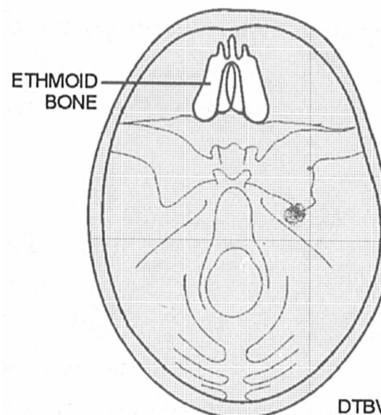
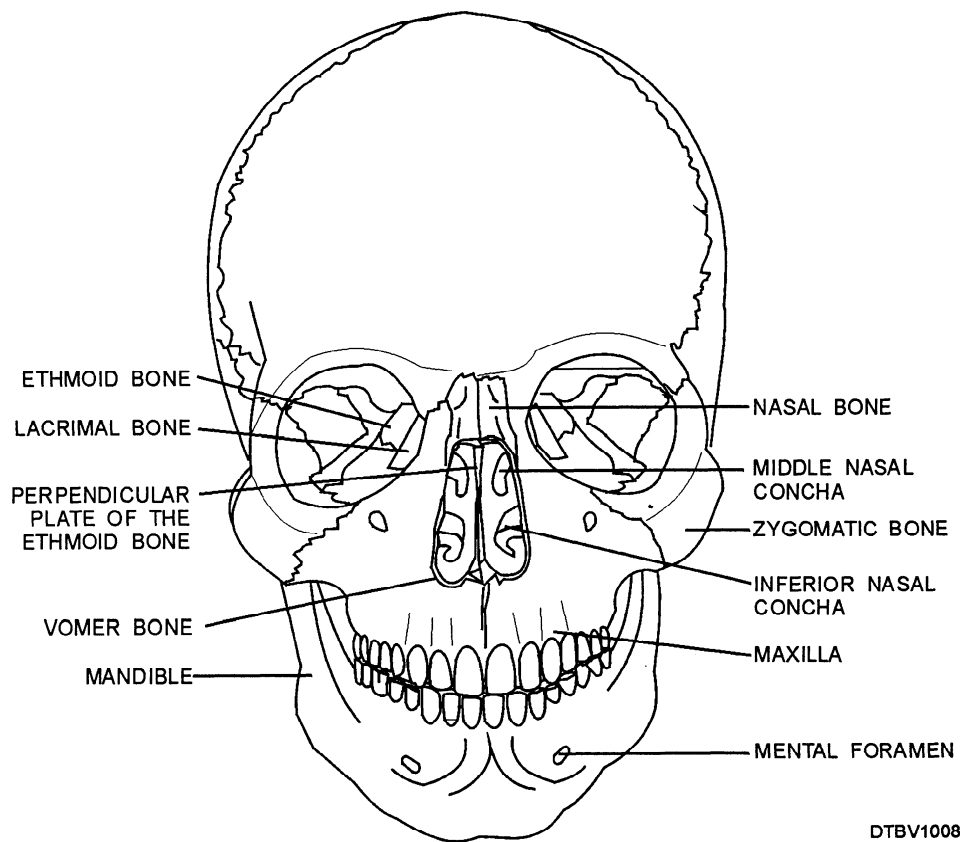
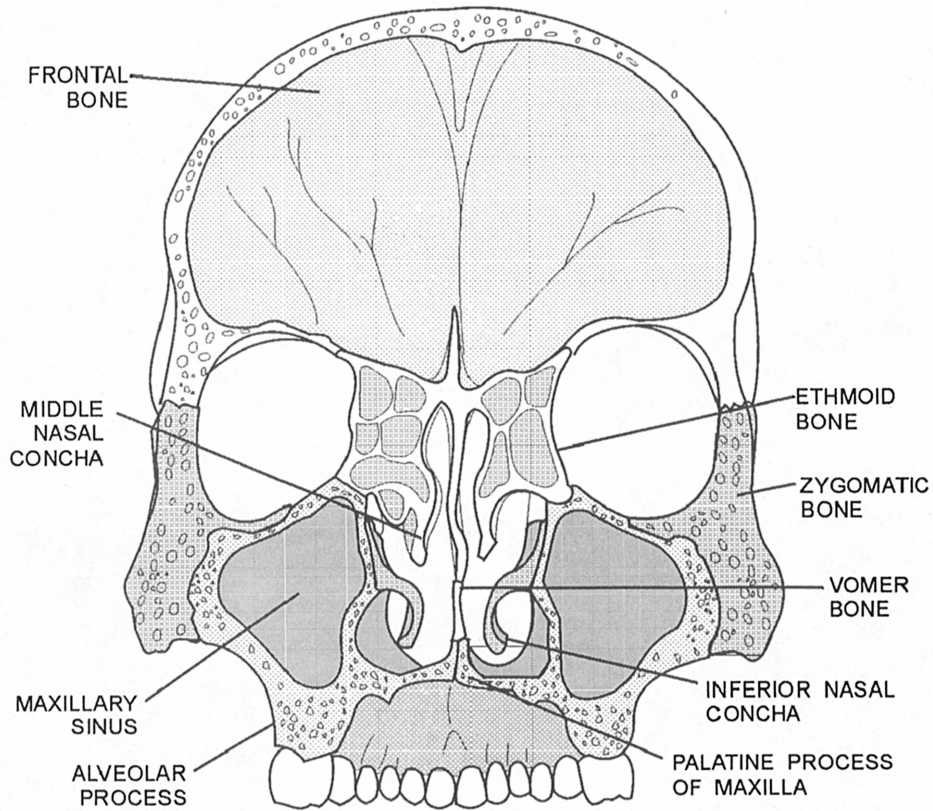


Figure 3-7.—Ethmoid bone viewed from above.



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Figure 3-8.—Anterior view of facial skeleton.



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Figure 3-9.—Posterior view of facial skeleton.

floor of the orbits are the maxillary sinuses; the largest of the sinuses.

### Palatine Bones

The palatine bones are located behind the maxillae (fig. 3-10). The bones are somewhat L-shaped and form the posterior portion of the hard palate and the floor of the nose. Anteriorly, they join with the maxillary bone.

### Zygomatic Bones (Zygoma, Malar Bone)

The zygomatic bones make up the prominence of the cheeks and extend from the zygomatic process of the temporal bone to the zygomatic process of the maxilla. The zygomatic bones form the “cheek bones” and help to form the sides and floor of the orbits.

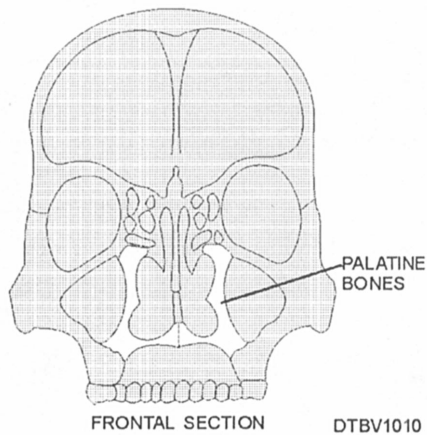


Figure 3-10.—Anterior view of palatine bones.

### Lacrimal Bones

The lacrimal bones are the smallest and most fragile of the cranial bones. These thin, scalelike structures are located in back of the frontal process of the maxilla.

### Nasal Bones

The nasal bones are small oblong bones somewhat rectangular in shape. They lie side by side and are fused at the midline to form the bridge of the nose (nasal septum). These bones are responsible for the shape of the nose.

### Inferior Nasal Conchae

The inferior nasal conchae are curved, fragile, scroll-shaped bones that lie in the lateral walls of the nasal cavity. They provide support for mucous membranes within the nasal cavity.

### Vomer Bone

The vomer bone is a thin, flat, single bone almost trapezoid in shape. It connects with the ethmoid bone and together they form the nasal septum.

### Mandible

The mandible (lower jaw-bone) is the longest, strongest, and the only movable bone in the skull. Figure 3-11 illustrates the anatomy of the mandible.

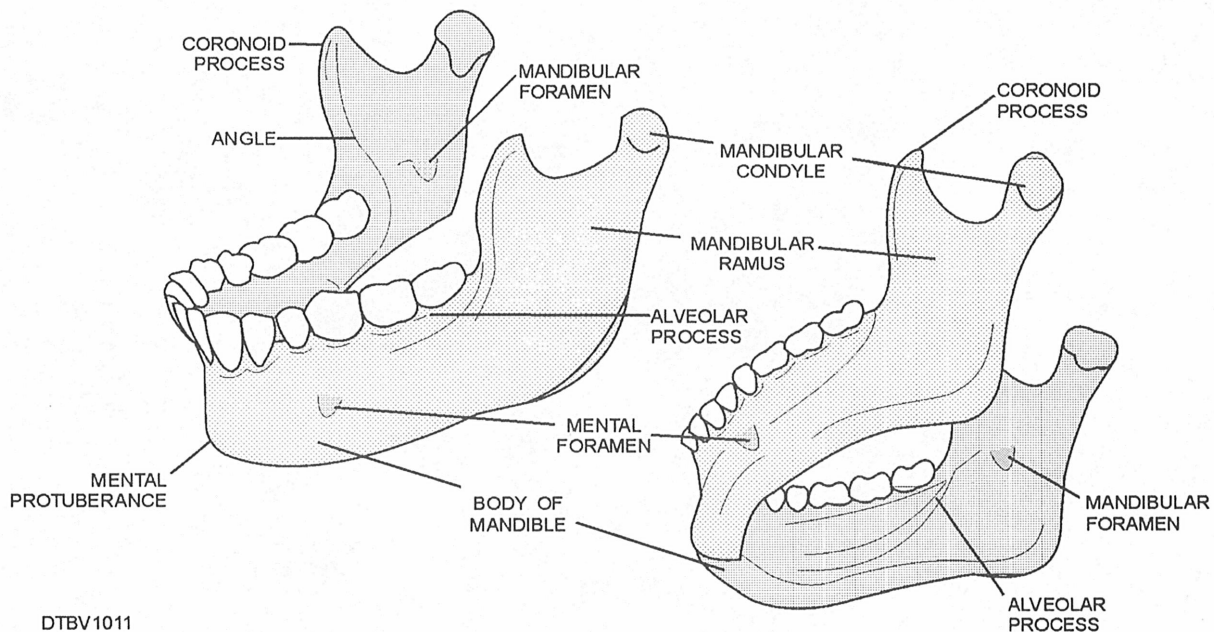


Figure 3-11.—Anatomy of the mandible; lateral view (left), inferior view (right).

The mandible is horseshoe-shaped, with an upward sloping portion at each end called the ramus. The rami are divided into two different processes:

- Condylod process—Also called mandibular condyle, located posterior on the ramus and forms the head of the mandible. It is knuckle-shaped, and articulates in the glenoid fossa of the temporal bone to form the temporal mandibular joint.
- Coronoid process—Located anterior of the condyle, and provides attachment for the temporal's muscle, which helps lift the mandible to close the mouth.

Other important anatomical landmarks of the mandible you should be able to recognize are as follows:

- Alveolar process—Supports the teeth of the mandibular arch.
- Mental protuberance—Also referred to as the chin and is located at the midline of the mandible.
- Mental foramen—Located on the facial surfaces of the mandible on both the right and left sides, just below the second premolars. This opening contains the mental nerve and blood vessels.
- Body—The heavy, horizontal portion of the mandible below the mental foramen extending from the angle to the parasymphysis region.

- Angle—Juncture where the body of the mandible meets with the ramus.

- Mandibular foramen—Located near the center of each ramus on the medial side (inside), through this opening passes blood vessels and the inferior alveolar nerve, which supply the roots of the mandibular teeth. This is a common area where the dental officer will inject anesthetic to block the nerve impulses and make the teeth on that side insensitive (numb).

## BONES OF THE EAR

In each middle ear and located in the auditory ossicles are three small bones named the malleus, incus, and stapes (fig. 3-12). Their function is to transmit and amplify vibrations to the ear drum and inner ear.

## TEMPORAL MANDIBULAR JOINT

The right and left temporal mandibular joints (TMJs) are formed by the articulation of the temporal bone and the mandible. This is where TMJs connect with the rest of the skull. Figure 3-13 illustrates the TMJ.

The mandible is joined to the cranium by ligaments of the temporal mandibular joint (fig. 3-14).

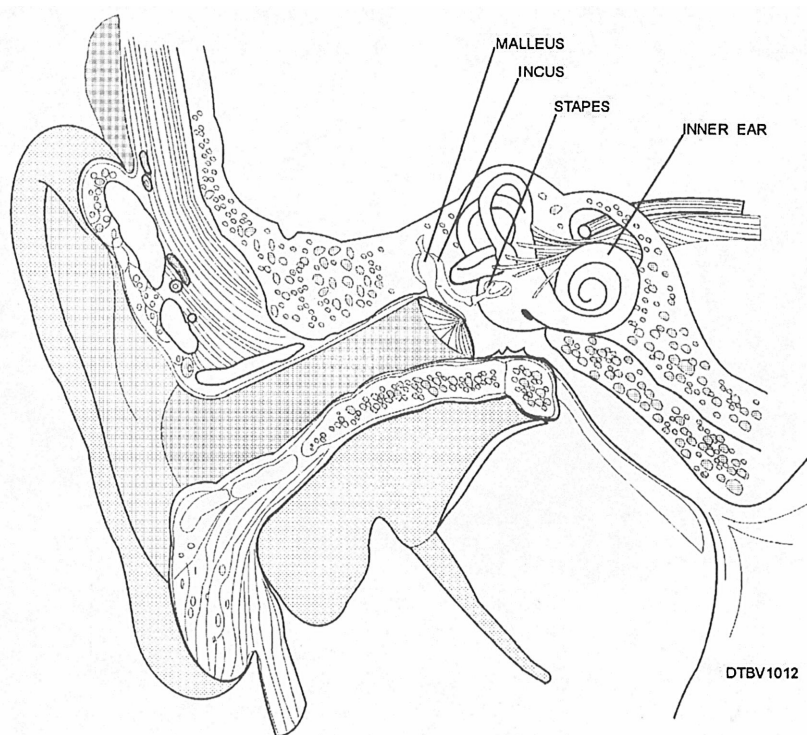
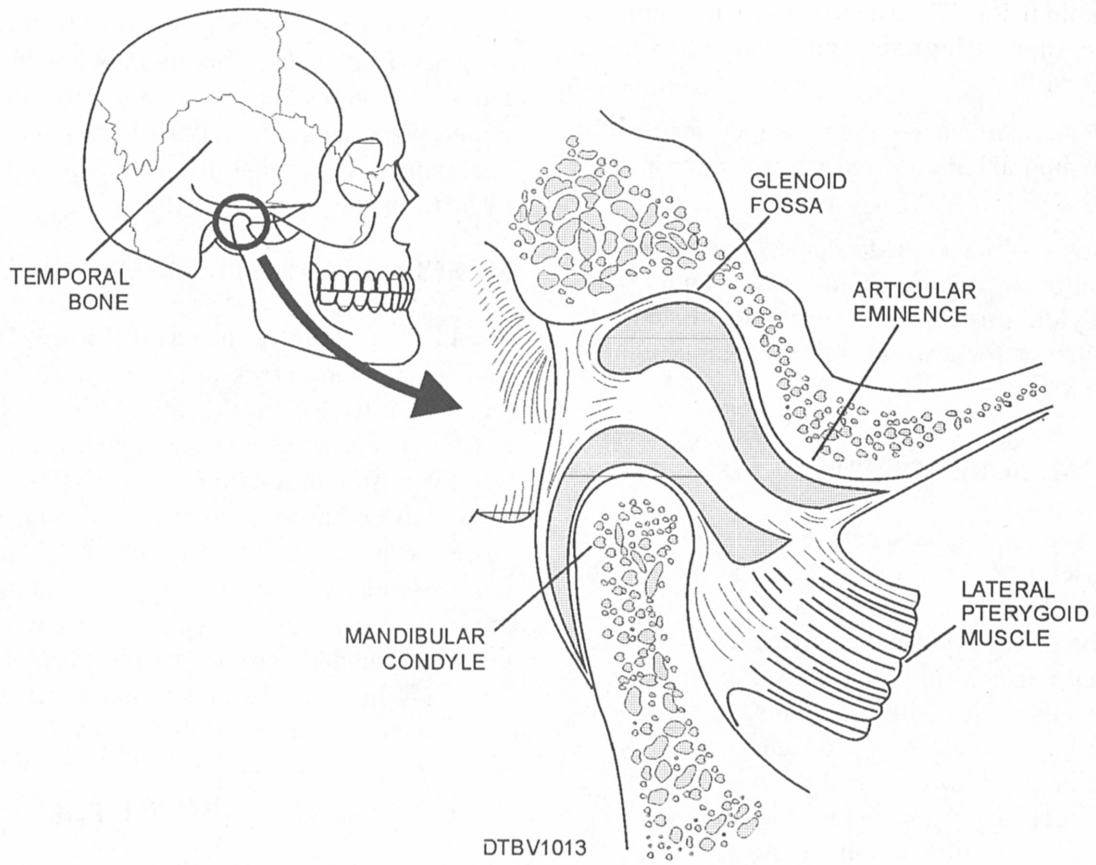
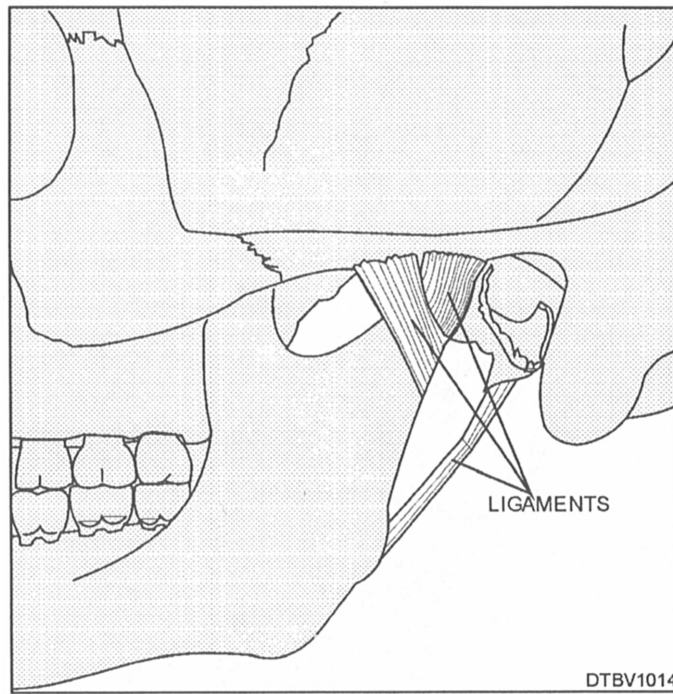


Figure 3-12.—Anatomy of the middle ear.



**Figure 3-13.—Temporal mandibular joint.**



**Figure 3-14.—Ligaments of a temporal mandibular joint.**

The TMJ consists of three bony parts:

- Glenoid fossa—Oval depression in the temporal bone that articulates with the mandibular condyle.
- Articular eminence—Ramp-shaped segment of the temporal bone located anterior to the glenoid fossa.
- Condyle—The knuckle-shaped portion of the mandibular ramus found on the end of the condyloid process. It is positioned underneath the glenoid fossa and makes up the hinge joint of the TMJ.

### MUSCLES OF THE HEAD

The muscles of the head can be classified into two groups, muscles of facial expression and muscles of mastication. How muscles work and function depends on the action of each muscle (movement), the type of joint it is associated with, and the way the muscle is attached on either side of the joint. Muscles are usually attached to two places: one end being joined to an immovable or fixed portion, and the other end being joined to a movable portion on the other side of a joint. The immovable portion is called the origin of the muscle, and the movable portion is called the insertion. When muscles of the head contract, the insertion end is pulled toward the origin.

### MUSCLES OF FACIAL EXPRESSION

The muscles that are underneath the skin of the face are responsible for helping communicate our feelings through facial expression. The muscles of the mouth help us express surprise, sadness, anger, fear, and pain. Table 3-3 lists the muscles of facial expression and figure 3-15 illustrates these muscles.

### MUSCLES OF MASTICATION

*Mastication* is defined as the process of chewing food in preparation for swallowing and digestion. Four pairs of muscles in the mandible make chewing movements possible. These muscles can be grouped into two different functions. The first group includes three pairs of muscles that elevate the mandible to close the mouth as in biting down. The last group includes one pair that can depress the mandible (open the mouth), make grinding actions side to side, and can make the mandible go forward in a protruding motion. Table 3-4 lists the muscles of mastication and figure 3-16 illustrates these muscles.

### ORAL STRUCTURES OF THE MOUTH

The oral cavity (mouth) contains various structures that aid in the digestion process of food and also serves as an organ of speech and sensory

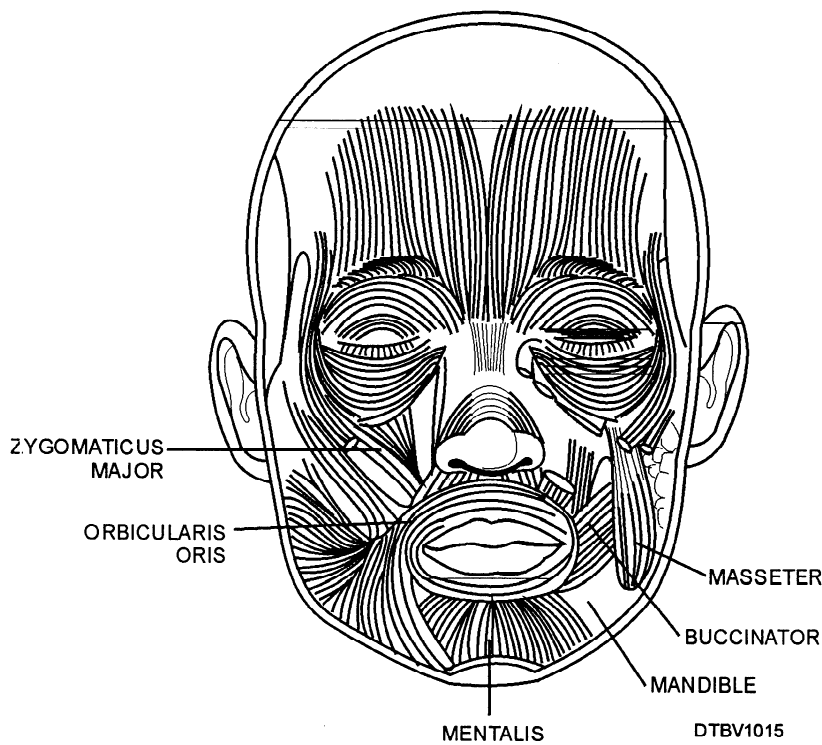
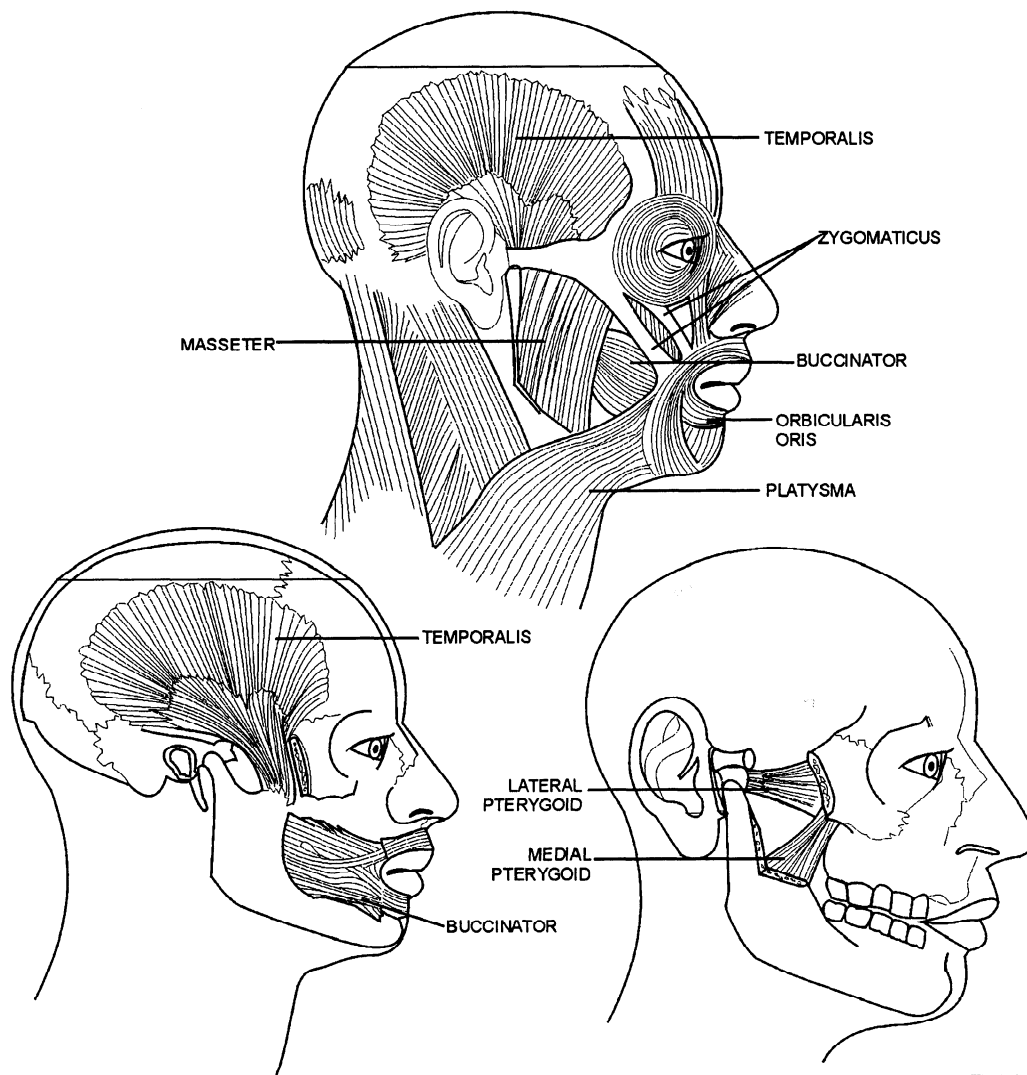


Figure 3-15.—Anatomy of muscles of facial expression.



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Figure 3-16.—Muscle anatomy of mastication.

Table 3-3.—Muscles of Facial Expression

Muscle	Origin	Insertion	Description
Orbicularis oris	Encircles the mouth (no attachment to bone)	Corners of the mouth	Located between the skin and mucous membranes of the lips. Makes lips close and pucker.
Buccinator	Alveolar process of maxilla and mandible	Orbicularis oris at the corner of the mouth	Located in the walls of the cheeks, holds food in contact with teeth when chewing, and assists in blowing air out of the mouth.
Mentalis	Mandible	Skin of chin	Raises and wrinkles the skin of the chin and decreases and protrudes the lower lip.
Zygomaticus Major	Zygomatic bone	Orbicularis oris (angle of the mouth)	Raises the corner of the mouth when smiling.

**Table 3-4.—Muscles of Mastication**

<b>Muscle</b>	<b>Origin</b>	<b>Insertion</b>	<b>Description</b>
Masseter	Zygomatic arch	Mandible (external surface)	Closes jaw; flat, thick muscle
Temporalis	Temporal bone	Coronoid process at the anterior border of the ramus	Closes jaw; fan-shaped
Medial pterygoid	Sphenoid, palatine, and maxillary bones	Inner (medial) surface of the ramus	Closes jaw; parallels masseter muscle
Lateral pterygoid	Sphenoid bone	Anterior surface of mandibular condyle	Opens jaw; allows grinding action side to side, and protrudes the mandible

reception. We receive food in the mouth, reducing it in size, and mixing it with saliva for the digestion process.

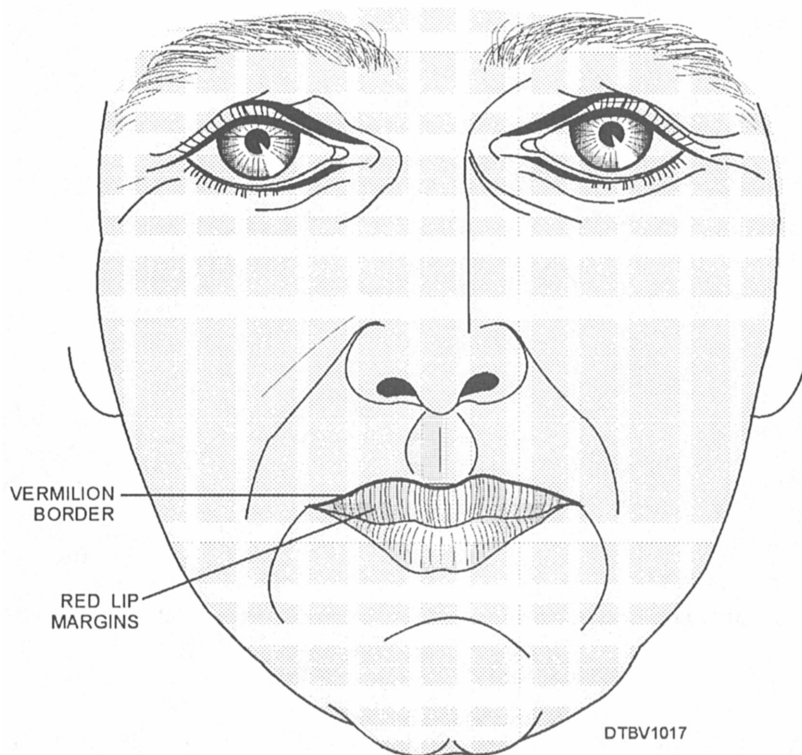
### **CHEEKS**

The cheeks are the side walls of the mouth. They are made up of layers of skin, a moist inner lining called mucosa, fat tissue, and certain muscles. The buccinator muscle of the cheeks prevents food from escaping the chewing action of the teeth.

### **LIPS**

The lips are covered externally by skin and internally by the same mucous membranes that line the oral cavity. They form the anterior border of the mouth. The area of the external lips where the red mucous membrane ends and normal outside skin of the face begins is known as the vermilion border. Figure 3-17 illustrates the anatomy of the lips.

The lips are very sensitive and act as sensory receptors, allowing food and liquids to be placed in the



**Figure 3-17.—Anatomy of the lips.**



mouth but guarding the oral cavity against the ingestion of excessively hot or cold substances. They also provide a seal for the mouth to keep food and saliva from escaping. The lips help to maintain the position of the teeth and are very important in speech.

## TONGUE

The tongue (fig. 3-18) is a vascular, thick solid mass of voluntary muscle surrounded by a mucous membrane (epithelium tissue). Located on the underneath side of the tongue is the lingual frenulum, which anchors the tongue in the midline to the floor of the mouth. The tip of the tongue is free moving and can readily change size, shape, and position.

### Surface (Dorsal Aspect)

On the surface of the tongue are rough projections called papillae. They provide the tongue with friction in handling food and also act as taste buds.

### Taste Buds

The four types of taste sensations are sweet, sour, bitter, and salty—all resulting from stimulation of the taste buds. Most are located on the tongue and the roof of the mouth. Figure 3-19 illustrates taste buds of the tongue.

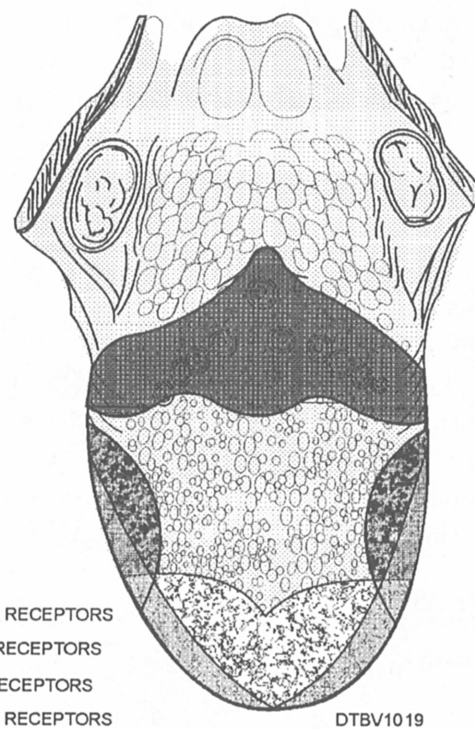


Figure 3-19.—Taste buds of the tongue.

## Tongue and Digestion

The tongue is an important muscle in the chewing process. It crushes food against the palate; it deposits food between the chewing surfaces of the teeth for

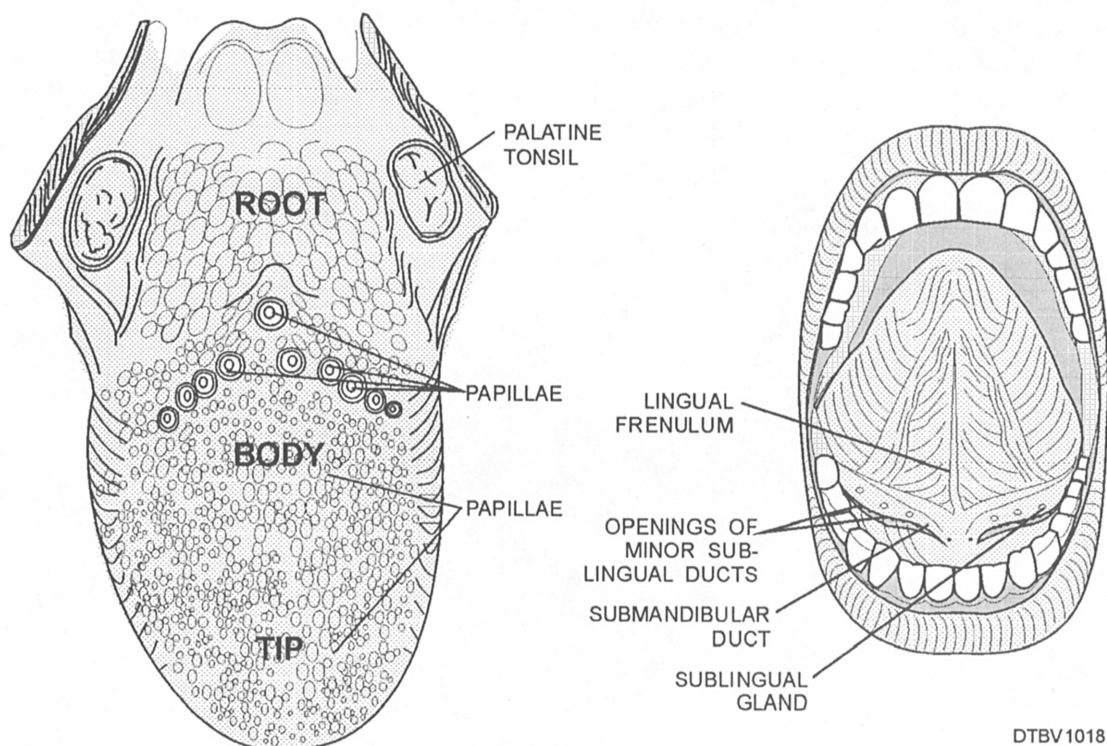


Figure 3-18.—Dorsal aspect of tongue (left), anatomy floor of mouth (right).

mastication; it transfers food from one area of the mouth to another; it mixes food with saliva, which assists in the digestive process; assists in swallowing; and cleans the mouth of residue.

## MYLOHYOID AND GENIOHYOID

The mylohyoid muscles anatomically and functionally form the floor of the mouth (fig. 3-20). They elevate the tongue and depress the mandible. Their origin is the mandible and insertion is the upper border of the hyoid bone. The geniohyoid muscles are found next to each other, on each side of the midline, directly on top of the mylohyoid muscle. They have the same origin and function as the mylohyoid muscle.

## PALATE

The palate (fig. 3-21) forms the roof of the mouth and is divided into two sections:

- **Hard palate**—This section is formed by the palatine process of the maxillary bones and is located in the anterior portion of the roof of the mouth. It has irregular ridges or folds behind the central incisors called rugae.
- **Soft palate**—This section forms a soft muscular arch in the posterior part of the palate. The uvula is located on the back portion of the soft palate. When you swallow, the uvula is drawn upward and backward by the muscles of the soft palate. This process blocks the opening between the nasal cavity and pharynx, not

allowing food to enter the nasal cavity. The soft palate must function properly to allow good speech quality.

Located in the posterior part of the mouth, on both sides of the tongue, are two masses of lymphatic tissue called the palatine tonsils. They assist the body to protect against infections.

## TEETH

The teeth are located in the alveolar process of the maxillae and the mandible. They serve important functions of tearing and masticating food, assisting in swallowing, speaking, and in appearance. The health of the teeth affects the health of the entire body.

## SALIVARY GLANDS

The functions of the three major salivary glands are to keep the lining of our mouths moist, and to bond with food particles creating a lubricant effect that assists in the swallowing process of food. It acts as a cleaning agent to wash away food particles that accumulate in the mouth and on the teeth. Figure 3-22 illustrates the salivary glands.

The salivary glands produce two to three pints of saliva daily, which greatly aids in the digestion process.

Enzymes are present in saliva, they act on food, and start the breakdown process. In dentistry, knowing exactly where the saliva glands and ducts (openings) are located is important in keeping the mouth dry

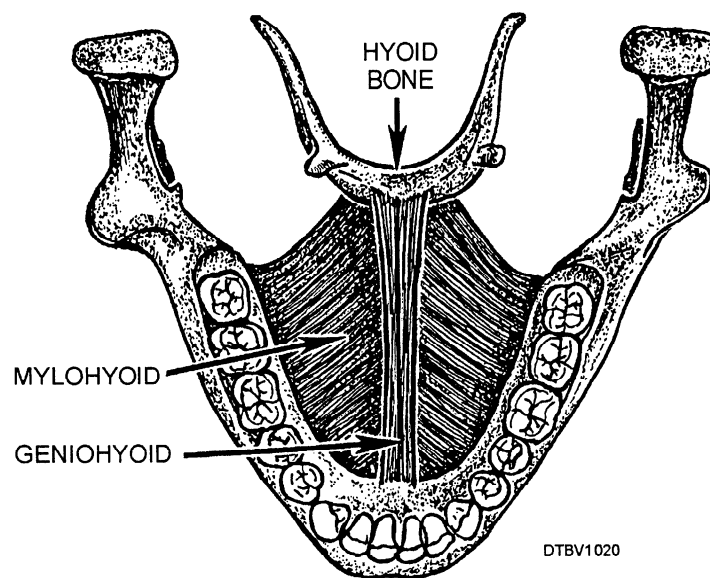


Figure 3-20.—Mylohyoid and geniohyoid muscles.

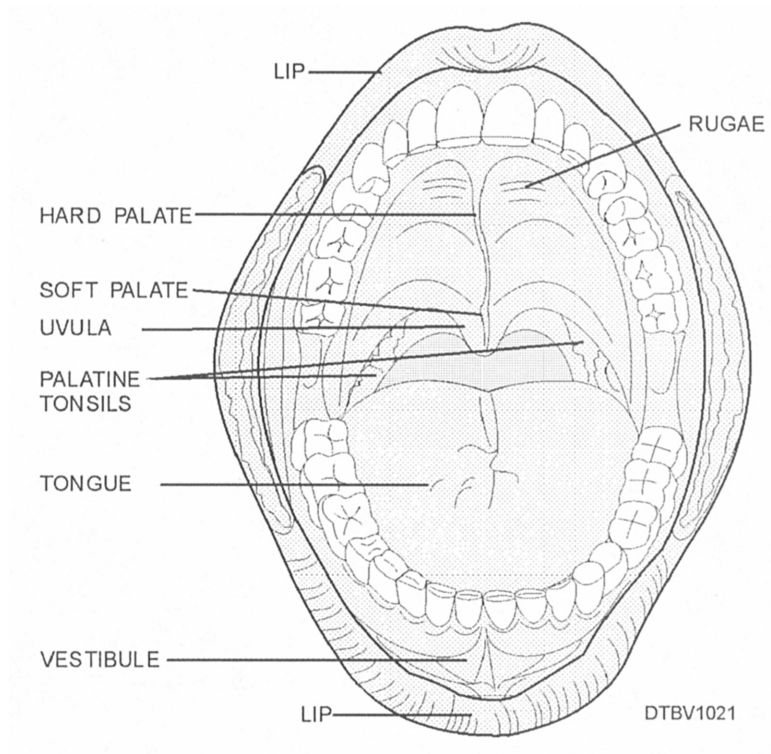


Figure 3-21.—Anatomy of the palate.

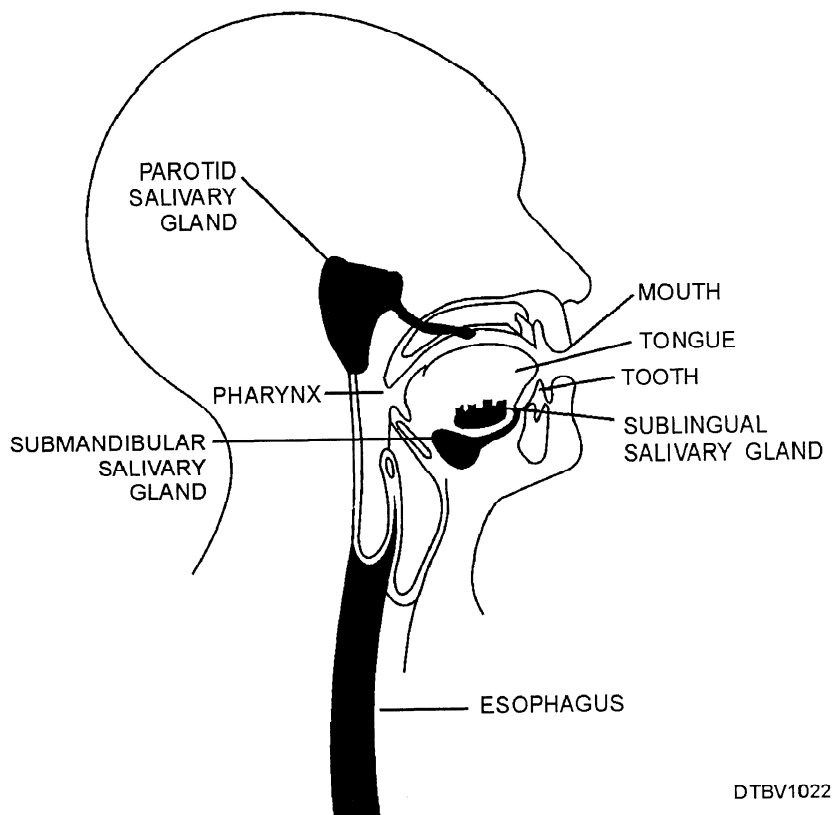


Figure 3-22.—Salivary glands.

during certain dental procedures. Table 3-5 lists the three major salivary glands.

### MASTICATION AND DEGLUTITION

The mastication process includes the biting and tearing of food into manageable pieces. This usually involves using the incisors and cuspid teeth. The grinding of food is usually performed by the molars and premolars. During the mastication process, food is moistened and mixed with saliva.

Deglutition is the swallowing of food and involves a complex and coordinated process. It is divided into three phases; the first phase of swallowing is voluntarily; phases two and three are involuntary.

- Phase one: the collection and swallowing of masticated food.
- Phase two: passage of food through the pharynx into the beginning of the esophagus.
- Phase three: the passage of food into the stomach.

**Table 3-5.—List of the Three Major Salivary Glands**

<b>Gland</b>	<b>Location</b>	<b>Duct</b>	<b>Description</b>
Sublingual	On each side underneath the tongue, in the floor of the mouth	Multiple separate ducts	Smallest of salivary glands, secretes, thick stringy mucus.
Submandibular	Posterior portion of mandible, lingual to mandibular incisors	Opens under the tongue, close to the frenulum	Walnut sized. Secretes watery fluid with some mucus. More viscous (thick) than parotid secretion.
Parotid	Inside cheek, opposite maxillary second molar	Parotid ducts go through the buccinator muscles and enter the mouth opposite maxillary second molars	Largest of salivary glands. Secretes clear watery fluid.

## CHAPTER 4

# ORAL ANATOMY

This chapter covers the oral anatomy and physiology of the teeth, the histology of their tissues and supporting structures, and concentrates on the external features of the teeth. To understand the material in this section, you must become familiar with the terms used to describe the external features of the teeth. In addition, you must know the numbering system by which the teeth are identified on the standard dental chart used by the armed services. As a basic dental assistant, you must be aware that teeth differ in size, shape, and other characteristics from one person to another. Such knowledge will be useful to you when you fill in dental charts, expose radiographs, clean teeth, and assist in all phases of dentistry throughout your career.

### FORMATION PERIOD

As all living things are forming, they go through a developmental process to reach maturity or a final outcome. When teeth are in the odontogenesis phase (tooth formation), every tooth goes through three developmental processes. They are categorized into the growth, calcification, and eruption periods (illustrated in figure 4-1). The term *emergence* is used to describe the tooth as it is breaking through the gingival tissue.

### GROWTH PERIOD

Dental development usually begins in the fifth or sixth week of prenatal life. By the seventh week, skin cells of the mouth called epithelium thicken along the ridge of the developing jaws creating a horse-shoe shaped band called the dental lamina. The growth period of development is divided into the bud, cap, and bell stages.

#### Bud Stage

From the dental lamina, patches of epithelial cells grow into the underlying tissues. These patches of cells are called tooth buds. As soon as the dental lamina is formed, the tooth buds for the primary teeth develop. Usually 10 tooth buds are present in each dental arch and they give rise to future primary teeth. Tooth buds

for the permanent teeth form between the 17th week of fetal life through the age of 5 years. When the primary teeth are lost, permanent teeth will replace them.

#### Cap Stage

This stage is also known as proliferation (reproduction or multiplication) in which the cells of the tooth grow and the tooth bud takes a hollowed caplike shape. The epithelium of the cap will give rise to the enamel. The zone under the cap is called the dental papilla. The dental papilla gives rise to the dentin, cementum, and the pulp.

#### Bell Stage

The last period of growth is also known as histodifferentiation (the acquisition of tissue characteristics by cell groups) or bell stage. It is here the ameloblast cells form the enamel, odontoblast cells form the dentin, and the cementoblast cells form the cementum.

### MORPHODIFFERENTIATION

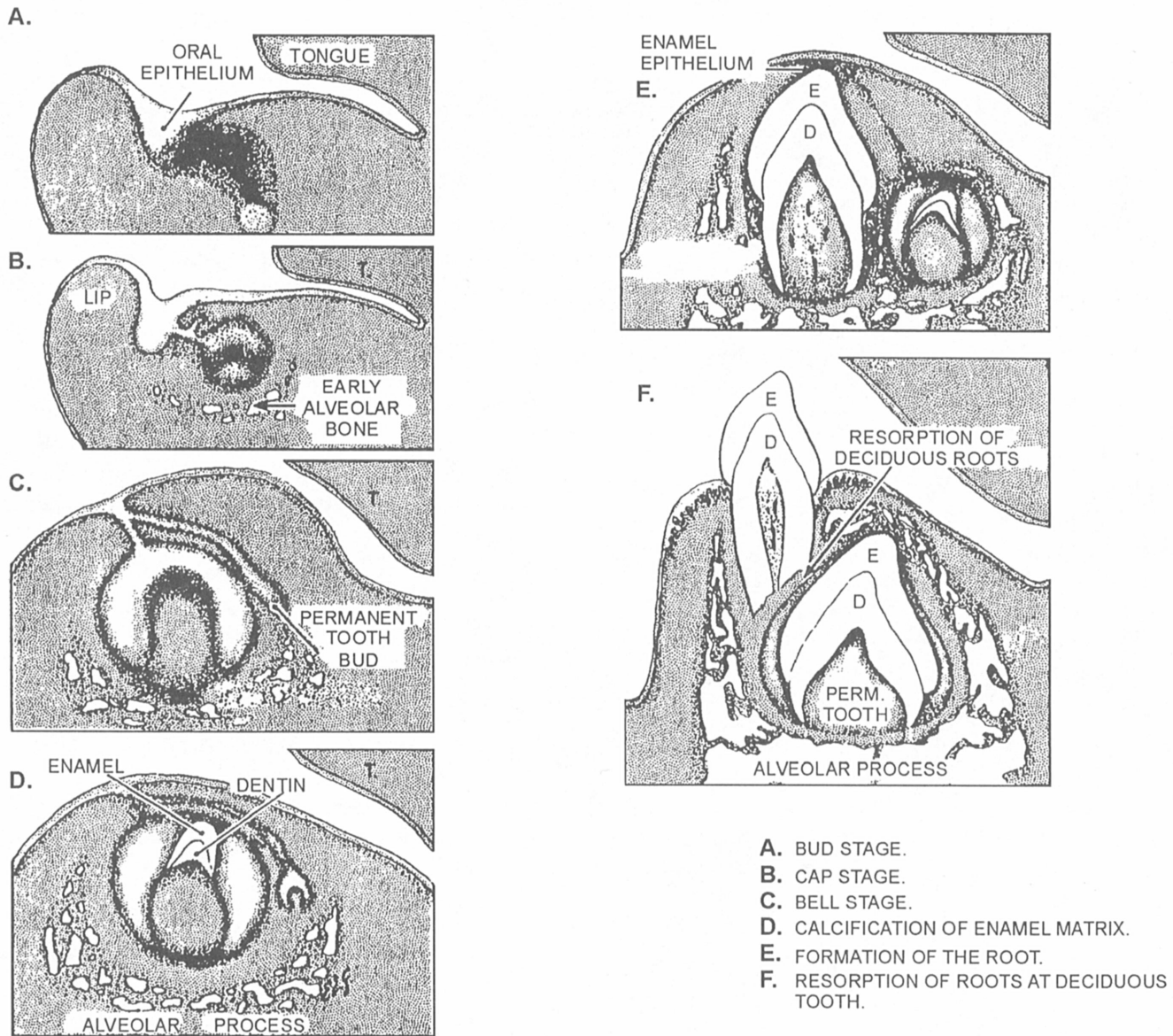
As the tooth is in the bell stage, it begins to take shape and form through a process called morphodifferentiation. Enamel forming cells (ameloblast) and dentin forming cells (odontoblast) line up on a boundary line called dentinoenamel junction.

### APPPOSITION

Apposition refers to the depositing of the matrix for the hard dental structures. This matrix is deposited by cells along the boundary line at the end of morphodifferentiation.

### CALCIFICATION

Calcification (fig. 4-1) is the process by which organic tissue (the matrix formed during apposition) becomes hardened by a deposit of calcium or any mineral salts. Next, the tooth crown receives layers of enamel that start at the top of the crown and go downward over the sides to the cementoenamel junction.



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Figure 4-1.—Stages in development of a tooth.

## ERUPTION

After the crown of the tooth has formed, the root begins to develop. Now the tooth begins to erupt (fig. 4-1), which is a movement of the tooth into its proper position in the mouth. For permanent teeth, it takes about 3 years from crown completion to the time the tooth emerges into the mouth. Figures 4-2 and 4-3 list the average emergence periods of primary and permanent teeth.

## EXFOLIATION

When primary teeth get ready to fall out and make way for the eruption of permanent teeth, they go through a process called exfoliation (shedding). The

root of the primary tooth resorbs (loses structure) as the permanent tooth erupts from beneath. The primary teeth act as guides for the developing permanent teeth. The premature loss of primary teeth can have a serious impact on the eruption of permanent teeth and how they will be in position in the dental arch.

## ORAL HISTOLOGY

Histology is the study of anatomy that deals with the minute structure, composition, and functions of tissues. Oral histology describes in detail the tissues of the teeth, periodontium, and the surrounding oral mucosa.

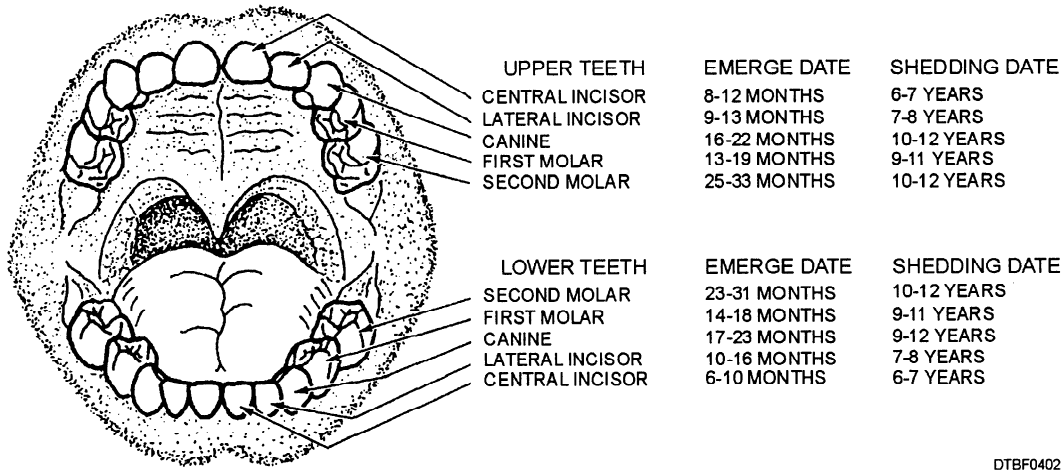


Figure 4-2.—Average periods for emergence and exfoliation of primary teeth.

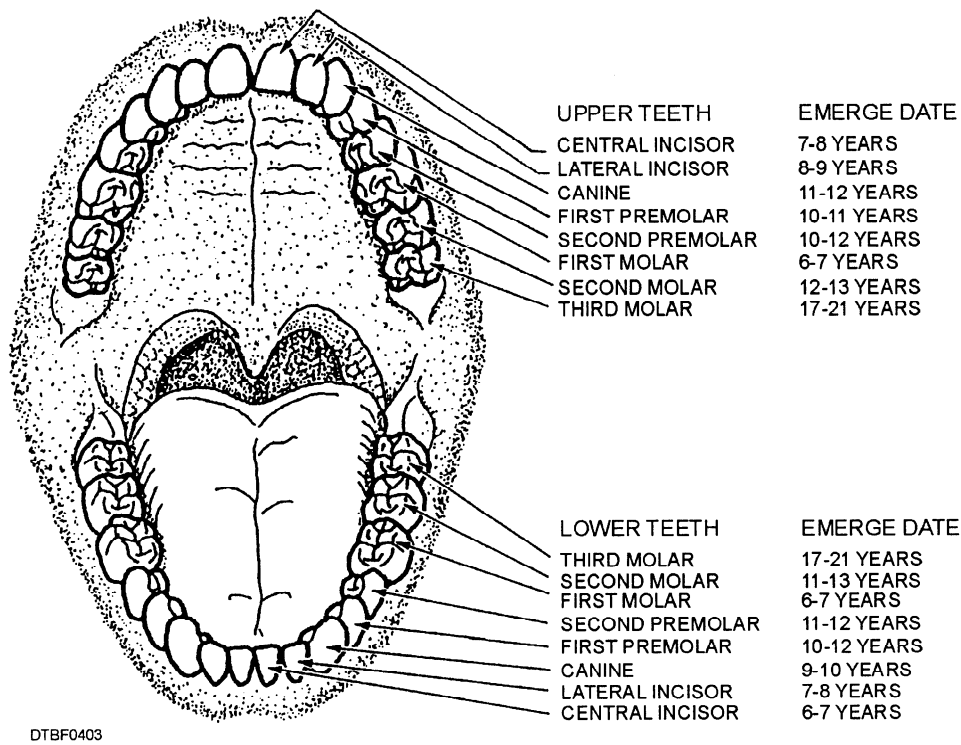


Figure 4-3.—Average periods of emergence of permanent teeth.

## STRUCTURE OF TEETH

A tooth is divided into two parts: the crown and one or more roots. Figure 4-4 illustrates the tooth crown and root.

### The Crown

The crown is divided into the anatomic and clinical crown. The anatomical crown is that portion of the tooth encased in enamel. In young people, areas of the

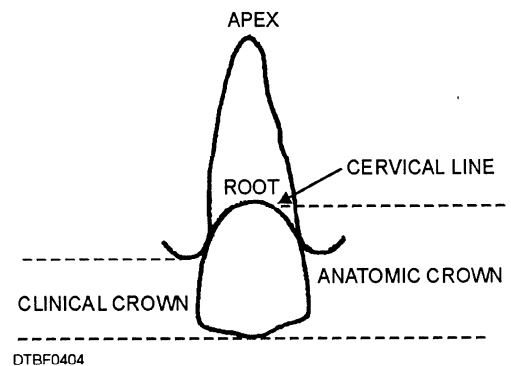


Figure 4-4.—Tooth crown and root.

anatomical crown are frequently buried in gingival tissue. As a person gets older, it becomes common for a tooth's enamel to be completely exposed above the gingiva and to have root surface showing (gingival recession). The term *clinical crown* is applied to the part of the crown exposed (visible) in the mouth.

### The Root

The root of a tooth is embedded in alveolar bone and is covered by cementum. The tooth may have a single root or it may have two or three roots. When teeth have more than one root, the region where the roots separate is called the *furcation*. When a tooth has two roots, the root portion is said to be bifurcated. When it has three roots, the root portion is said to be trifurcated (fig. 4-5). If a tooth has four or more roots, it is said to be multirooted. The tip of each root is called apex. On the apex of each root, there is a small opening that allows for the passage of blood vessels and nerves into the tooth. This opening is called the apical foramen.

### The Cervix

The *cervix* or cervical line (fig. 4-4) is a slight indentation that encircles the tooth and marks the junction of the crown with the root. The cementum joins the enamel at the cervix of the tooth. The point at which they join is called the cemento-enamel junction or cervical line.

## TISSUES OF THE TEETH

This section describes the histologic structures of enamel, dentin, cementum, and the dental pulp. Figure 4-6 illustrates the tissues of the teeth.

### ENAMEL

Enamel is translucent and can vary in color from yellowish to grayish white. The different colors of

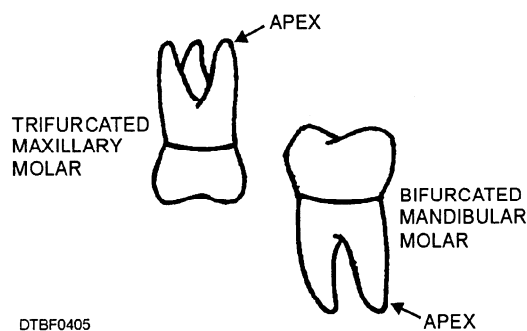


Figure 4-5.—Bifurcated and trifurcated roots.

enamel may be attributed to the variation in the thickness, translucent properties, and the quality of the crystal structure and surface stains of enamel.

Enamel (fig. 4-6) is the calcified substance that covers the entire anatomic crown of the tooth and protects the dentin. It is the hardest tissue in the human body and consists of approximately 96% inorganic minerals, 1% organic materials, and 3% water. Calcium and phosphorus (as hydroxyapatite) are its main inorganic components. Enamel can endure crushing pressure of approximately 100,000 pounds per square inch. A layering of the dentin and periodontium, coupled with the hardness of the enamel, produces a cushioning effect of the tooth's different structures enabling it to endure the pressures of mastication. Structurally, enamel is composed of millions of enamel rods or prisms. Each rod begins at the dentinoenamel junction (junction between the enamel and dentin) and extends to the outer surface of the crown. Enamel is formed by epithelial cells (ameloblasts) that lose their functional ability when the crown of the tooth has been completed. Therefore, enamel, after formation, has no power of further growth or repair.

### DENTIN

Dentin (fig. 4-6) is the light yellow substance that is more radiolucent than enamel and is very porous; it constitutes the largest portion of the tooth. The pulp chamber is located on the internal surface of the dentin walls. Dentin is harder than bone but softer than enamel. Dentin consists of approximately 70% inorganic matter and 30% organic matter and water. Calcium and phosphorus are its chief inorganic components.

Dentin is a living tissue and must be protected during operative or prosthetic procedures from dehydration (drying) and thermal shock. The dentin is perforated by tubules (similar to tiny straws) that run between the cemento-enamel junction and the pulp. Cell processes from the pulp reach part way into the tubules like fingers. These cell processes create new dentin and mineralize it. Dentin transmits pain stimuli by the way of dentinal fibers. Because dentin is a living tissue, it has the ability for constant growth and repair that reacts to physiologic (functional) and pathologic (disease) stimuli.



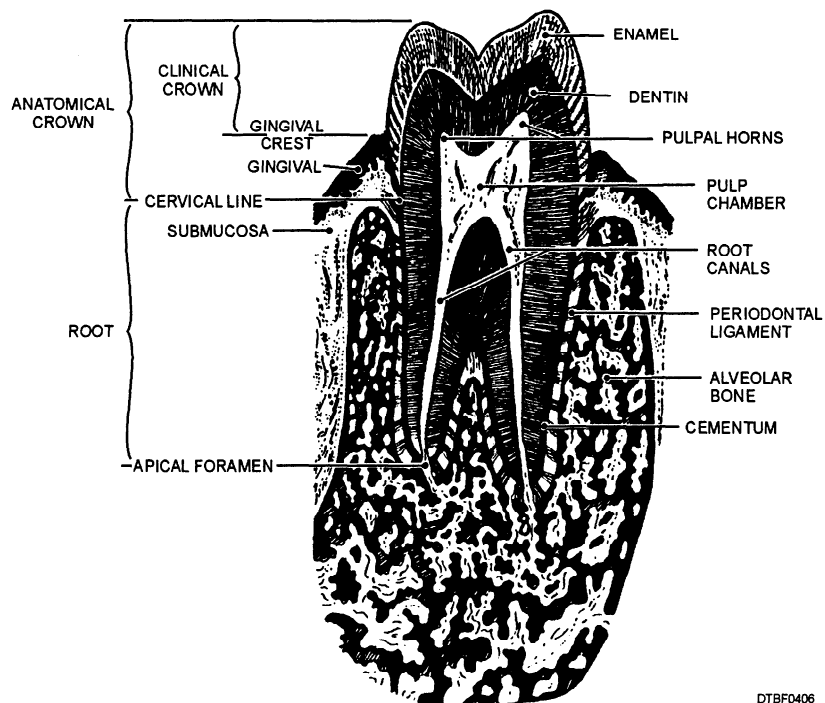


Figure 4-6.—Tissues of the teeth.

## CEMENTUM

Cementum is the bonelike tissue that covers the roots of the teeth in a thin layer (fig. 4-6). It is light yellow in color, slightly lighter than dentin. The cementum is composed of approximately 55% organic material and 45% inorganic material. (The inorganic components are mainly calcium salts.) The cementum joins the enamel at the cervix of the tooth. The point at which they join is called the cemento-enamel junction (CEJ). In most teeth the cementum overlaps the enamel for a short distance. In some, the enamel meets the cementum in a sharp line. In a few, a gap may be present between the enamel and the cementum, exposing a narrow area of root dentin. Such areas may be very sensitive to thermal, chemical, or mechanical stimuli.

The main function of cementum is to anchor the teeth to the bony walls of the tooth sockets in the periodontium. This is accomplished by means of the fibers of the periodontal ligament or membrane. Cementum is formed continuously throughout the life of the tooth to compensate for the loss of tooth substance because of occlusal wear, and to allow for the attachment of new fibers of the periodontal ligament to the surface of the root.

## THE DENTAL PULP

The dental pulp, (figure 4-7), is the soft tissue of the tooth, which develops from the connective tissue of the dental papilla. Within the crown, the chamber containing the dental pulp is called the pulp chamber. The pulp contains blood vessels and nerves that enter through the apical foramen. The coronal pulp is within the crown. Within the root is the radicular pulp.

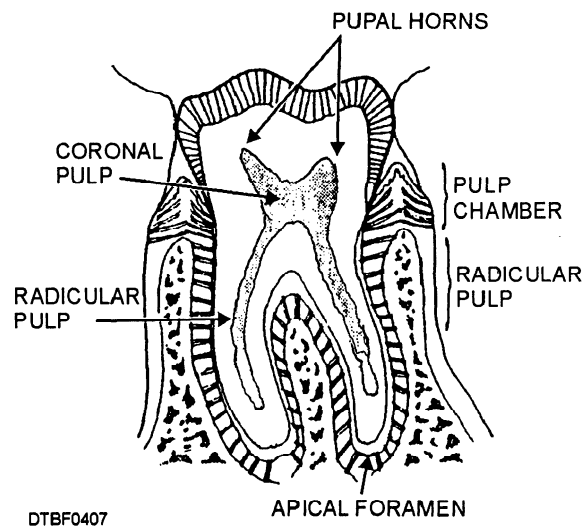


Figure 4-7.—Dental pulp.

The chief function of the pulp is the formation of dentin. However, it also furnishes nourishment to the dentin; provides sensation to the tooth, and responds to irritation, either by forming reparative secondary dentin or by becoming inflamed. The pulp chamber contains the coronal pulp and pulp horns located within the crown portion of the tooth. The apical foramen is at the end or apex of the radicular pulp. Blood vessels, nerves, and connective tissue pass through this area to reach the interior of the tooth.

## PERIODONTIUM

The tissues that surround and support the teeth are collectively called the periodontium. Their main functions are to support, protect, and provide nourishment to the teeth. Figure 4-8 illustrates the supporting tissues of the periodontium. The periodontium consists of cementum, alveolar process of the maxillae and mandible, periodontal ligament, and gingiva.

## CEMENTUM

Cementum is the only tissue considered as both a basic part of the tooth and a component of the periodontium. It is a thin, calcified layer of tissue that completely covers the dentin of the tooth root. Cementum is forming during the development of the root and throughout the life of the tooth. Cementum functions as an area of attachment for the periodontal ligament fibers.

## ALVEOLAR PROCESS

The *alveolar process* (fig. 4-8) is that bony portion of the maxilla and mandible where the teeth are embedded and by which tooth roots are supported.

The alveolar socket is the cavity within the alveolar process in which the root of the tooth is held by the periodontal ligament. The bone that divides one socket from another is called the interdental septum. When multirrooted teeth are present, the bone is called the interradicular septum. The alveolar process includes the cortical plate, alveolar crest, trabecular bone, and the alveolar bone proper.

## Cortical Plate

Structurally, the cortical plate is composed of lingual and facial plates of compact bone. It is dense in nature and provides strength and protection and acts as the attachment for skeletal muscles. The mandibular cortical plate is more dense than the maxilla cortical plate and has fewer perforations for the passage of nerves and blood vessels.

## Alveolar Crest

The alveolar crest is the highest point of the alveolar ridge and joins the facial and lingual cortical plates.

## Trabecular Bone

Trabecular or spongy bone lies within the central portion of the alveolar process, and is the less dense,

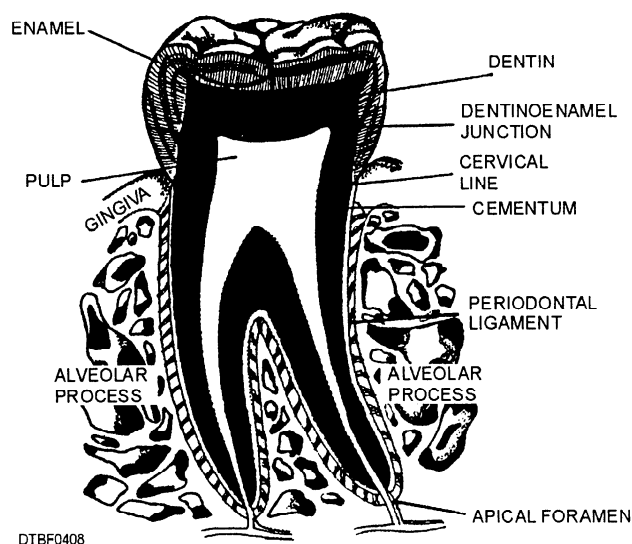


Figure 4-8.—The periodontium.

cancellous bone. When viewed by a radiograph, trabecular bone has a web-like appearance.

### Alveolar Bone Proper

The alveolar bone proper is a thin layer of compact bone, that is a specialized continuation of the cortical plate and forms the tooth socket. The **lamina dura** (fig. 4-10) is a horseshoe shape white line on a dental radiograph that roughly corresponds to the alveolar bone proper.

### PERIODONTAL LIGAMENT

The periodontal ligament (fig. 4-8) is a thin, fibrous ligament that connects the tooth to the bony socket. Normally, teeth do not contact the bone directly; a tooth is suspended in its socket by the fibers of the ligament. This arrangement allows each tooth limited individual movement. The fibers act as shock absorbers to cushion the force of the chewing impact of mastication.

### TISSUES OF THE ORAL CAVITY

The oral cavity is made up of specialized epithelial tissues that surround the teeth and serve as a lining. These tissues are called the oral mucosa and consist of three types: masticatory mucosa, lining mucosa, and specialized mucosa.

#### Masticatory Mucosa

Masticatory mucosa is comprised of the tissue that covers the hard palate and the gingiva.

Masticatory mucosa is usually light pink in color (can vary with skin color) and is keratinized. Keratinized tissue has a horny, tough, protective outer layer of tissue. Characteristics of masticatory mucosa are:

- no submucosa lies under the masticatory mucosa,
- held in place firmly to bone and does not move,
- has a dense, hard covering, and
- functions to withstand the active process of chewing and swallowing food.

**HARD PALATE.**—The hard palate or roof of the mouth (fig. 4-9) is covered with masticatory mucosa and is firmly adhered to the palatine process (bone). Its

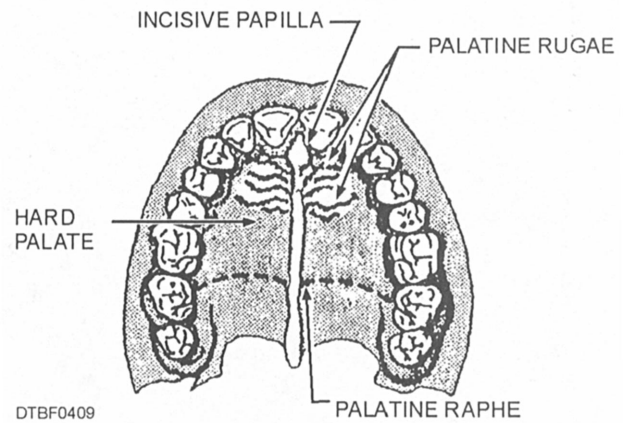


Figure 4-9.—Masticatory mucosa of the hard palate.

color is usually pale pink. Important structures of the hard palate are:

- **Incisive papilla**—Located at the midline, directly posterior of the maxillary central incisors (pear-shaped in appearance).
- **Palatine raphe**—Extends from the incisive papilla posteriorly at the midline (may be ridge shaped in appearance with a whitish streak at the midline).
- **Palatine rugae**—Extends laterally (along side) from the incisive papilla and from the palatine raphe (wrinkled, irregular ridges in appearance).

**GINGIVA.**—The *gingiva*, shown in figure 4-10, is specialized masticatory mucosa covering the alveolar process. In a healthy mouth, gingiva is firmly in place encircling the necks of the teeth. It aids in the support of the teeth, and protects the alveolar process and periodontal ligament from bacterial invasion. Healthy gingiva is firm and resilient. Healthy gingiva under normal flossing and brushing activities does not bleed. The color of healthy gingiva can range from pale pink to darker shades (purple to black) depending on each individual's pigmentation. The surface of the attached gingiva and interdental papillae may be stippled (resembling the texture of the skin of an orange).

Like the tongue, the gingiva is highly vascular and receives its blood supply from the lingual, mental, buccal, and palatine arteries. Other important aspects of the gingiva are discussed in the following paragraphs.

**Unattached Gingiva.**—The portion of gingiva that extends from the gingival crest to the crest of the bone is called unattached gingiva. It can also be called the free gingiva. It can be displaced and is not bound directly to the tooth or bone. In a healthy mouth, this

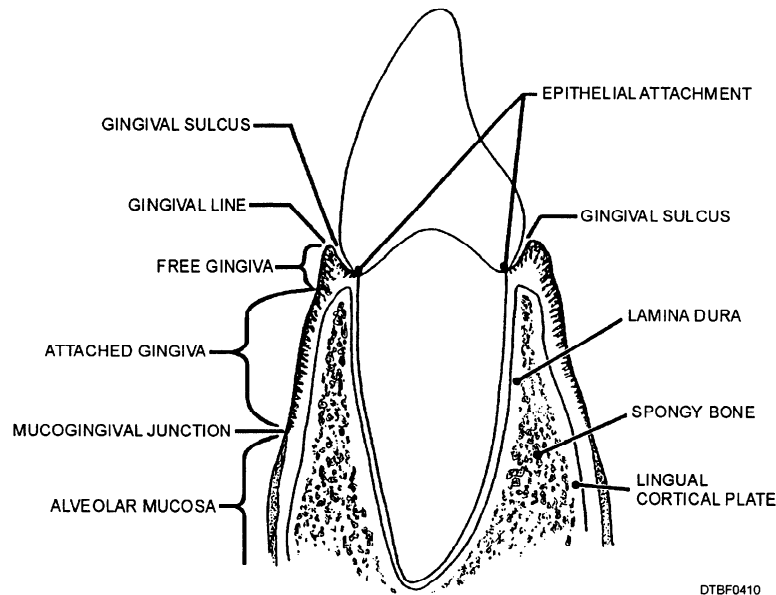


Figure 4-10.—Structures of the gingiva.

portion is approximately 1 to 3 mm wide and forms the soft tissue wall of the gingival sulcus next to the tooth. Other structures of unattached gingiva include:

- **Gingival margin**—The 1 mm narrow band of gingiva that forms the immediate collar around the base of the tooth. This area is first to show symptoms of gingivitis.
- **Gingival sulcus**—Area between the unattached gingiva and the tooth. Popcorn hulls get trapped in this area.
- **Epithelial attachment**—Joins the gingiva to the tooth surface.
- **Interdental papilla**—The portion of the free gingiva that fills the interproximal embrasures below the contact areas of adjacent teeth. It helps prevent food from packing between the teeth.

**Attached Gingiva.**—Located apical to the free gingiva on the labial and lingual aspects. It is firmly fixed to the underlying bone of the cortical plates of the alveolar process.

**Mucogingival Junction.**—A line that separates the attached gingiva from the lining mucosa.

### Lining Mucosa

Lining mucosa is found on the inside of the lips, cheeks, vestibule, soft palate, and under the tongue. It consists of a thin, fragile tissue that is very vascular. Lining mucosa is brighter red in color than masticatory

mucosa. Also included in the lining mucosa is alveolar mucosa. It lies apical to the mucogingival junction and is loosely attached.

## TOOTH MORPHOLOGY

This section describes the external features of the teeth. A *tooth* is defined as “one of the hard, bony appendages that are borne on the jaws...and serve for the seizing and mastication of food, as weapons of offense and defense, etc.” In man and the lower animals, the design of the teeth are a reflection of eating habits. Animals, classified according to their eating habits, are carnivorous (flesh eating), herbivorous (plant eating), or omnivorous (eating everything; both flesh and plant).

### TYPES OF TEETH

Man is omnivorous, so his teeth are formed for cutting, tearing, and grinding food. The human permanent dentition is divided into four classes of teeth based on appearance and function or position. Figure 4-11 illustrates the types and working surfaces of the four classes of teeth.

#### Incisors

Incisors are named because they are used to incise food. They are located in the front of the mouth and have sharp, thin edges for cutting. The lingual surface can have a shovel-shaped appearance.

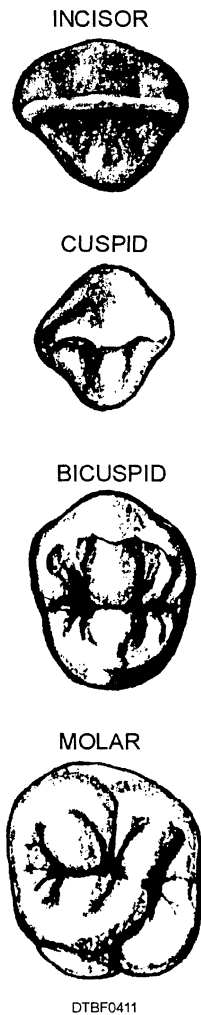


Figure 4-11.—Working surfaces of human teeth.

### Cuspids

cuspids, also referred to as *canines*, are at the angles of the mouth. Each has a single cusp in stead of an incisal edge and are designed for cutting and tearing.

### Bicuspids

Bicuspids, also referred to as *premolars*, are similar to the cuspids. They have two cusps used for cutting and tearing, and an occlusal surface that is wider to crush food.

### Molars

*Molars* are located in the back of the mouth; their size gradually gets smaller from the first to third molar.

Each molar has four or five cusps, is shorter and more blunt in shape than other teeth and provides a broad surface for grinding and chewing solid masses of food.

### DENTAL ARCHES

The teeth of the upper arch are called maxillary teeth, (fig. 4-12) because their roots are embedded within the alveolar process of the maxilla. Those of the lower arch are called mandibular teeth because their roots are embedded within the alveolar process of the mandible. Each arch contains 16 teeth. The teeth in an arch are composed of 6 anteriors (cuspid to cuspid) and 10 posterior (all teeth distal to the cuspids). In a quadrant, there are 3 anterior and 5 posterior teeth.

### DENTAL QUADRANTS

Each dental arch is divided into a right and a left quadrant. The quadrants are formed by an imaginary line called the midline that passes between the central incisors in each arch and divides the arch in half (fig. 4-13). There are four quadrants in the mouth (two

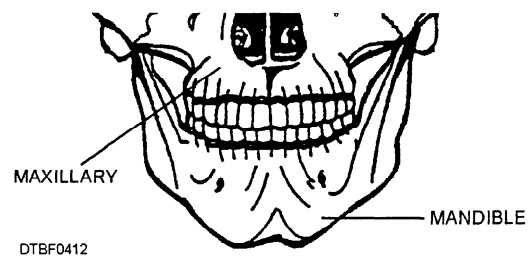


Figure 4-12.—Maxillary and mandibular arches showing relationship of the bones and teeth.

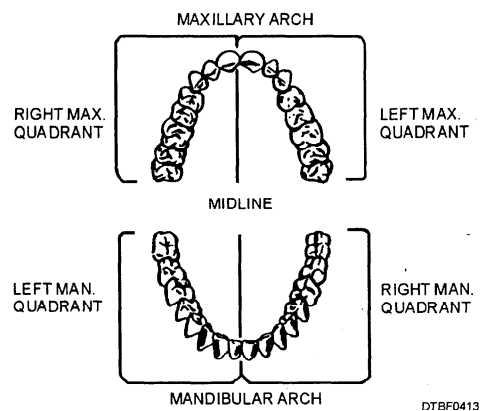


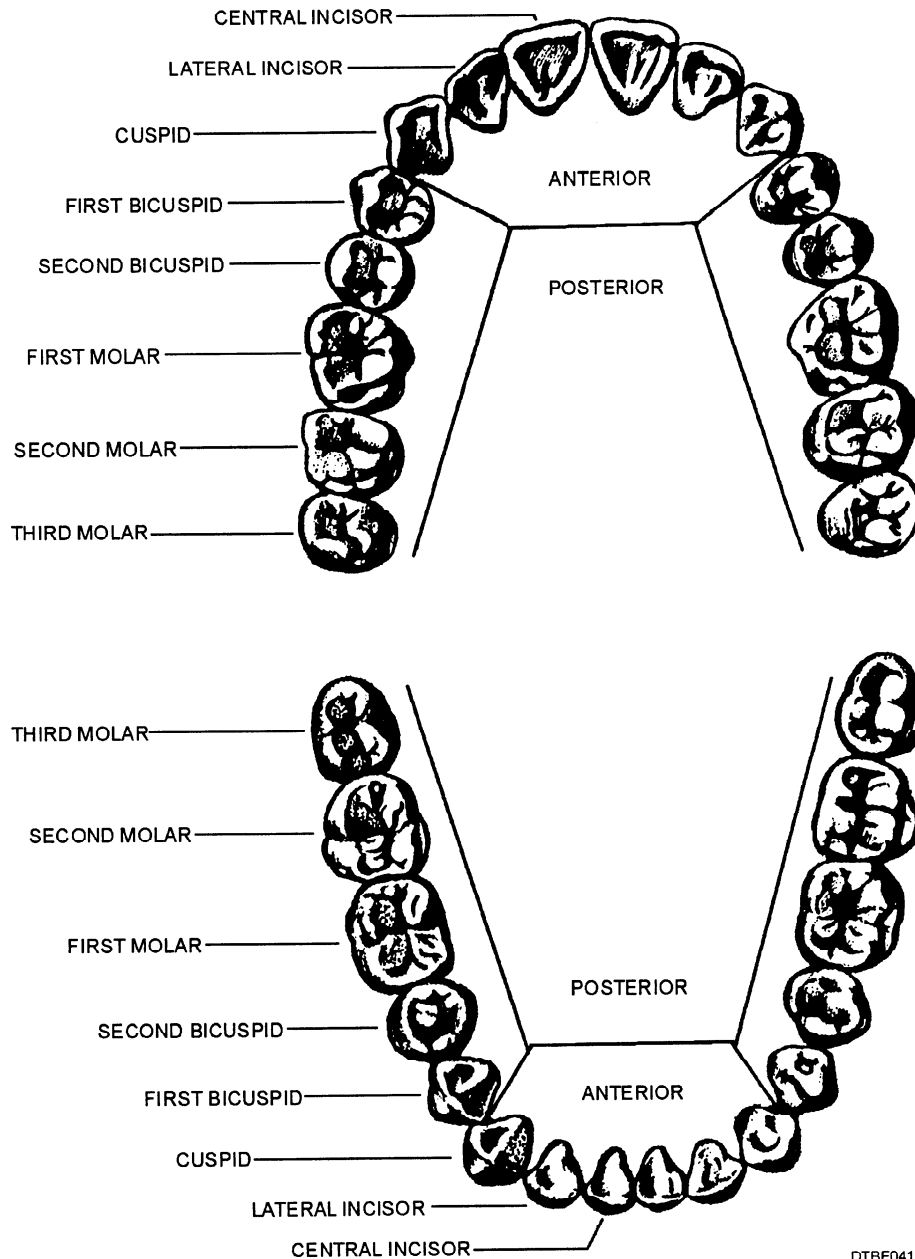
Figure 4-13.—Maxillary and mandibular arches divided into quadrants.

per arch) that divide the mouth into four equal parts. Quadrant means one fourth, and each quadrant is one fourth of the entire mouth. Teeth are described as being located in one of the four quadrants: right maxillary quadrant, left maxillary quadrant, right mandibular quadrant, or the left mandibular quadrant.

### LOCATION OF THE TEETH

Normally, a human receives two sets of teeth during a lifetime. The first (deciduous or primary) set consists of 20 teeth ("baby" teeth). The second

(permanent) set usually consists of 32 teeth. In each quadrant, there are eight permanent teeth: two incisors, one cuspid, two bicuspids, and three molars (fig. 4-14). The tooth positioned immediately to the side of the midline is the central incisor, so called because it occupies a central location in the arch. To the side of the central incisor is the lateral incisor. Next is the cuspid, then the two bicuspids (the first bicuspid, followed by the second bicuspid). The last teeth are three molars. After the second bicuspid comes the first molar, followed by the second molar, followed by the



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Figure 4-14.—Names of the teeth in the right maxillary and mandibular quadrants; anterior and posterior teeth.

third molar or more commonly called the “wisdom tooth.”

Another method of describing the location of teeth is to refer to them as anterior or posterior teeth (fig. 4-15). Anterior teeth are those located in the front of the mouth, the incisors, and the cuspids. Normally, these are the teeth that are visible when a person smiles. The posterior teeth are those located in the back of the mouth—the bicuspid and molars.

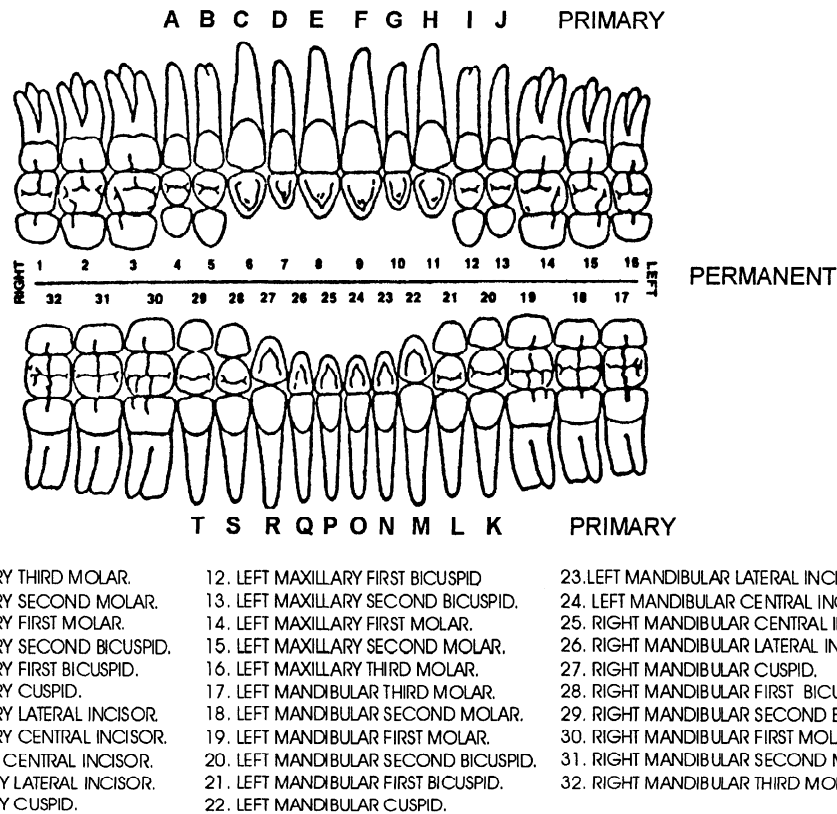
## IDENTIFICATION OF TEETH

To avoid confusion, you must identify a tooth as completely as possible. Give its full name: Central incisor (not incisor), second molar (not molar), etc. But even the full name of a tooth does not provide adequate identification because several teeth have the same name. Complete tooth identification requires that you identify:

- the quadrant in which the tooth appears, and

### PRIMARY

- |  |   |
|--|---|
| A. RIGHT MAXILLARY SECOND PRIMARY MOLAR. | T. RIGHT MANDIBULAR SECOND PRIMARY MOLAR. |
| B. RIGHT MAXILLARY FIRST PRIMARY MOLAR.  | S. RIGHT MANDIBULAR FIRST PRIMARY MOLAR.  |
| C. RIGHT MAXILLARY CUSPID.               | R. RIGHT MANDIBULAR CUSPID.               |
| D. RIGHT MAXILLARY LATERAL.              | Q. RIGHT MANDIBULAR LATERAL.              |
| E. RIGHT MAXILLARY CENTRAL.              | P. RIGHT MANDIBULAR CENTRAL.              |
| F. LEFT MAXILLARY CENTRAL.               | O. LEFT MANDIBULAR CENTRAL.               |
| G. LEFT MAXILLARY LATERAL.               | N. LEFT MANDIBULAR LATERAL.               |
| H. LEFT MAXILLARY CUSPID.                | M. LEFT MANDIBULAR CUSPID.                |
| I. LEFT MAXILLARY FIRST PRIMARY MOLAR.   | L. LEFT MANDIBULAR FIRST PRIMARY MOLAR.   |
| J. LEFT MAXILLARY SECOND PRIMARY MOLAR.  | K. LEFT MANDIBULAR SECOND PRIMARY MOLAR.  |



- |                                     |                                      |                                       |
|-------------------------------------|--------------------------------------|---------------------------------------|
| 1. RIGHT MAXILLARY THIRD MOLAR.     | 12. LEFT MAXILLARY FIRST BICUSPID    | 23. LEFT MANDIBULAR LATERAL INCISOR.  |
| 2. RIGHT MAXILLARY SECOND MOLAR.    | 13. LEFT MAXILLARY SECOND BICUSPID.  | 24. LEFT MANDIBULAR CENTRAL INCISOR.  |
| 3. RIGHT MAXILLARY FIRST MOLAR.     | 14. LEFT MAXILLARY FIRST MOLAR.      | 25. RIGHT MANDIBULAR CENTRAL INCISOR. |
| 4. RIGHT MAXILLARY SECOND BICUSPID. | 15. LEFT MAXILLARY SECOND MOLAR.     | 26. RIGHT MANDIBULAR LATERAL INCISOR. |
| 5. RIGHT MAXILLARY FIRST BICUSPID.  | 16. LEFT MAXILLARY THIRD MOLAR.      | 27. RIGHT MANDIBULAR CUSPID.          |
| 6. RIGHT MAXILLARY CUSPID.          | 17. LEFT MANDIBULAR THIRD MOLAR.     | 28. RIGHT MANDIBULAR FIRST BICUSPID.  |
| 7. RIGHT MAXILLARY LATERAL INCISOR. | 18. LEFT MANDIBULAR SECOND MOLAR.    | 29. RIGHT MANDIBULAR SECOND BICUSPID. |
| 8. RIGHT MAXILLARY CENTRAL INCISOR. | 19. LEFT MANDIBULAR FIRST MOLAR.     | 30. RIGHT MANDIBULAR FIRST MOLAR.     |
| 9. LEFT MAXILLARY CENTRAL INCISOR.  | 20. LEFT MANDIBULAR SECOND BICUSPID. | 31. RIGHT MANDIBULAR SECOND MOLAR.    |
| 10. LEFT MAXILLARY LATERAL INCISOR. | 21. LEFT MANDIBULAR FIRST BICUSPID.  | 32. RIGHT MANDIBULAR THIRD MOLAR.     |
| 11. LEFT MAXILLARY CUSPID.          | 22. LEFT MANDIBULAR CUSPID.          |                                       |

### PERMANENT

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Figure 4-15.— Standard dental chart; names and numbers of teeth.

- the full name of the tooth.

Therefore, you would identify a specific second molar in the following manner: right mandibular second molar. Although there are four second molars in the mouth, naming the quadrant (right mandibular) narrows the field down to one specific second molar.

## UNIVERSAL NUMBERING SYSTEM

The Universal Numbering System is a simplified method of identifying teeth that is approved by the American Dental Association and used by the armed services. This method employs numbers with each tooth designated by a separate number from 1 to 32. Figure 4-15 illustrates the numbering system used on a Standard Dental Chart. When charting, you would refer to a tooth by number rather than the name. Instead of referring to the right maxillary third molar, you would refer to tooth No. 1. Each permanent tooth has its own number.

The 20 primary teeth are identified on the dental chart by the use of capital letters A to T. Lettering starts with upper right second primary molar (tooth A, located above the root of the maxillary second premolar); goes across to the upper left second primary molar (tooth J); down to the lower left second primary molar (tooth K), and across to the lower right second primary molar. Please note that the letters of the primary second and first molars appear above the roots of the permanent teeth of the second and first premolars.

When using a dental form, remember that the right and left sides are reversed. The right side of the patient's mouth appears on the left side of the dental

chart; the left side of the patient's mouth appears on the right side. This arrangement is necessary because the dental officer and the assistant see the sides reversed when they look into a patient's mouth. Full instructions for using dental forms, will be provided in *Dental Technician, Volume 2, NAVEDTRA 12573*, chapter 2, "Oral Examination."

## SURFACES OF THE TEETH

Not only must the assistant be able to name and locate a tooth, but must also be able to identify the different types of tooth surfaces. Figure 4-16 shows a number of different surfaces of the teeth.

### Facial, Mesial, Distal, Lingual, and Incisal Surfaces

The **facial** is the surface of a tooth that "faces" toward the lips or cheeks. When there is a requirement to be more specific, terms like **labial** and **buccal** are used. The labial is the surface of an anterior tooth that faces toward the lips. The buccal is the surface of a posterior tooth that faces toward the cheek.

The **mesial** is the proximal surface closest to the midline of the arch. The **distal** is the opposite of mesial. The distal is the proximal surface oriented away from the midline of the arch.

The **lingual** is the surface of an anterior or posterior tooth that faces toward the tongue. **Incisal** edges are narrow cutting edges found only in the anterior teeth (incisors). Incisors have one incisal edge.

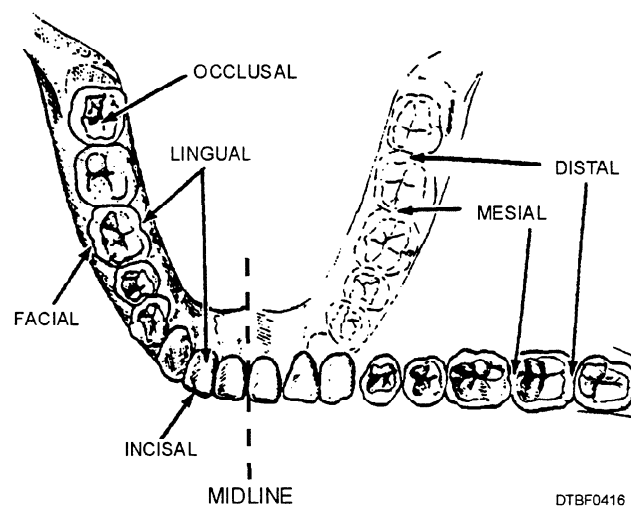


Figure 4-16.—Surfaces of the teeth.



## Proximal Surfaces

A tooth has two proximal surfaces (fig 4-17), one that is oriented toward the midline of the dental arch (mesial) and another that is oriented away from the midline of the arch (distal). Other important surfaces of the proximal area are discussed in the following paragraphs.

**CONTACT POINT.**—The point on the proximal surface where two adjacent teeth actually touch each other is called a contact point. An example of a contact point is when you pass dental floss in between two teeth. You should feel some resistance of the contact point while the floss is being passed through.

**INTERPROXIMAL SPACE.**—The interproximal space is the area between the teeth. Part of the interproximal space is occupied by the interdental papilla. The interdental papilla is a triangular fold of gingival tissue. The part of the interproximal space not occupied is called the embrasure.

**EMBRASURE.**—The embrasure occupies an area bordered by interdental papilla, the proximal surfaces of the two adjacent teeth, and the contact point (fig 4-18). If there is no contact point between the

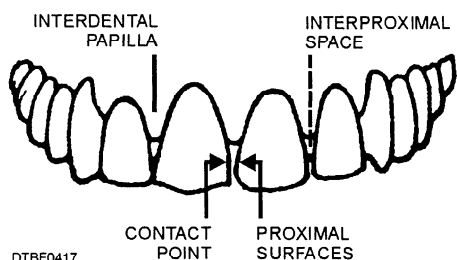


Figure 4-17.—Proximal tooth surfaces and spaces.

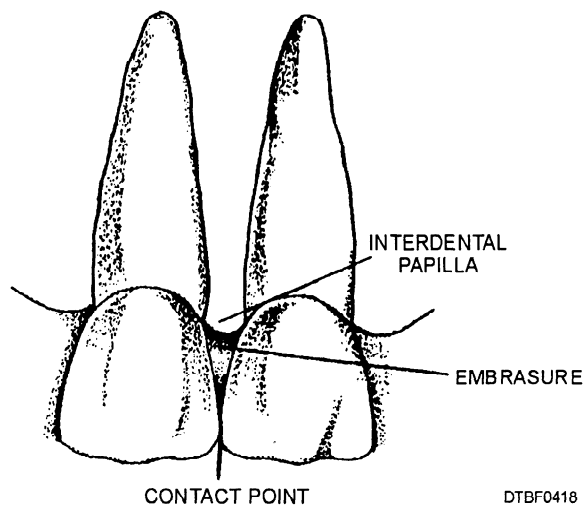


Figure 4-18.—Embrasure.

teeth, then the area between them is called a diastema instead of an embrasure.

## Occlusal

The occlusal surface is the broad chewing surface found on posterior teeth (bicusps and molars).

To get a clearer picture of the various tooth surfaces, refer to figure 4-15, which has previously been discussed. The Dental Chart shows each of the teeth “unfolded” so that the facial, occlusal, incisal, or lingual surfaces of the teeth can be shown. For posterior teeth, the facial surfaces are shown adjacent to the roots, followed by the occlusal surfaces, and then by the lingual surfaces (which are located next to the numbers on the chart). For the anterior teeth, the facial surfaces are shown as a line between the facial and lingual surfaces. The lingual surfaces are located next to the numbers on the chart.

**OCCLUSION.**—Occlusion is the relationship between the occlusal surfaces of maxillary and mandibular teeth when they are in contact. Many patterns of tooth contact are possible. Part of the reason for the variety is the mandibular condyle’s substantial range of movement within the temporal mandibular joint. Malocclusion occurs when any abnormality in occlusal relationships exist in the dentition. Centric occlusion, figure 4-19, is the centered contact position of the chewing surfaces of mandibular teeth on the chewing surface (occlusal) of the maxillary teeth.

**OCCLUSAL PLANE.**—Maxillary and mandibular teeth come into centric occlusion and meet along anteroposterior and lateral curves. The anteroposterior curve is called the *Curve of Spee*

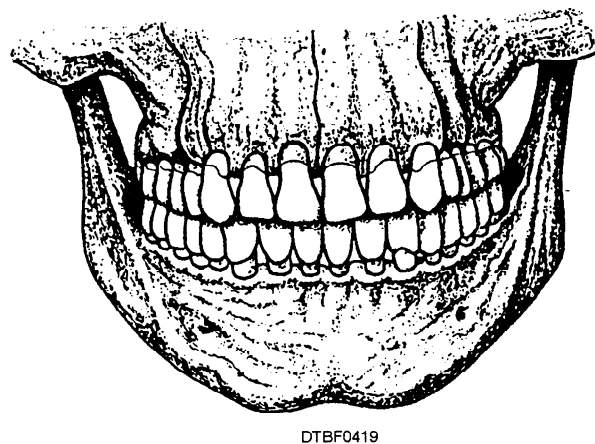


Figure 4-19.—Centric occlusion.

(fig. 4-20) in which the mandibular arch forms a concave (a bowl-like upward curve). The lateral curve is called the *Curve of Wilson* (fig. 4-21). The composite (combination) of these curves form a line called the occlusal plane, and is created by the contact of the upper and lower teeth as shown in figure 4-22.

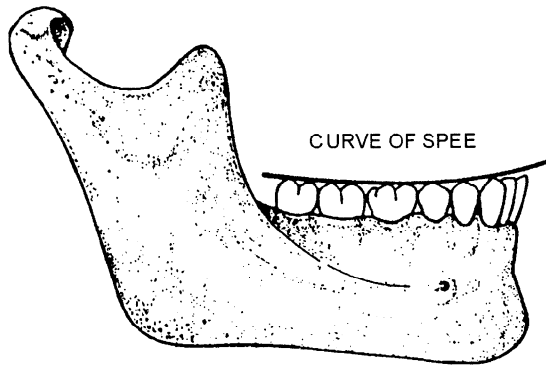
**VERTICAL AND HORIZONTAL OVERLAP.**—Vertical overlap is the extension of the maxillary teeth over the mandibular counterparts in a vertical direction when the dentition is in centric occlusion (fig. 4-23). Horizontal overlap is the projection of maxillary teeth over antagonists

(something that opposes another) in a horizontal direction.

**ANGLES CLASSIFICATION.**—Angle was a dentist who developed a classification of normal and abnormal ways teeth meet into centric occlusion. Angle came up with three classes, Class I, II and III, as illustrated by figure 4-24.

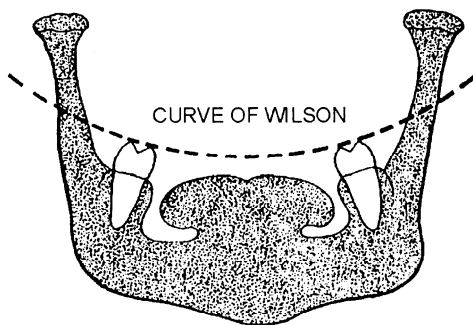
- Class I—patient’s profile is characterized as normal.
- Class II—patient’s profile is deficient in chin length and characterized as a retruded (retrognathic) profile.
- Class III—patient’s profile is excessive in chin length and characterized as protruded (prognathic) profile.

**KEY TO OCCLUSION.**—The occlusal surfaces of opposing teeth bear a definite relationship to each other (fig. 4-25). In normal jaw relations and when teeth are of normal size and in the correct position, the mesiofacial cusp of the maxillary first molar occludes in the facial groove of the mandibular first molar. This normal relationship (fig. 4-26) of these two teeth is called the key to occlusion.



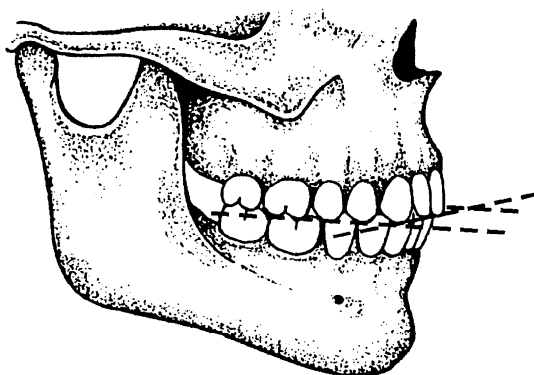
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Figure 4-20.—Curve of Spee.



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Figure 4-21.—Curve of Wilson.



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Figure 4-22.—Occlusal plane.

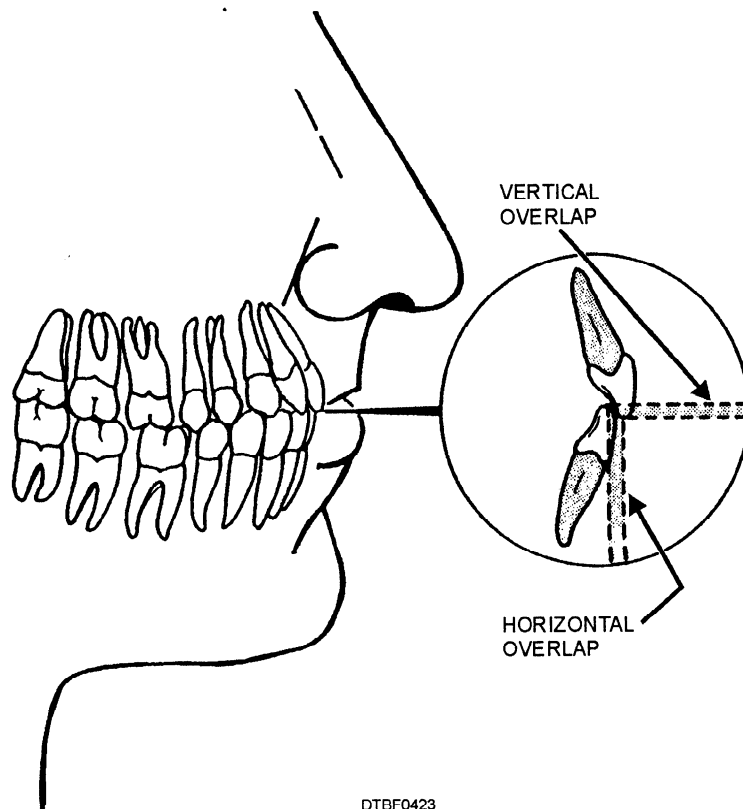
## PERMANENT DENTITION

The permanent dentition consists of 32 teeth. Each tooth in the permanent dentition is described in this section. It should be remembered that teeth show considerable variation in size, shape, and other characteristics from one person to another. Certain teeth show a greater tendency than others to deviate from the normal. The descriptions that follow are of normal teeth.

### MAXILLARY CENTRAL INCISORS

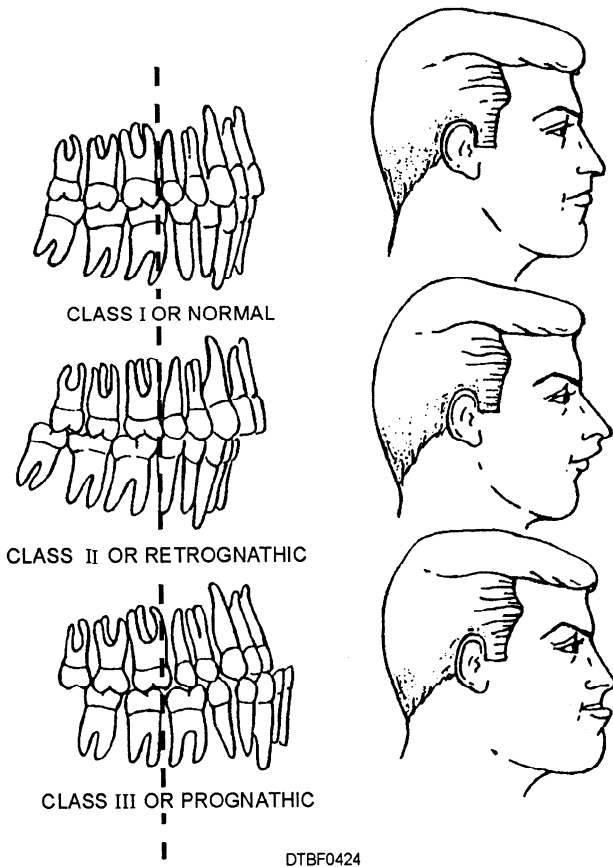
The maxillary central incisor (tooth #8 or #9) is illustrated in figures 4-27 and 4-28. Viewed mesially or distally, a maxillary central incisor looks like a wedge, with the point of the wedge at the incisal (cutting) edge of the tooth.

**Facial Surface**—The facial surface resembles a thumbnail in outline. The mesial margin is nearly straight and meets the incisal edge at almost a 90° angle, but the distal margin meets the incisal edge in a curve. The incisal edge is straight, but the cervical margin is curved like a half moon. Two developmental grooves are on the facial surface.



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Figure 4-23.—Vertical and horizontal overlap.



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Figure 4-24.—Angle's classification.

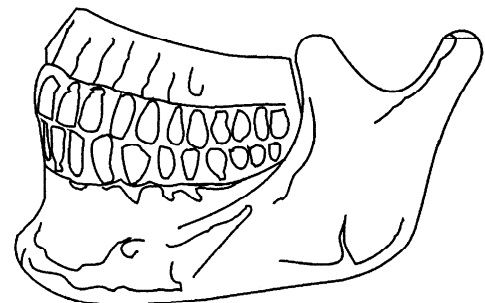
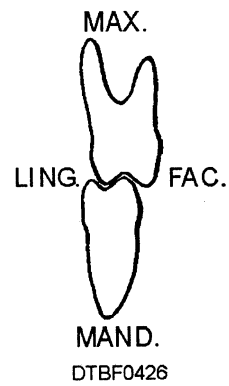
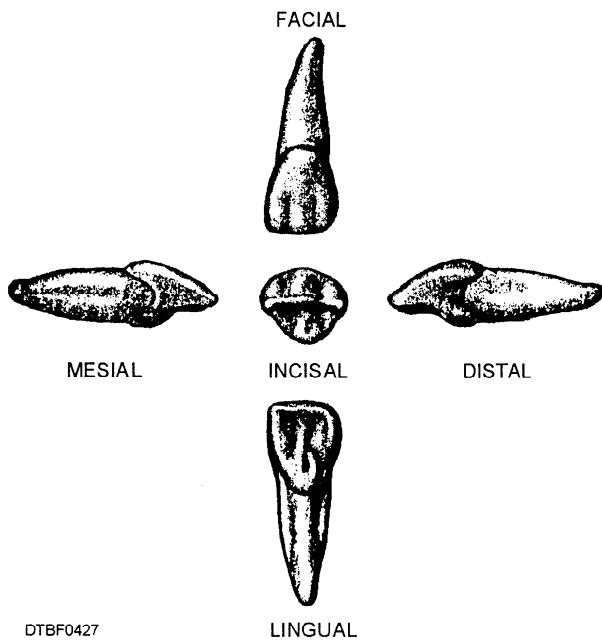


Figure 4-25.—Key to occlusion. Shows relationship of mandible to maxillae.



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Figure 4-26.—Normal cusp relations of posterior teeth.



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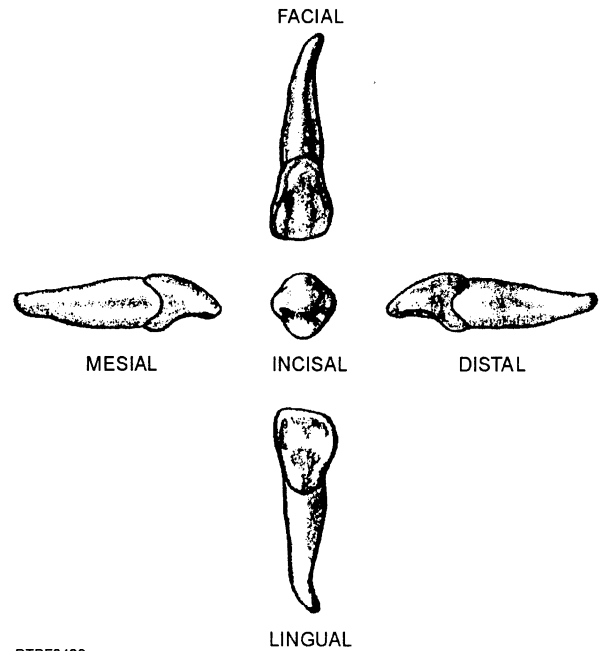
Figure 4-27.—Surfaces of a maxillary central incisor.

**Lingual Surface**—The lingual surface (fig. 4-28) is quite similar to the facial surface in outline except that it is slightly smaller in all dimensions. At the mesial and distal margins there are marginal ridges. Occasionally there is a cingulum at the junction of the lingual surface with the cervical line. Sometimes a deep pit, the lingual pit, is found in conjunction with a cingulum.

**Root Surface**—As with all anterior teeth, the root of the maxillary central incisor is single. This root is from one and one-fourth to one and one-half times the length of the crown. Usually, the apex of the root is inclined slightly distally.

### MAXILLARY LATERAL INCISORS

The maxillary lateral incisor (tooth #7 or #10), illustrated in figure 4-29, is much like the maxillary central incisor, except in size: it is shorter, narrower, and thinner.



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Figure 4-29.—Surfaces of a maxillary lateral incisor.

**Facial Surface**—The developmental grooves on the facial surface are not so evident as those of the central incisor. Of more significance, however, is the distoincisor angle, which is well-rounded with this curvature continuing to the cervical line. The mesiofacial angle is nearly straight to the cervical line.

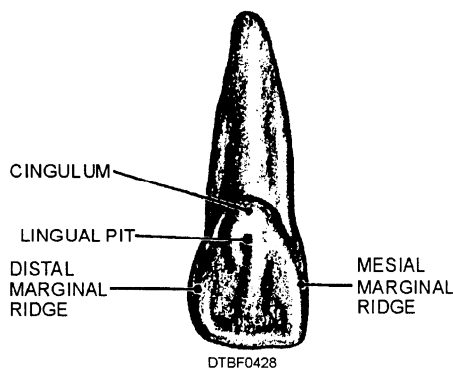
**Lingual Surface**—The shape of the lingual surface varies with the individual. In some persons it is markedly concave, almost spoon-like in appearance, and in others, it is flat. The lingual surface is almost the same as the facial surface.

**Root Surface**—The root is conical (cone-shaped) but somewhat flattened mesiodistally.

### MANDIBULAR CENTRAL INCISORS

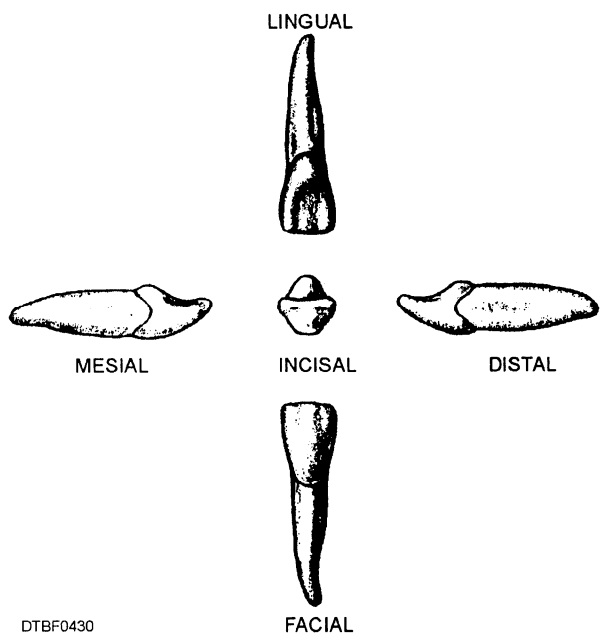
The mandibular central incisor (tooth #24 or #25) is illustrated in figure 4-30. These are the first permanent teeth to erupt, replacing deciduous teeth, and are the smallest teeth in either arch.

**Facial Surfaces**—The facial surface of the mandibular central incisor is widest at the incisal edge. Both the mesial and the distal surfaces join the incisal surface at almost a 90° angle. Although these two surfaces are nearly parallel at the incisal edge, they converge toward the cervical margin. The developmental grooves may or may not be present. When present, they appear as very faint furrows.



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Figure 4-28.—Features of a lingual surface of maxillary central incisor.



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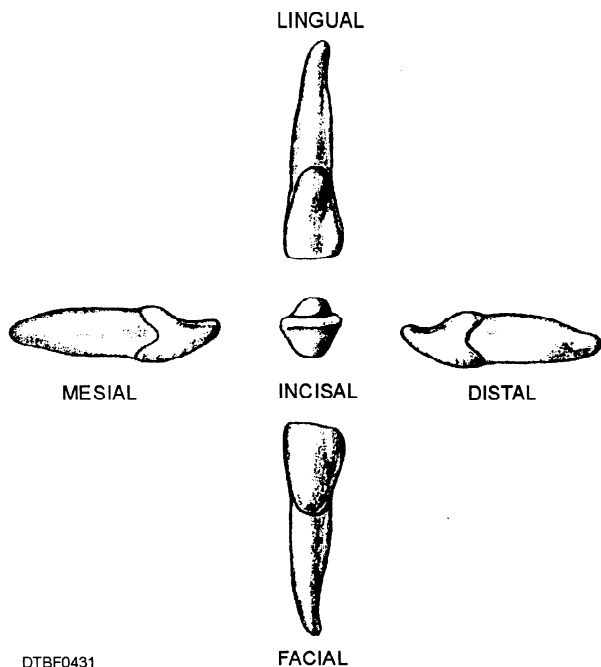
Figure 4-30.—Surfaces of a mandibular central incisor.

**Lingual Surface**—The lingual surface is concave from the incisal edge to the cervical margin.

**Root Surface**—The root is slender and extremely flattened on its mesial and distal surfaces.

### MANDIBULAR LATERAL INCISORS

The mandibular incisor (tooth #23 or #26) illustrated in figure 4-31, is a little wider mesiodistal



DTBF0431

Figure 4-31.—Surfaces of a mandibular lateral incisor.

than the mandibular central incisor, and the crown is slightly longer from the incisal edge to the cervical line.

**Facial Surface**—The facial surface is less symmetrical than the facial surface of the mandibular central incisor. The incisal edge slopes upward toward the mesioincisal angle, which is slightly less than 90°. The distoincisal angle is rounded. The mesial border is more nearly straight than the distal border.

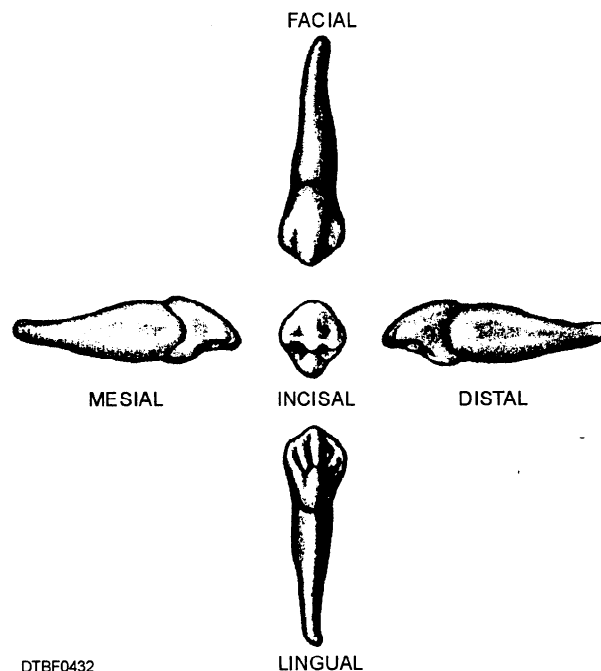
**Lingual Surface**—The lingual surface is similar in outline to the facial surface. The incisal portion of the lingual surface is concave. The cingulum is quite large but blends in smoothly with the rest of the surface.

**Root Surface**—The root is single and extremely flattened on its mesial and distal surfaces.

### MAXILLARY CUSPIDS

The maxillary cuspid (tooth #6 or #11) is illustrated in figures 4-32 and 4-33. The maxillary cuspid is usually the longest tooth in either jaw. Since it resembles a dog's tooth, it is sometimes called the canine.

**Facial Surface**—The facial surface of the crown (fig. 4-33) differs considerably from that of the maxillary central or lateral incisors. In that the incisal edges of the central and lateral incisor are nearly



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Figure 4-32.—Surfaces of a maxillary cuspid.

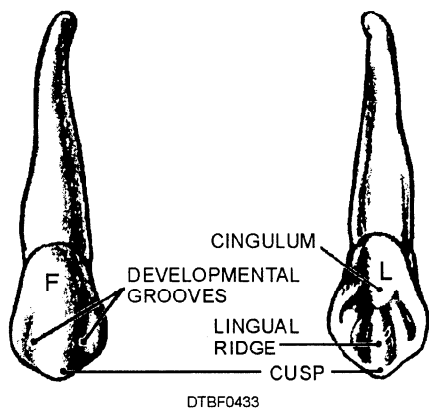


Figure 4-33.—Features of facial and lingual surfaces of a maxillary cuspid.

straight, the cuspid has a definite point, or cusp. There are two cutting edges, the mesioincisal and the distoincisal. The distoincisal cutting edge is the longer of the two. The developmental grooves that are so prominent on the facial surface of the central incisor are present here, extending two-thirds of the distance from the tip of the cusp to the cervical line.

**Lingual Surface**—The lingual surface has the same outline as the facial surface but is somewhat smaller because the mesial and distal surfaces of the crown converge toward the lingual surface. The lingual surface is concave, with very prominent mesial and distal marginal ridges, and a lingual ridge, which extends from the tip of the cusp toward the cervical

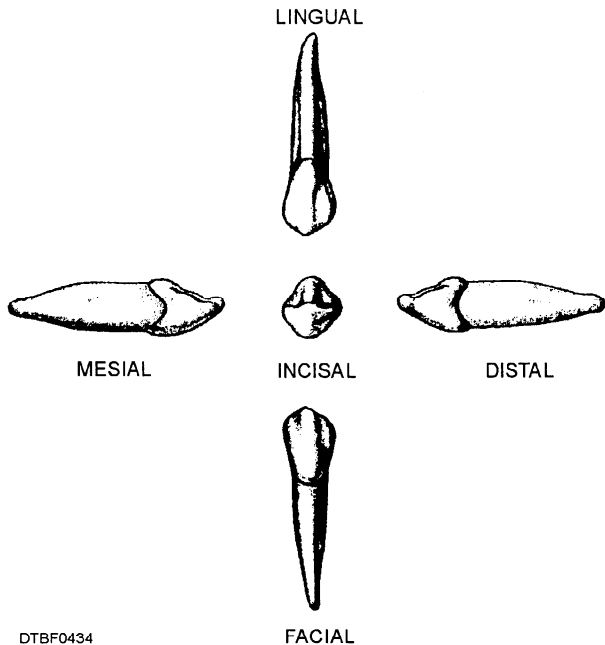


Figure 4-34.—Surfaces of a mandibular cuspid.

line. There is often a cingulum in the cervical portion of the lingual surface of the crown.

**Root Surface**—The root is single and is the longest root in the arch. It is usually twice the length of the crown. This is because the cuspid is designed for seizing and holding food.

### MANDIBULAR CUSPIDS

The mandibular cuspid (tooth #22 or #27) is illustrated in figure 4-34. These teeth, like the mandibular incisors, are smaller and more slender than the opposing teeth in the maxillary arch.

**Facial Surface**—The facial surface of a mandibular cuspid is much the same as that of a maxillary cuspid, except that the distoincisal cutting edge is almost twice the length of the mesial edge.

**Lingual Surface**—The lingual surface as a rule is very smooth, and a cingulum is rarely present.

**Root Surface**—The single root is not so long as that of the maxillary cuspid and is much flatter mesiodistal.

### MAXILLARY FIRST BICUSPID

The maxillary first bicuspid (tooth #5 or #12), illustrated in figures 4-35 and 4-36, is the fourth tooth from the midline. It is considered to be the typical bicuspid. (The word “bicuspid” means “having two

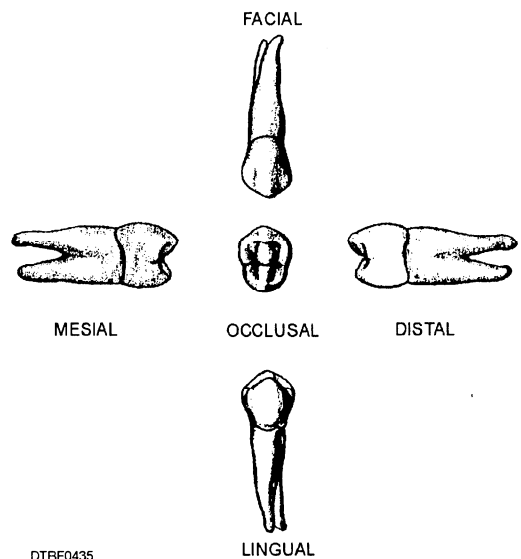


Figure 4-35.—Surfaces of maxillary first bicuspid.

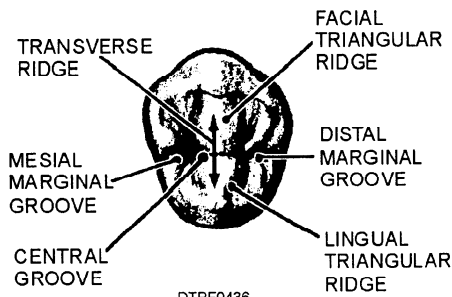
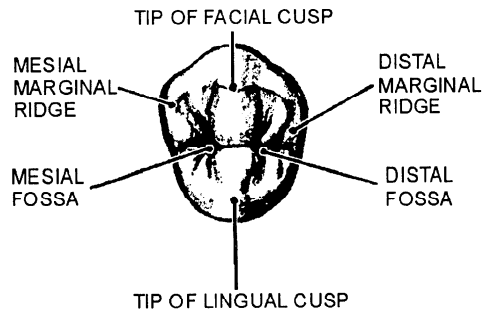


Figure 4-36.—Features of an occlusal surface of maxillary first bicuspid.

cusps.“) Sometimes bicuspid are called *premolars* because they are just in front of the molar teeth.

**Facial Surface**—The facial surface is somewhat similar to the facial surface of the cuspid. However, the tip of the facial cusp is located in the center of the “biting” edge, which is called the occlusal edge or occlusal margin. From the cusp tip to the cervical margin, there is a slight ridge, called the facial ridge, similar to the facial ridge found in cuspid teeth.

**Lingual Surface**—The lingual surface is narrower and shorter than the facial surface, and is smoothly convex in all directions. The cusp tip is in the middle of the occlusal edge.

**Root Surface**—The root is quite flat on the mesial and distal surfaces. In about 50 percent of maxillary first bicuspid, the root is divided in the apical third, and when it so divided, the tips of the facial and lingual roots are slender and finely tapered.

**Occlusal Surface**—The occlusal surface (fig. 4-36) has a facial cusp and a lingual cusp. There are mesial and distal marginal ridges. Two fossae are on the occlusal surface—the mesial and distal fossae.

## MAXILLARY SECOND BICUSPID

The maxillary second bicuspid (tooth #4 or #13), illustrated in figure 4-37, resembles the first bicuspid very closely, but is smaller in dimensions. The cusps are not as sharp as the maxillary first bicuspid and have only one root.

## MANDIBULAR FIRST BICUSPID

The mandibular first bicuspid (tooth #21 or #28), illustrated in figure 4-38, is the fourth tooth from the midline. It is the smallest of the four bicuspid. The term *bell-crowned* is used to describe its appearance. The mandibular first bicuspid has many characteristics of a cuspid.

**Occlusal Surface**—A large facial cusp, which is long and well defined, and a small nonfunctional lingual cusp are present on the mandibular first bicuspid.

**Root Surface**—The root of the mandibular first bicuspid is usually single, but on occasion can be bifurcated (two roots).

## MANDIBULAR SECOND BICUSPID

The mandibular second bicuspid (tooth #20 or #29), illustrated in figure 4-39, is the fifth tooth from the midline.

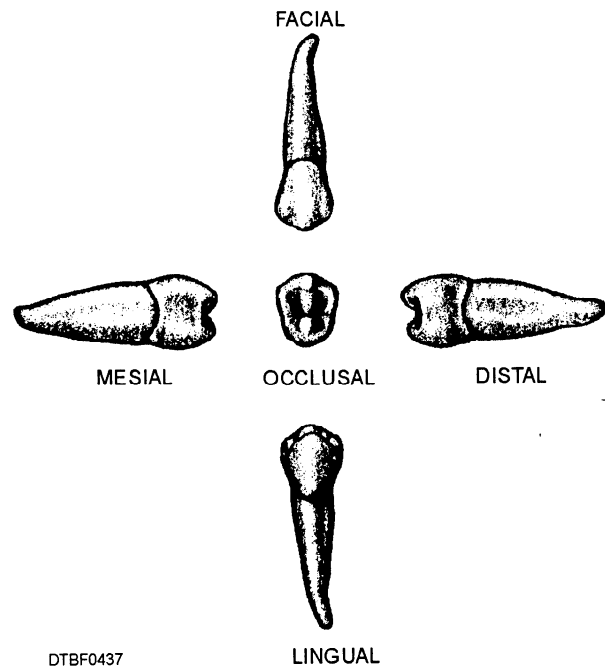
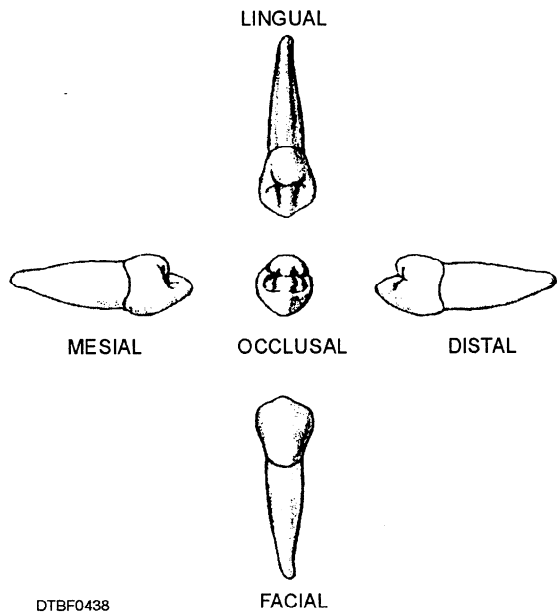
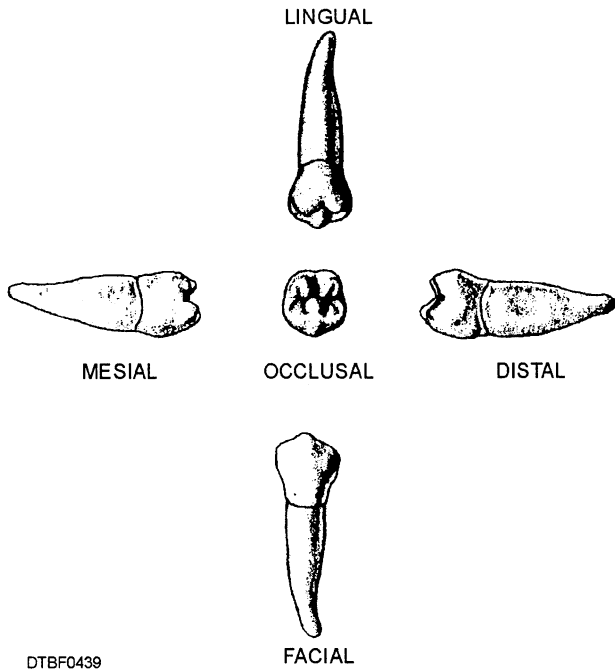


Figure 4-37.—Surfaces of maxillary second bicuspid.



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Figure 4-38.—Surfaces of mandibular first bicuspid.



DTBF0439  
Figure 4-39.—Surfaces of mandibular second bicuspid.

**Facial Surface**—The facial surface has the same facial surface as the first bicuspid.

**Lingual Surface**—The lingual surface is similar to that of the mandibular first bicuspid, with the exception that there may be two lingual cusps present.

**Occlusal Surface**—The occlusal surface usually has a total of three well-defined cusps. Viewed from above, the three cusp present a Y-form pattern.

**Root Surface**—The root of the tooth is single, and in a great many instances, the apical region is found to be quite curved.

### MAXILLARY FIRST MOLAR

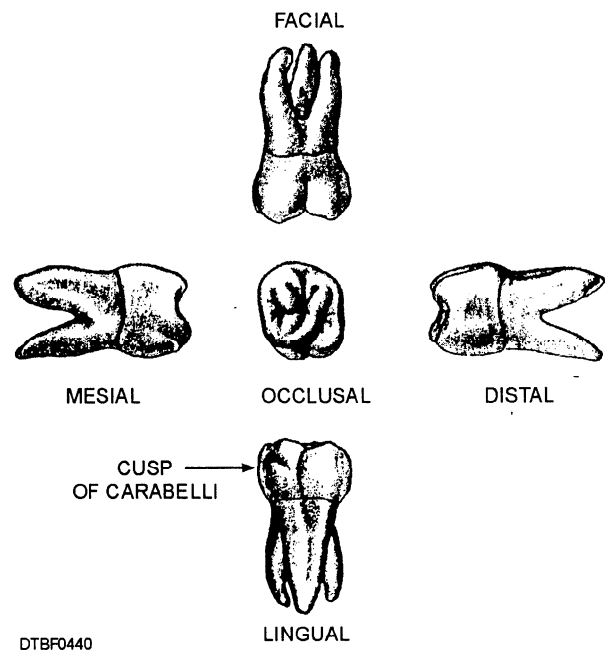
The maxillary first molar (tooth #3 or #14), illustrated in figures 4-40 and 4-41, is the sixth tooth from the midline. The first molars are also known as 6-year molars, because they erupt when a child is about 6 years old

**Facial Surface**—The facial surface has a facial groove that continues over from the occlusal surface, and runs down to the middle third of the facial surface.

**Lingual Surface**—In a great many instances, there is a cusp on the lingual surface of the mesiolingual cusp. This is a fifth cusp called the cusp of Carabelli, which is in addition to the four cusps on the occlusal surface.

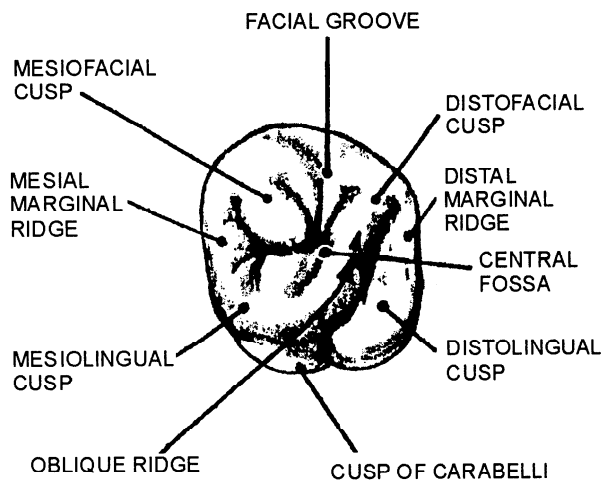
**Occlusal Surface**—In all molars the patterns of the occlusal surface (fig. 4-41) are quite different from those of the bicuspid. The cusps are large and prominent, and the broad grinding surfaces are broken up into rugged appearing ridges and well-defined grooves. An oblique ridge, which is not present on the bicuspid, appears here (it also appears on maxillary second and third molars).

**Roots**—The maxillary first molar has three roots, which are named according to their locations—mesiofacial, distofacial, and lingual (or palatal root). The lingual root is the largest.



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Figure 4-40.—Surfaces of maxillary first molar.





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**Figure 4-41.—Features of occlusal surfaces of maxillary first molar.**

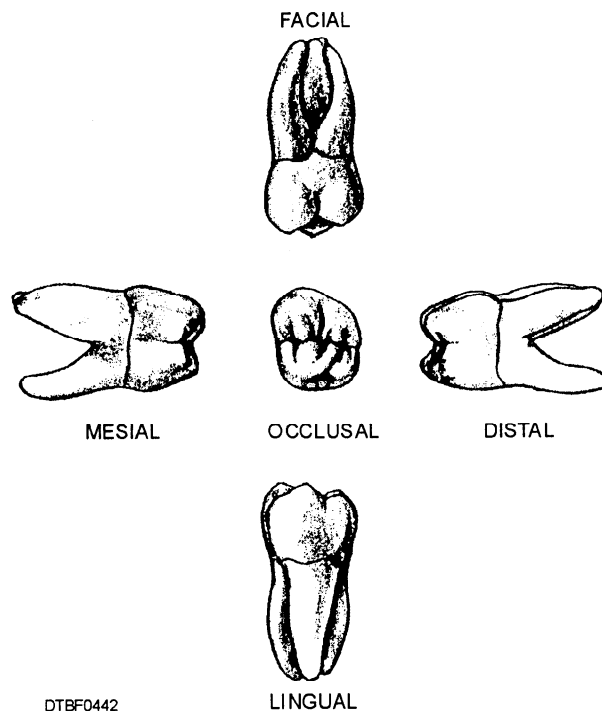
### MAXILLARY SECOND MOLAR

The maxillary second molar (tooth #2 or #15), illustrated in figure 4-42, is the seventh tooth from the midline. The second molars are often called 12-year molars because they erupt when a child is about 12 years old.

Because it has the same function as the maxillary first molar, its physical characteristics are basically the same. The second molar is smaller, the occasional fifth cusp of Carabelli does not appear, and there is a marked reduction in the size of the distolingual cusp.

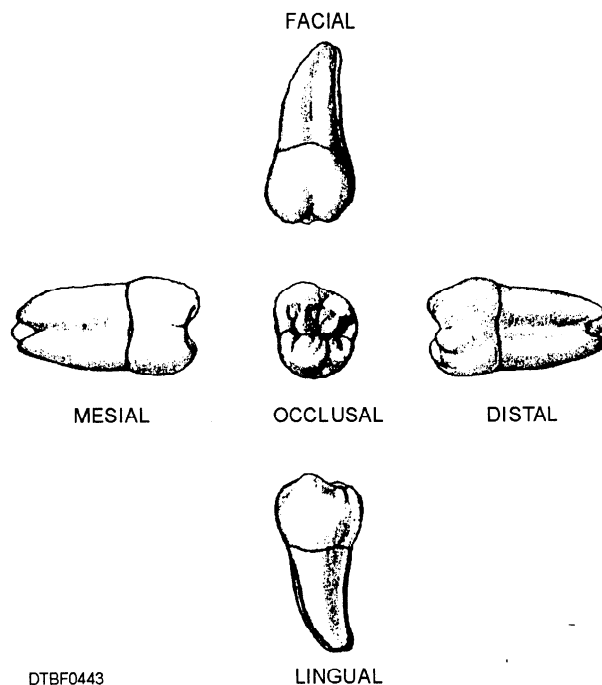
### MAXILLARY THIRD MOLAR

The maxillary third molar (tooth #1 or #16), illustrated in figure 4-43, is the eighth tooth from the midline. Third molars are often called wisdom teeth



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**Figure 4-42.—Surfaces of maxillary second molar.**



DTBF0443

**Figure 4-43.—Surfaces of maxillary third molar.**

because they erupt when the young adult is passing into manhood or womanhood. The tooth is much smaller than the maxillary first or second molars, with an occlusal outline that is nearly circular.

## Occlusal Surface

Numerous fissures and grooves cover the occlusal surface. There is no distinct oblique ridge.

**Root Surface**—The root may have from one to as many as eight divisions. These divisions are usually fused and very often curved distally.

## MANDIBULAR FIRST MOLAR

The mandibular first molar (tooth #19 or #30), illustrated in figures 4-44 and 4-45, is the sixth tooth from the midline. It is the first permanent tooth to erupt.

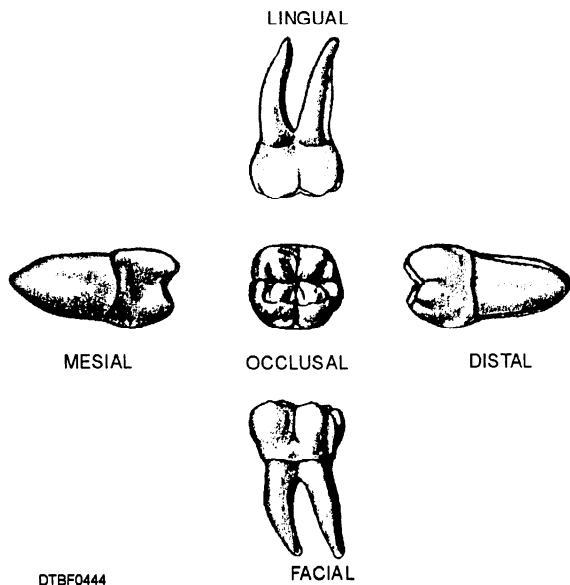
**Facial Surface**—The facial surface has two grooves: the facial groove, which is an extension of the facial groove from the occlusal surface and the distofacial groove, an extension of the distofacial groove from the occlusal surface.

**Occlusal Surfaces**—The occlusal surface has five cusps (fig. 4-45). The fifth cusp is called the distal cusp.

**Roots**—The tooth has two roots, a mesial and a distal.

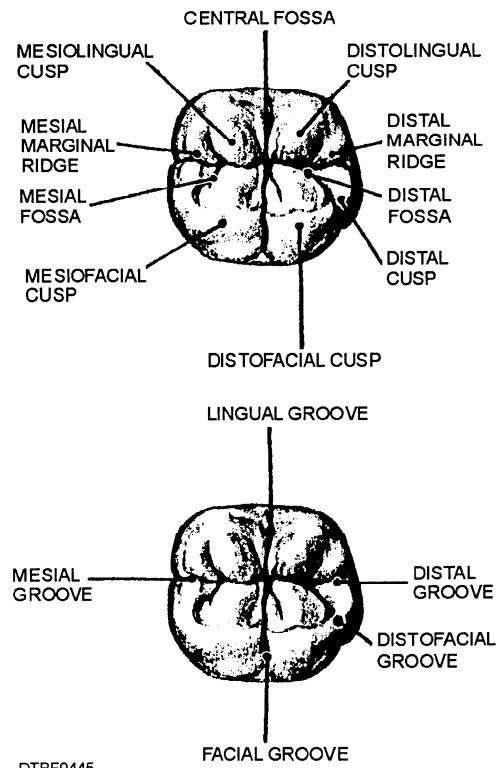
## MANDIBULAR SECOND MOLAR

The mandibular second molar (tooth #18 or #31), illustrated in figure 4-46, is the seventh tooth from the midline.



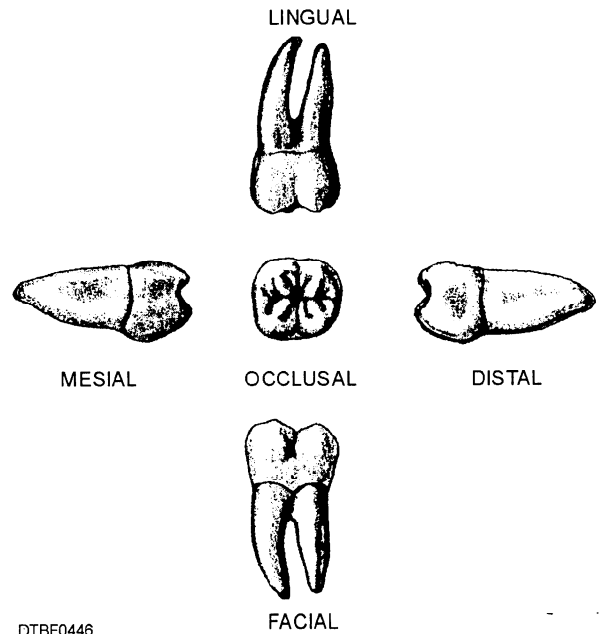
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Figure 4-44.—Surfaces of mandibular first molar.



DTBF0445

Figure 4-45.—Features of an occlusal surface of mandibular first molar.



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Figure 4-46.—Surfaces of mandibular second molar.

**Facial Surface**—The facial surface has only one groove, the facial groove, which arises on the occlusal surface, extends over the facial margin onto the facial surface.

**Occlusal Surfaces**—The greatest difference between the occlusal surfaces of the mandibular first

and second molars is that the occlusal surface of the second molar has no fifth cusp.

**Roots**—The mandibular second molar has two roots that are smaller than those of the first molar.

### MANDIBULAR THIRD MOLAR

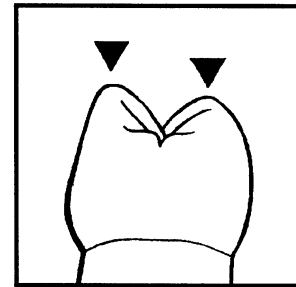
The mandibular third molar (tooth #17 or #32), illustrated in figure 4-47, is the eighth tooth from the midline. It appears in many forms, sizes, and shapes. Since its function is similar to that of the other two mandibular molars, its general appearance is the same. It has smaller surfaces, more supplemental grooves, and four or five cusps, which are not so sharply differentiated as those of the first two molars.

**Roots**—The roots, generally two in number, are shorter in length and tend to be fused together. In many instances they show a distinct distal curve.

### GLOSSARY OF UNIQUE DENTAL ANATOMY

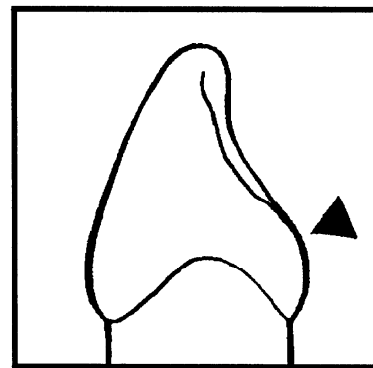
The following list will be helpful to you in understanding some of the anatomical terms used in this chapter.

**Cusp**—A pointed or rounded elevation of enamel found on cuspids and on the chewing surfaces of bicuspid and molars.



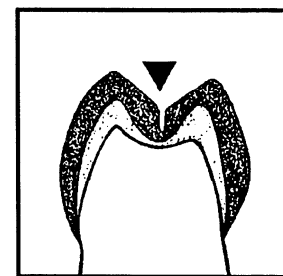
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**Cingulum**—Found on the lingual aspect of an anterior tooth. It is a convex mount of enamel localized to the cervical one-third of the crown.

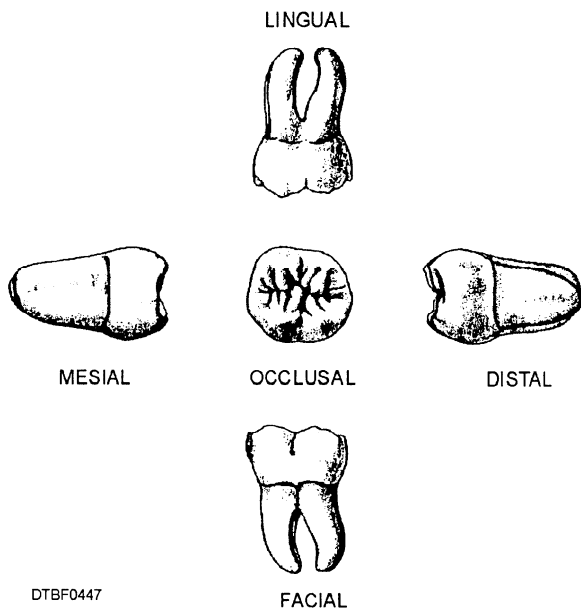


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**Fissure**—A linear fault that sometimes occurs in a developmental groove by incomplete or imperfect joining of the lobes. A pit is usually found at the end of a developmental groove or a place where two fissures intersect.



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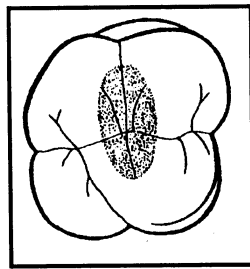


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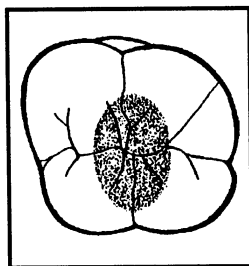
Figure 4-47.—Surfaces of mandibular third molar.

**Fossa**—A rounded or angular depression of varying size found on the surface of a tooth.

**Central fossa**—Centrally located depression found on the occlusal surface of molars and mandibular second bicuspid. The other bicuspid has mesial and distal triangular fossa, but do not have a central fossa.

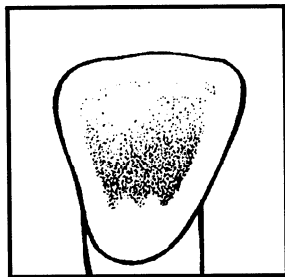


MAXILLARY MOLARS



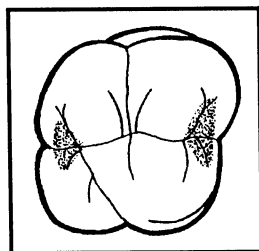
MANDIBULAR MOLARS  
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**Lingual fossa**—Irregular, shallow depression found on the lingual surfaces of an incisor or cuspid.



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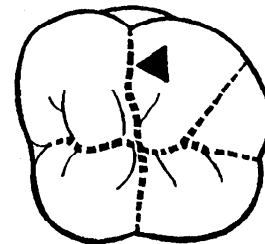
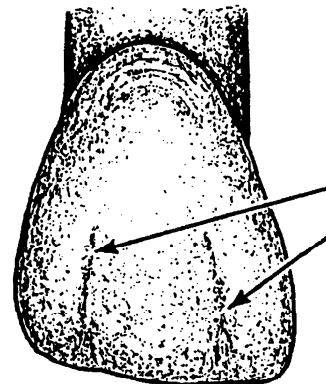
**Triangular fossa**—Located adjacent to the marginal ridges on the occlusal surfaces of posterior teeth. Two types of triangular fossae are mesial and distal.



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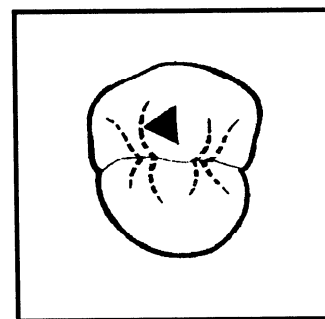
**Groove**—A small linear depression on the surface of a tooth.

**Developmental groove-Fissure**—Between the cusps on the crown of the tooth. Cusp tips are the initial site where enamel develops. As the enamel develops and spreads laterally, it touches enamel developing from other cusps. This junction forms a developmental groove. Such grooves appear on the labial, buccal, and lingual surfaces, and are least apparent on the labial aspect of anteriors.



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**Supplemental groove**—A minor, auxiliary groove that branches off from a much more prominent developmental groove. They do not represent the junction of primary tooth parts and give the occlusal surface a wrinkled appearance.

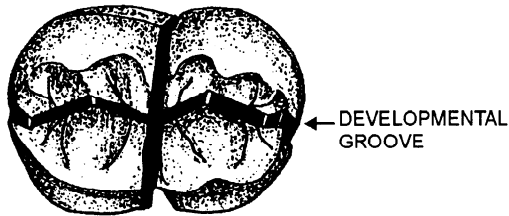


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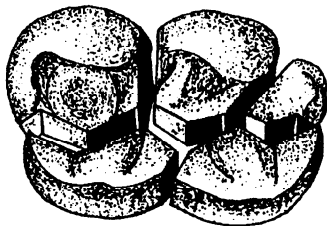
**Lobe**—Is one of the primary divisions of a crown; all teeth develop from four or five lobes. Lobes are usually separated by readily identifiable developmental grooves.



LOBES OF A CENTRAL INCISOR



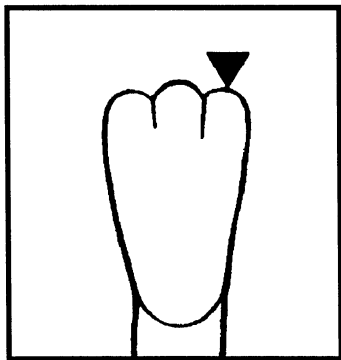
LOWER SECOND MOLAR



LOWER FIRST MOLAR

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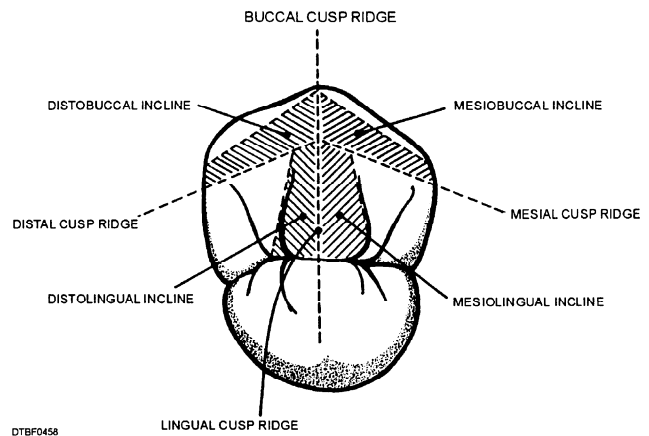
**Mamelons**—Are small, rounded projections of enamel from the incisal edges of newly erupted anterior teeth. The projections wear away soon after eruption.



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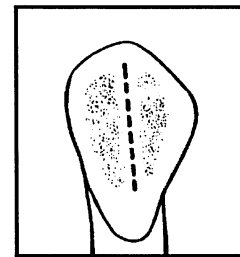
**Ridge**—Any linear elevation found on the surface of a tooth, named according to its location or form.

**Cusp ridge**—Each cusp has four cusp ridges radiating from its tip. They are named according to the direction they take away from the cusp tip (for example, mesial, distal, buccal, or lingual).



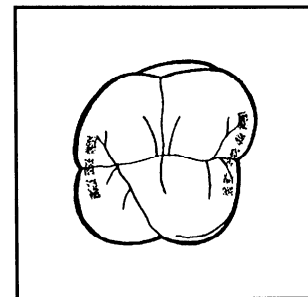
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**Lingual ridge**—The ridge of enamel that extends from the cingulum to the cusp tip on the lingual surface of most cusps.



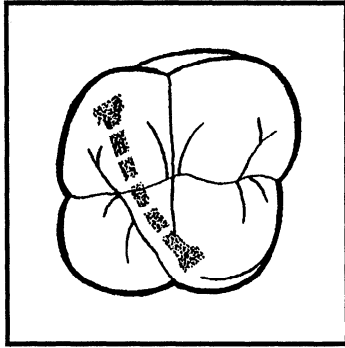
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**Marginal ridge**—A linear, rounded border of enamel that forms the mesial and distal margins of anterior teeth as viewed from the lingual, and the mesial and distal borders of occlusal surfaces on posterior teeth.



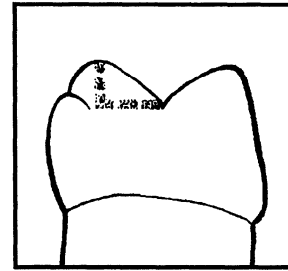
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**Oblique ridge**—The only tooth on which an oblique ridge is found is the maxillary molar. Consists of an elevated prominence on the occlusal surface and extends obliquely from the tips of the mesiolingual cusp to the distobuccal cusp.



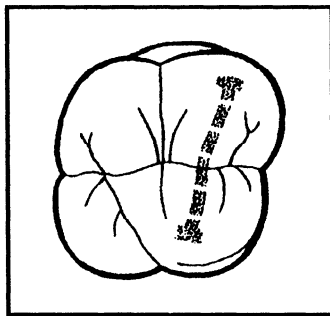
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**Triangular ridge**—Two inclines meet to form a triangular ridge and are located either on a facial or a lingual cusp ridge.



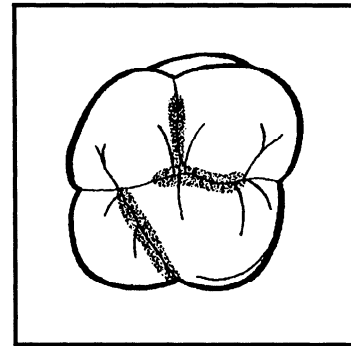
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**Transverse ridge**—The union of a buccal and lingual triangular ridge that crosses the surface of a posterior tooth transversely (roughly 90° to both the buccal and lingual tooth surfaces).



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**Sulcus**—An elongated valley or depression in the surface of a tooth formed by the inclines of adjacent cusp or ridges.



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## CHAPTER 5

# ORAL PATHOLOGY

Oral pathology is the science that treats the nature, causes, and development of oral diseases. It includes both the clinical and the microscopic study of structural and functional changes that cause, or are caused by, oral and other diseases. Either the calcified or the soft tissues of the oral cavity, or both, may be involved.

Some of the abnormal conditions that exist in the oral cavity and cause patients to request treatment will be described in this chapter and chapter 6, "Treatment of Oral Diseases." Occasionally, the Dental Technician might be the first one to observe these pathologic conditions in the patient's mouth. Always notify a dental officer if you observe a condition you may have in question. Never make a diagnosis or tell a patient what you think he/she might have. That area of expertise is the sole responsibility of the dental officer.

Although there are many oral anomalies (deviations from normal), this chapter is limited to the two classes of prime interest to Dental Technicians. These classes are discussed in the following statements:

- **Congenital anomalies**—Occur before birth. Examples of such are cleft lip (fig. 5-1), and supernumerary teeth.

- **Acquired anomalies**—Occur after birth. Examples are periodontal disease and dental caries.
- **Pathogenic conditions of the oral cavity** may be caused by:
  - Pathologic micro-organisms:** Destroy the calcified tissues and inflame the soft tissues in the oral cavity.
  - Defective development:** Involves the calcified tissues as a result of infection, trauma, nutritional deficiencies, disease, or heredity.
  - Degeneration:** Involves the hard or soft tissues.
  - Malocclusion:** Results from defective development of the jaws or loss of teeth, and produces excessive stress on portions of the periodontium.
  - Trauma:** Involves either the calcified or soft tissues.



**Figure 5-1.**—Cleft lip of an infant.

—Neglect: Result of the lack of proper oral hygiene.

## MICRO-ORGANISMS

Salivary glands secrete about 1,500 ml of saliva on a daily basis. Microscopic counts in saliva show an average of 750 million micro-organisms per milliliter. Because the temperature in the oral cavity is around 98.6° Fahrenheit, the mouth is the perfect environment for micro-organisms to live. Micro-organisms have a dark, moist, warm area, and a good source of food supply to live. These micro-organisms can be divided into four major classifications—bacteria, protozoa, viruses, and fungi—which will be discussed in chapter 9, "Infection Control."

## ORAL LESIONS

Oral lesions can be defined as any pathological or traumatic disorder of tissue that creates a loss of function of the area affected. They can include wounds, sores, and any other tissue damage resulting from disease or injury. Many types of lesions can occur in the mouth. The location of the lesion can assist in determining the type.

### LESIONS BELOW THE SURFACE

The types of lesions that extend below the surface of the mucosa and are the most common in oral pathology are the following:

- **Abscess**—A localized collection of pus in a specific area of soft tissue or bone. Often it is confined in a particular space, and is commonly caused by a bacterial infection.
- **Cyst**—An enclosed pouch or sac that contains fluid or semisolid material.
- **Ulcers**—A disruption of the superficial covering of the mucosa or skin. May be caused by biting, denture irritation, toothbrush injury, viruses or other irritants.

### ELEVATED LESIONS

Numerous types of lesions are above the surface of the mucosa. Two of the most common are discussed below.

- **Vesicles**—A small elevation that contains fluid. Most of these lesions in the oral cavity rupture, leaving superficial ulcers.

- **Hematoma**—A localized collection of blood that escaped from blood vessels due to trauma. It is well-defined and with time, changes to a dark color.

## NONELEVATED LESIONS

Two common lesions of the oral mucosa in this category are as follows:

- **Petechiae**—Round pinpoint, nonraised, purplish-red spots, caused by mucosal or dermal hemorrhage.
- **Ecchymoses**—Large, purplish-red areas caused by blood under the skin or mucosa; turns to a blue or yellow color.

## DISEASES OF THE TEETH

Teeth become diseased for many reasons. We will look at some of the more common diseases found in teeth such as impaction, attrition, abrasion, erosion, resorption, and dental caries.

### IMPACTION

An *impaction* (fig. 5-2) is the condition in which a tooth is blocked by a physical barrier, usually teeth or bone. A tooth may not erupt in the normal time period if an impaction occurs. Some of the causes of impacted teeth are:

- Movement of the erupting tooth into a horizontal, vertical, or other abnormal position.
- Early loss of deciduous teeth.
- Insufficient jaw space, abnormally large tooth crowns, supernumerary or other teeth in a dental arch.

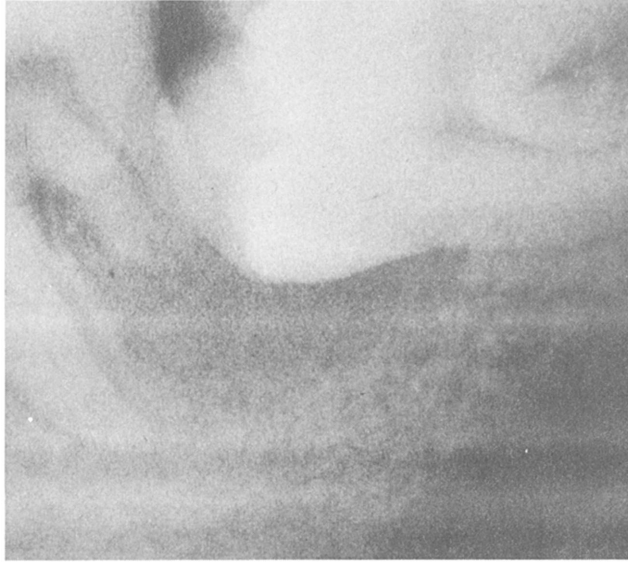
### ABRASION AND ATTRITION

*Attrition* (fig. 5-3) is the loss of substance of a tooth from a wearing away process caused by teeth against teeth. Whereas, *abrasion* results in the loss of tooth structure secondary to the action of external agents.

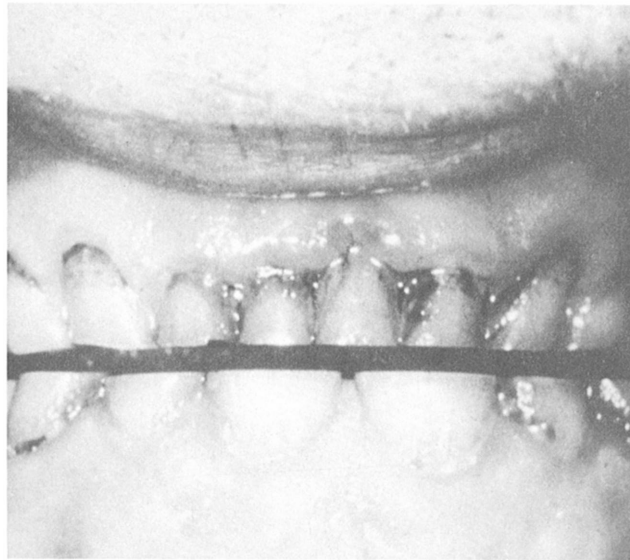
In attrition, wear involves aspects on the incisal, occlusal, and interproximal surfaces of the teeth and is considered a normal or gradual loss of tooth substance because of the mastication of food. Causes of occlusal attrition can result from bruxism (grinding of teeth), chewing of tobacco or gum, or other oral habits that involve mastication.

In abrasion, one or more teeth may show wear, generally brought about by improper toothbrushing,





**Figure 5-2.—Impaction.**



**Figure 5-3.—Attrition.**

biting foreign objects such as a pipestem, thread, or bobby pins. Other mechanical actions such as a poorly fitted clasp of partial dentures or acid from food debris can cause abrasion.

### **EROSION**

*Erosion* is a loss of tooth substances from a chemical process that does not involve bacteria. It

occurs usually on the facial surfaces at the gingival third of the crown and often involves the maxillary incisors. The enamel and dentin on the floor of the lesion are smooth, hard, and glistening. Some types of lesions are called idiopathic erosion because the factors producing this condition are unknown or may occur from a known acid source such as people who have bulimia (who vomit frequently).

During the early stages of erosion, the eroded areas are very sensitive to heat and cold, acid foods, and toothbrushing, but sensitivity may decrease when secondary dentin is formed.

## DENTAL CARIES

Man has suffered the effects of dental caries for centuries, and much study and research have been devoted to their causes and prevention. The disease is caused by a microbial process that starts on the surface of the teeth and leads to the breaking down of the enamel, dentin, and cementum, in some cases causing pulp exposure. This pathologic break that is produced on or in the tooth surface is called *acariou lesion* (fig. 5-4) or commonly called a cavity. The process that destroys the hard surfaces of the tooth is called *decay*.

### Contributing Factors

The cause of tooth decay has been linked to a group of bacteria called streptococci and other acid producing bacteria that are in the oral cavity. Decalcification of the enamel, the first step in the decay process, is caused by:

- Bacterial plaque adhering to the smooth surfaces of the teeth
- Acid, produced by bacteria in food debris, being trapped in pits and fissures

### Decay Process

Dental caries usually appear first as a chalky white spot on the enamel, which indicates the decalcification process. If proper oral hygiene is not maintained, the lesion may become stained and take on a dark appearance. In pit and fissure caries, the area of decalcification at the surface is normally small, and the white spot is less noticeable than in smooth surface caries. In either type of caries, the surface becomes roughened, as can be noted by passing a dental explorer point over it. If the tooth surface has an area that has not progressed past the decalcification stage, this type of carious lesion is called incipient. As the decay spreads in the enamel, it may stop. If this occurs, the process is called an arrested carious lesion (fig. 5-5). These areas in which dental caries have been arrested are dark and, in some instances, hollowed out. A dental explorer passed over or in these areas will feel hard to the touch. If the area still has active decay, the explorer may “sink in” the soft decay.

Dental caries can progress further into the dentin of the tooth, and spread out laterally widely undermining the enamel and dentin. If this occurs, often there may be no visible changes until extensive destruction has taken place. The condition of the caries if not arrested or restored with operative dentistry (filling) will spread through the dentin into the pulp of the tooth, thus requiring endodontic treatment (root canal).

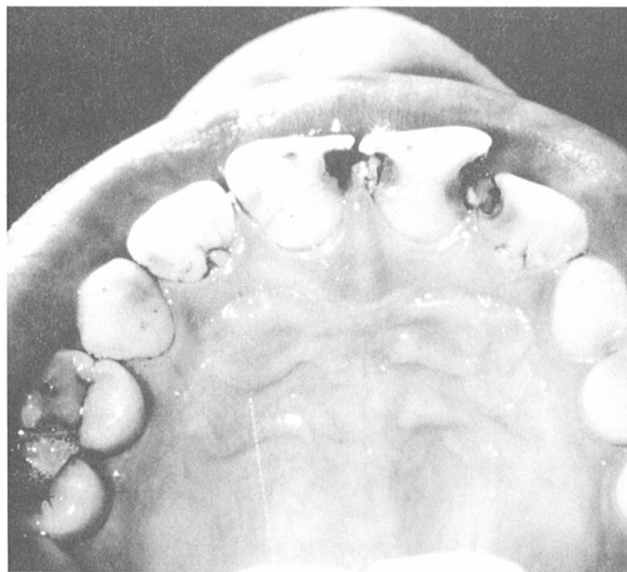


Figure 5-4.—Carious lesions.

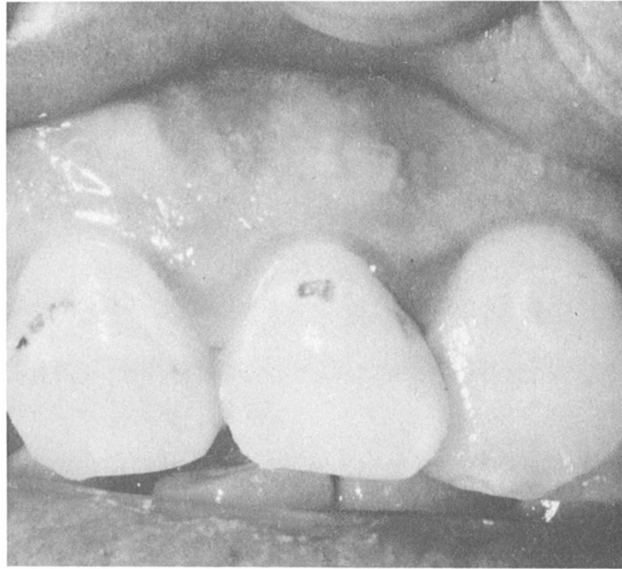


Figure 5-5.—Arrested caries.

## RECURRENT CARIES

**Recurrent** caries are decay processes that occur underneath existing dental restorations. More simply stated, another cavity has occurred in the tooth where there was a filling or restoration. Some of the causes are as follows:

- Improper cavity preparation—The dentist was unable to remove all of the decay in the tooth before the placement of a restoration.
- Inadequate cavity restoration—Open margins (space in-between the restoration and tooth).
- Old restorations—The margins of the restoration break down or are not completely sealed when originally placed, creating a "leaky margin."

## TYPES OF CARIOUS LESIONS

Depending on its location, a carious lesion is designated as either a pit and fissure type or a smooth surface type. Pit and fissure caries develop in depressions of teeth surfaces that are hard to keep clean of food debris and plaque.

Smooth surface caries usually develop on the proximal surface (fig. 5-6) or the gingival third of facial and lingual surfaces on the teeth. These areas in-between (interproximal) the teeth are where plaque accumulate and form, starting the decay process.

## DISEASES OF THE DENTAL PULP

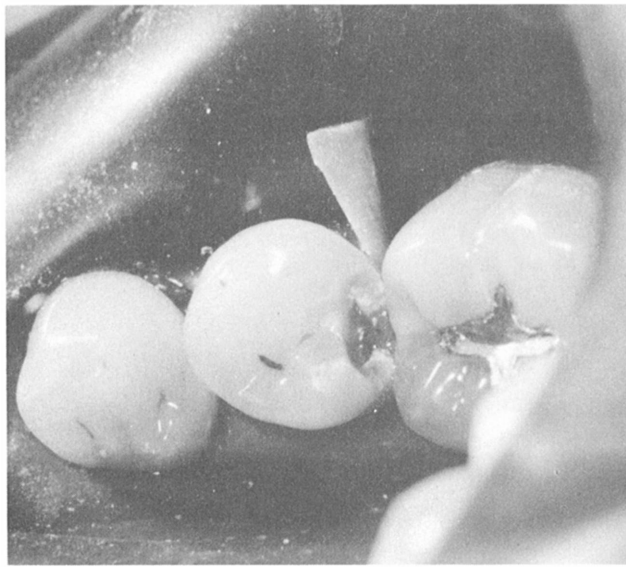
The dental pulp is a living tissue. All living tissues can die or become diseased. The dental pulp is composed of vascular connective tissue encased in dentin, which provides protection. Even with this protection, the pulp may receive injuries by thermal changes, carious lesions from micro-organisms, and mechanical trauma. The extent of pulpal damage and the vitality (life) of the tooth depend on the severity of injury and how the pulp will react to disease. The term pulpitis refers to any disease involving the dental pulp. Some of the more common diseases of the pulp are pulpalgia, pulpitis, periapical abscess, and necrosis, which are briefly explained next.

### PULPALGIA

*Pulpalgia* refers to pain in the dental pulp, and commonly occurs after a restoration has been placed in a tooth. It can also be caused by root planing and periodontal surgery. The tooth may become sensitive to touch, temperature changes, and sweet or sour foods. Pain associated with pulpalgia has been described as short, sharp shooting pain that may increase when lying down or walking upstairs.

### PULPITIS

*Pulpitis* is an inflammation of the dental pulp, usually caused by a bacterial infection resulting from



**Figure 5-6.—Interproximal caries.**

dental caries or fractured teeth. Pulpitis may be caused by other conditions, such as chemical irritants and thermal changes with materials used in dental restorations that can transmit heat or cold to the dental pulp. When micro-organisms enter the pulp, they start to produce severe damage, which leads to a buildup of pressure in the canal. The result of this pressure may cause a dull ache that can lead to a more severe, pulsating pain. When severe pulpitis occurs, the dentist may remove a portion or all of the pulp in an injured tooth.

### **PERIAPICAL ABSCESS**

A *periapical abscess* results when the pulp has become inflamed and a small pus-like abscess forms in the pulpal canal. If left untreated, the inflammation spreads out through the apex of the root and into the bone. As the abscess gets bigger, pressure from the inflammation and pus at the apex of the root may cause the tooth to be pushed up higher in its socket. The patient may complain the tooth feels “high” when biting and very sensitive to touch.

Bone loss around the apex of the tooth can occur if left untreated. The abscess and bone loss at the apex cause a radiolucency appearing like a “grape” when viewed radiographically. The course that the abscess of pus follows from the apex, into the jaw bone, and drains into the mouth is referred to as a *fistula*

### **NECROSIS**

The death of tissue is called *necrosis*. Pulpal necrosis can occur as a result of untreated pulpitis or

from a traumatic injury. A tooth that is necrotic must be treated. The dead pulpal tissue will decompose, producing toxins that will smell foul or rotten when the tooth is being treated. Dental pain may or may not occur from a necrosis.

## **PATHOLOGY OF THE PERIODONTIUM**

Periodontal disease is the most prevalent chronic disease of mankind. The term *periodontal disease* refers to all diseases of the periodontium and can affect the tissues around and supporting the teeth. As a basic dental assistant, you should know symptoms of periodontal disease your patients might describe:

- Bleeding gingival tissue during toothbrushing
- Tender or red swollen gums
- Receding gingival tissue
- Tooth shifting or elongation (looks longer)
- Mobile (loose) teeth
- Purulent exudate (pus) in-between the teeth and gums
- Abnormal change in the fit of partial dentures
- Halitosis (bad breath)

### **GINGIVITIS**

*Gingivitis* is an inflammation involving the gingival tissues. Conditions pertaining to the gingiva of principal concern to the Dental Assistant are marginal gingivitis and acute necrotizing ulcerative gingivitis.

## Marginal Gingivitis

*Marginal gingivitis* (fig. 5-7) is the most common type of gingival disease. Most frequently it is the result of poor oral hygiene and affects both the gingival margins and papilla. Chief irritants are food debris and plaque around the necks of the teeth, interproximal spaces, or overhanging margins of dental restorations. Occasionally, a localized inflamed condition may exist from a popcorn husk or toothbrush bristle. Early formation of calculus deposits can also form under the gingival sulcus (subgingival) on the facial and lingual surfaces of the upper and lower teeth. Calculus deposits can also be responsible for the occurrence of marginal gingivitis, and if left untreated, may proceed to destruction of the supporting structures (as in periodontitis).

Marginal gingivitis usually starts at the tips of the papillae and then extends to the gingival margins. Swelling, loss of stippling (orange peel texture of surface) of the attached gingiva, redness, easily retractable sulcus, and foremost, a tendency to bleed easily, are the main characteristics. This condition may be generalized (exist around all teeth), or it may be localized to one or two or a group of teeth.

### Acute Necrotizing Ulcerative Gingivitis

Acute necrotizing ulcerative gingivitis (ANUG) (fig. 5-8) is a disease commonly referred to as

trenchmouth, or Vincent's infection. It is characterized during the acute stage by redness, swelling, pain, accumulation of calculus around the sulcus of the teeth, and bleeding of the gingival tissues. Usually there is a film of necrotic white or grayish tissue around the teeth. This membrane may be wiped off, leaving a raw, bleeding base. The ulceration of the gingival crest results in a characteristic punched-out appearance and loss of the interdental papillae. There is an unpleasant odor and a foul taste in the mouth. The gingival tissues bleed easily when touched, and patients will complain of not being able to brush their teeth or chew well because of the pain or discomfort.

## PERIODONTITIS

*Periodontitis* (fig. 5-9) is a chronic inflammatory condition that involves the gingiva, crest of the alveolar bone, and periodontal membrane. This condition results in loss of bone that supports the teeth, periodontal pocket formation, and tooth mobility. It usually develops as a result of untreated chronic marginal gingivitis. The color of the gingival tissues is intensified and becomes bluish red as the disease progresses. A gradual recession of the periodontal tissue will occur. Neglected deposits of calculus and formation of additional calculus over time contribute to the spread of the disease. Like marginal gingivitis, it may affect the entire dentition, or only localized areas.

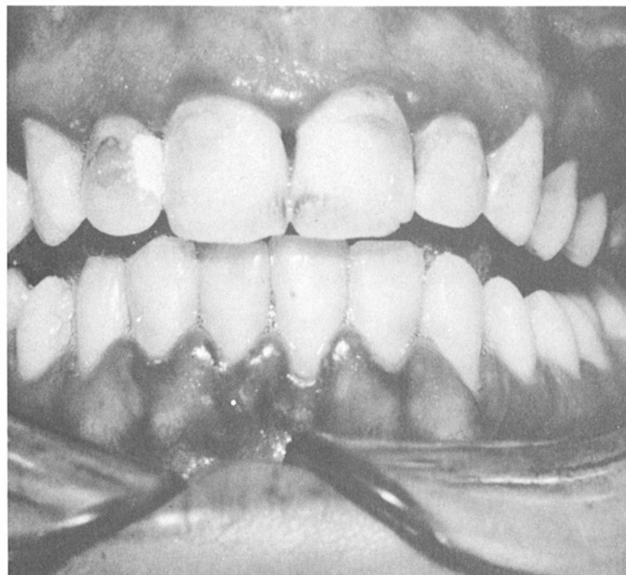
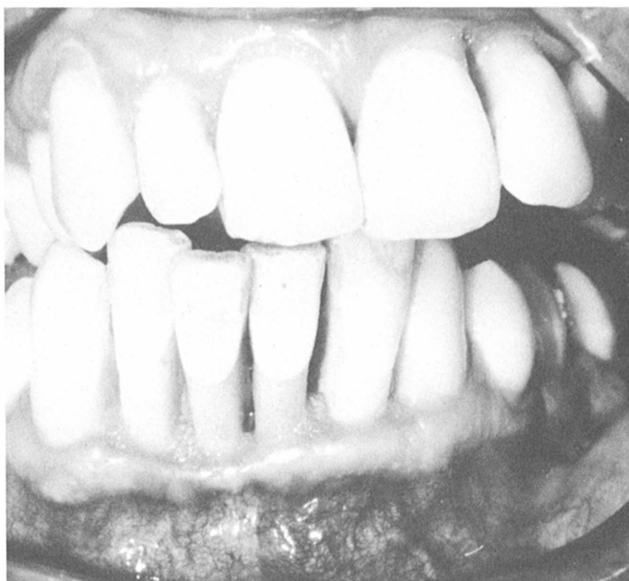


Figure 5-7.—Marginal gingivitis.



**Figure 5-8.—Acute necrotizing ulcerative gingivitis (ANUG).**



**Figure 5-9.—Periodontitis.**

### **Pocket Formation**

As the inflammation continues, micro-organisms and their products progress toward the apex of the tooth, forming a *pocket* in which additional calculus forms. Frequently, the gingival margin also recedes toward the apex and the pocket is shallow. With pocket formation, the gingival tissue bleeds easily, and shelflike projections of calculus form between the teeth. These calculus formations irritate the

interdental papillae, which become ulcerated and finally are destroyed.

As the rest of the alveolar bone is resorbed, the attachment fibers of the periodontal membrane are loosened. They may remain attached to the tooth for a time, but finally they are destroyed, and the pocket can extend farther toward the apex of the tooth. Eventually, if the condition remains untreated, the tooth will be lost through destruction of its supporting tissues.

## Periodontal Abscess

A *periodontal abscess* (fig. 5-10) usually results from long-continued irritation by food debris, plaque, deep deposits of calculus, or foreign objects such as a toothbrush bristle or popcorn husk being tightly packed in the interproximal spaces or within the walls of a pocket. The gingiva surrounding the area becomes inflamed and swollen.

## PERICORONITIS

*Pericoronitis* is an inflammation of the gingiva around a partially erupted tooth. The mandibular third molars are most often affected, although any erupting tooth may be involved. In the mouth of a young adult, part of a tooth can be seen projecting through the gingiva, usually distal to the second molar. The surrounding tissues are usually acutely inflamed. The inflammation may be caused by irritation resulting from the patient's inability to keep the area properly cleansed. Another cause of inflammation is infection from oral pathogens that gained access to the tissues

surrounding the crown of the erupting tooth through the opening made by a projecting tooth cusp. The "gingival flap" may become infected after inflammation as a result of the constant irritation caused by contact with the occlusal surface of an erupting maxillary third molar.

## DISEASES OF THE ORAL SOFT TISSUES

Many oral diseases can affect the soft tissues. We will cover only a small portion of the most common types. These lesions can be caused by viruses, bacteria, fungi, and physical and chemical agents. Direct contact with the diseases covered may present some degree of hazard or a life-threatening disease to you, the Dental Assistant. Always follow infection control procedures when in contact with all patients.

## RECURRENT APHTHOUS STOMATITIS

*Recurrent aphthous stomatitis* (RAS) (fig. 5-11), or canker sores, are painful ulcerations. These lesions

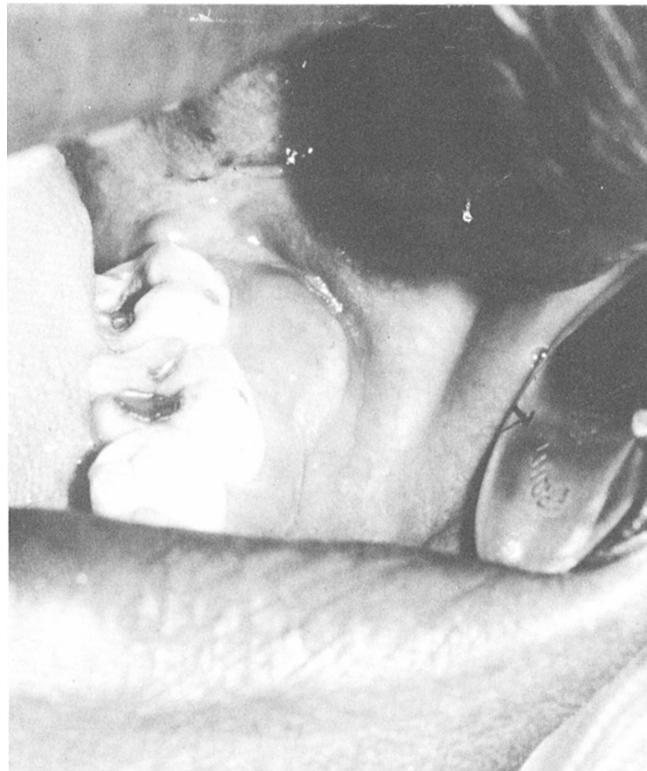


Figure 5-10.—Periodontal abscess.



**Figure 5-11.—Recurrent aphthous stomatiti (RAS).**

are found in the vestibular and buccal mucosa, tongue, soft palate, and in the floor of the mouth. The exact cause of these lesions are not known, but studies show that physical and emotional stress make them appear. Also injuries from toothbrushing, eating harsh foods, and allergies can start RAS. The healing time of the ulcers is usually 7 to 10 days.

## **VIRAL INFECTIONS**

The viral infections of main concern that will be explained are those caused by the herpes simplex virus (HSV), and the human immunodeficiency virus, also referred to as the HIV (causing AIDS) virus. Both are extremely contagious to you and your other dental patients through cross contamination of dental instruments and dental equipment. Also the virus can gain access via the skin, the eye, or mucous membranes. If you treat a patient with one of these or other viruses, ensure you follow the proper infection control procedures outlined in chapter 10.

### **Herpes Simplex Viruses**

The herpes simplex viruses are among the most common infectious agents. There are two types:

- Herpes simplex virus—Type 1 (HSV-1)
- Herpes simplex virus—Type 2 (HSV-2) (genital herpes)

In oral pathology the most commonly diagnosed sites for HSV-1 are the oral cavity, tongue (fig. 5-12), lips, and the eyes. Direct contact with HSV-1 lesions is probably the most common mode of spread. Transmission through saliva is possible even if there are no active lesions. Infection on the hands of healthcare personnel from patients shedding HSV can result in herpetic lesions.

Other lesions of the HSV-1 virus are acute herpetic gingivostomatitis, characterized by red and swollen gingiva. All of the oral mucosa is tender and eating is painful. Vesicles form throughout the mouth and rupture, leaving painful ulcers.





Figure 5-12.—Herpes simplex virus-Type 1 (HSV-1).

The most common of all the herpetic HSV-1 lesions is herpes labialis. They frequently involve the lips and adjacent skin at the corners of the mouth. Recurrence usually starts at the same location, starting with a burning, tingling sensation and then forming vesicles that fuse together leaving large lesions. After the vesicles rupture, crusting of the surface occurs. These lesions are known as “fever blisters.” The crusted lesions are also referred to as “cold sores,” because a common cold sometimes accompanies these HSV-1 lesions. Known causes for the reoccurrence of the HSV-1 lesions are:

- Sunlight
- Menstruation
- Dental treatment (local trauma)
- Stress or anxiety

The recurrent HSV-1 lesions usually take about 7 to 10 days to resolve. Any routine dental treatment is recommended to be rescheduled during the active phase of these lesions because the disease is highly transmissible.

### **AIDS Virus (HIV Infection)**

The human immunodeficiency virus type 1 (HIV-1) is the main cause of the acquired immunodeficiency syndrome (AIDS). It is a worldwide epidemic. This deadly disease is a direct

threat to all dental health professionals and other healthcare workers who are exposed to patients who carry the virus.

Healthcare workers can be exposed to the AIDS virus through contaminated body fluids, exposure to blood or blood products, instruments, and equipment. You should also know some of the oral manifestations that infected people may have. Some of them are the initial signs a dentist can use to diagnosis patients who are carriers of the virus, but who have not been tested or diagnosed. Some of the more common oral manifestations of HIV infection are as follows:

- *Candidiasis*—(fig. 5-13) a fungal infection of the mouth, usually red or white in color
- *Hairy leukoplakia*—(fig. 5-14) a viral infection, whose lesions appear as white, slightly raised, on the tongue
- *Kaposi's sarcoma*—(fig. 5-15) cancerous, dark bluish-purple lesions that involve blood vessels

Procedures and precautions for protection will be discussed in chapter 10, “Infection Control.”

### **ORAL CANCER**

Forms of oral cancer are found in the oral cavity at any site, but most often in the tongue, floor of the mouth, and the lower lip. The cancer is a neoplasm



**Figure 5-13.—Candidiasis.**



**Figure 5-14.—Hairy leukoplakia.**

(tumor) and is a growth of abnormal tissue. There are two types of neoplasms:

- Benign tumors—not life threatening
- Malignant tumors—life threatening if left untreated

#### **Classifications of Malignant Tumors**

Dentists are trained and give special attention when performing an oral cancer screening on a patient

to detect any type of cancer. Often these lesions do not cause any pain while in the early stages of development. A malignant tumor can become fatal if not found in its early stages or if left untreated. The following are classifications of malignant tumors.

- *Carcinoma*—cancer of the epithelium usually found on the oral mucosa of the mouth, lips (fig. 5-16), tongue, cheeks, and floor of the mouth. Carcinomas start off looking like elevated or ulcerated lesions, and

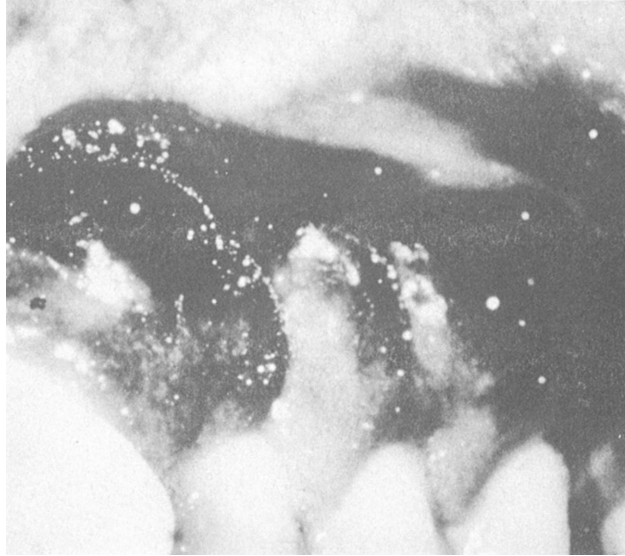


Figure 5-15.—Kaposi's sarcoma.

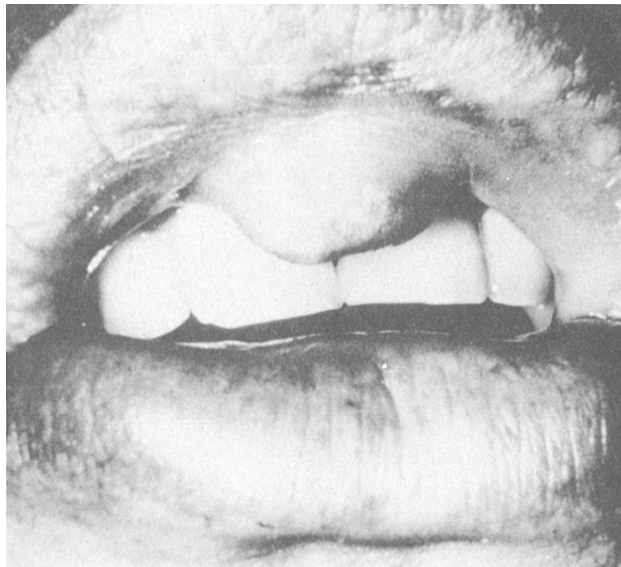


Figure 5-16.—Carcinoma of the upper lip.

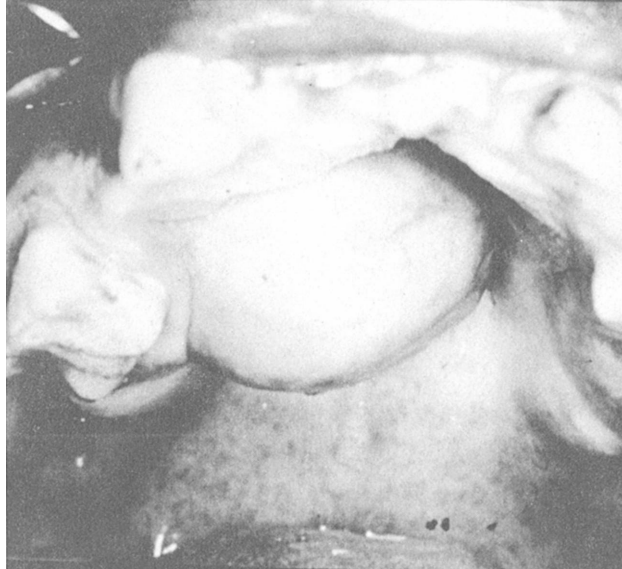
can quickly spread to other locations on the body and invade the lymph nodes.

- *Adenocarcinoma* —usually found in the oral region or salivary glands, most often of the palate (fig. 5-17) and appears as a lump or a bulge under the mucosa.

- *Sarcomas*—affects the supportive and connective tissues, for example, bones of the jaw.

#### **Causes**

The causes for many neoplasms are unknown. What is known is that the disease is characterized by



**Figure 5-17.—Adenocarcinoma.**

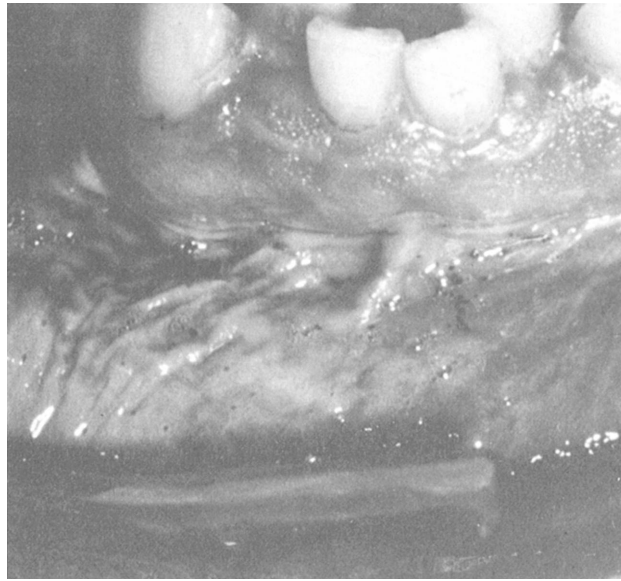
the abnormal growth and spread of cancer cells. This growth or spread of malignant tumors from one area to another is called *metastasis*. Modern research concerning the development of neoplasms has been linked to the following factors:

- Hereditary
- Chemicals (carcinogens, such as found in tobacco smoke and alcoholic beverages)
- Overexposure to X-rays
- Excessive sunlight

### **Smokeless Tobacco**

Smokeless tobacco, such as chewing tobacco or snuff, may play a role in the development of oral

precancerous lesions on the oral mucosa and can result in increased tooth loss from periodontal disease. The area where the user of smokeless tobacco places it in his mouth may leave a smooth or scaly white patch called leukoplakia or snuff-dipper's keratosis (fig. 5-18). Irritation of the oral mucosa occurs because 90 percent of the nicotine of smokeless tobacco is directly absorbed through the oral mucosa, which then goes directly into the blood stream. The effects and damage of nicotine pose a serious health hazard. Many smoking cessation programs are available through naval hospitals and clinics. Dental patients who wish to get assistance from this addiction can be referred to these programs.



**Figure 5-18.—Snuff-dipper's keratosis.**



# EMERGENCY TREATMENT FOR ORAL DISEASES AND INJURIES

The dentist is responsible for all patient diagnosis and treatment. Certain circumstances may warrant that you, the Dental Technician, provide emergency dental treatment to a patient. An example might be when one of the following circumstances occur:

- **You are standing duty Dental Technician watch**—There is no dental officer aboard the dental clinic, the hospital, the ship, or the Fleet Marine Force where you are stationed.
- **A mass casualty situation has occurred**—The dental officer may be involved with the treatment of more serious medical injuries.

Always contact a dental officer if an emergency occurs. The dentist will indicate the treatment plan and authorize you to perform treatment. You may provide temporary treatment that provides relief from pain, combats infection, or prevents further damage to the oral structures. Always instruct your patient to come to dental sick call the next day, or make an appointment in the dental specialty for which you have treated him or her. Advise your patient to keep the appointment even if the symptoms of the condition disappear. Follow any command or department instructions on patient care.

Oral conditions are discussed in terms of symptoms and signs. A **symptom** is what a patient tells you about his or her disease or injury (for example, this person tells you of a toothache or sore gums). A **sign** is what you observe when you examine the oral structures (for example, bleeding gums, carious lesion, or heavy deposits of plaque or calculus).

### EMERGENCY TREATMENT GUIDELINES

Certain emergency guidelines have been established to assist you in providing emergency treatment to your patients. In all these conditions, you should follow the emergency guidelines listed below:

- Check the patient's general physical condition.
- Question the patient and record any symptoms.

- Review patient's health history.
- Examine the patient and record signs, including the vital signs. Also check for other injuries if trauma has been found.
- Consult with the dentist and report the patient's condition.
- Request instructions from the dentist.
- Follow the treatment plan exactly.
- Record the emergency treatment provided on the Health Record, Dental, SF 603. Use the standard operating procedures (SOP) format discussed in *Dental Technician, Volume 2*, NAVEDTRA 12573, chapter 2, "Oral Examination."
- Advise the patient the treatment provided is temporary and to return for definitive treatment.

### DISEASES OF THE TISSUES OF THE TEETH

An important part of your job as a Dental Technician is the ability to recognize diseases of the tissues of the teeth. We will discuss some of these diseases in the paragraphs that follow as well as give symptoms that will help you recognize these diseases.

#### DENTAL CARIES

Dental caries still occur in the majority of the adult population. The most common cause of dental caries is bacterial plaque, which we discussed in chapter 5.

Caries begin in the enamel, appearing as a chalky white spot. If the lesion progresses, it will continue into the dentin and eventually involve the pulp.

#### Symptoms

The patient may complain that the affected tooth is sensitive to hot and cold (usually cold), sweets, and pressure to biting. Sometimes the pain from an

affected tooth can manifest in a healthy, noninvolved tooth; this is called referred pain.

## Signs

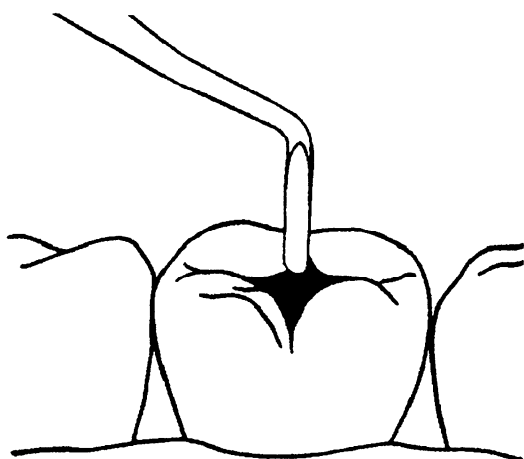
Upon examination you may find the following signs of an infection:

- A chalky white spot on the enamel
- Roughness on the surface of the tooth
- A dark, stained cavity
- A cavity filled with food or a spongy mass of decaying dentin

## Treatment

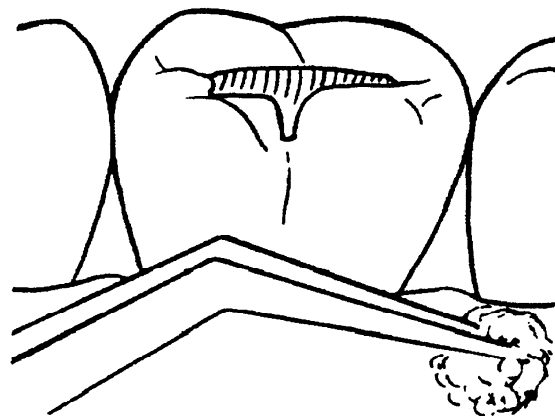
As a part of the emergency treatment plan, you may perform the following duties:

- Perform emergency treatment guidelines.
- Gently remove all debris from the cavity with a spoon excavator as illustrated in figure 6-1.
- Flush the cavity with warm water.
- Isolate the tooth with cotton rolls or gauze.
- Carefully dry the cavity with cotton pellets as illustrated in figure 6-2.
- Mix a temporary filling (zinc oxide eugenol, IRM, etc.).
- Gently fill the cavity with the temporary filling material as illustrated in figure 6-3.
- Check the occlusion. Make sure the temporary restoration does not touch the opposing tooth.
- Instruct the patient to return for definitive treatment on the next work day.



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Figure 6-1.—Removing debris from the cavity.



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Figure 6-2.—Preparing to dry the cavity.

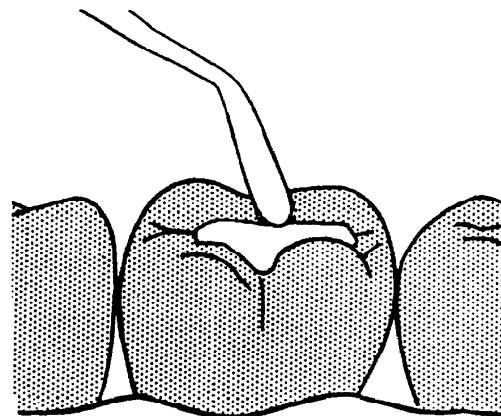


Figure 6-3.—Placing the temporary filling.

## ACUTE PULPITIS

Acute pulpitis is an inflammation of the pulp caused by injury to the pulp, usually from dental caries or trauma. It is the most frequent cause of severe tooth pain. The pain is caused by the pressure of fluids building up inside the pulp chamber or root canal.

## Symptoms

A patient with acute pulpitis may complain of the following:

- Spontaneous, continuous, or intermittent pain that lingers
- Piercing and pulsating pain in the affected area
- Increased pain when lying down

## Signs

Upon examination for acute pulpitis, you may observe one of the following signs:

- A large carious lesion



- A large carious lesion with a pulpal exposure
- Blood or pus oozing from the pulpal exposure
- A fractured tooth or missing restoration

### Treatment

As part of the emergency treatment plan for acute pulpitis, you may need to perform some of the following procedures:

- Perform emergency treatment guidelines.
- Gently remove loose debris from the cavity.
- Dry the cavity with cotton pellets.
- Pack the cavity with a cotton pellet slightly moistened with eugenol.
- Gently fill the cavity with a temporary filling material.
- Check the occlusion.
- Instruct the patient to return for definitive treatment.

### PERIAPICAL ABSCESS

A periapical abscess (fig. 6-4) usually results from an infection of the pulpal tissue causing the pulp to become necrotic (die). This type of infection causes fluids and by-products to build up within the walls of the pulp chamber and root canal(s). The periapical abscess is formed when these materials escape through the apical foramen of the tooth. An area of pus and fluid accumulation forms in the bone surrounding the apex of the tooth. As the pressure builds up, a channel may form through the alveolar bone and the soft tissue. This channel is called a sinus tract. When the pus reaches the soft tissue, vestibular or facial swelling can occur. Extensive swelling is called cellulitis. Swelling that is confined to a small area at the site of a sinus tract is called a gumboil.

### Symptoms

A patient with periapical abscess may complain of the following:

- Constant, throbbing pain in the affected area.
- Increased pain when chewing.
- Increased pain when lying down.
- Bad taste in the mouth.
- A gumboil.
- The tooth “feels longer” than the others.

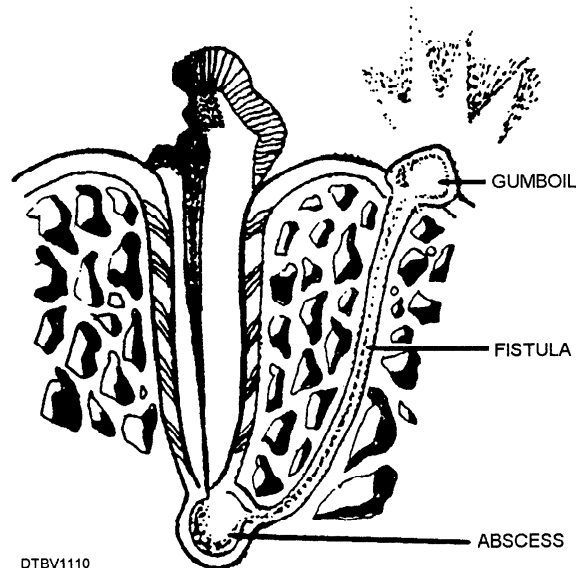


Figure 6-4.—Periapical abscess.

- Malaise.
- Tender lymph nodes.

### Signs

When there is a periapical abscess, you may observe some of the following signs upon examination:

- A severe pain reaction is experienced when light pressure is applied to the affected tooth.
- A gumboil.
- Facial swelling (general or localized).
- Tooth mobility.
- An elevated temperature.
- Enlarged lymph nodes.

### Treatment

To treat the periapical abscess, you should perform the following in the emergency treatment plan:

- Perform emergency treatment guidelines.
- Expose a periapical radiograph of the affected tooth. The abscess will appear as a radiolucency around the apex of the tooth.
- Drain the abscess. If the abscess is soft and pus is evident, drainage can be done without local anesthesia. Puncture the most raised portion of the abscess with an explorer.
- If a carious lesion is present, gently excavate the cavity. **NOTE: If drainage occurs through the cavity, the patient may experience a rapid relief from pain.**

- If drainage does not occur, have the patient rinse with warm saline solution for 10 minutes every 2 hours. This should help promote drainage. **NOTE: NEVER apply heat to the external surfaces of the face.**
- If drainage still does not occur, apply an ice pack to the affected area. This may reduce the patient's discomfort until the dentist can provide emergency treatment.
- When drainage is established, give the patient instructions about home care and notify the dental officer to see if a prescription for antibiotics can be called in to the pharmacy.
- Instruct the patient to return to the dental treatment facility (DTF) for definitive treatment as soon as possible.

## DISEASES OF THE PERIODONTAL TISSUES

Most periodontal diseases result in the gradual recession of the tissues of the periodontium. If the disease process is not stopped, it may progress to the harder, bony tissues of the alveolar ridge and lead to the loss of teeth.

### MARGINAL GINGIVITIS

Gingivitis is an inflammation of the gingival tissue. Marginal gingivitis is a relatively mild inflammation of the borders of the gingival tissue. Sometimes, the inflammation is localized; it may exist around one, two, or a group of teeth. If the condition is generalized, then it will exist around all the teeth. The most frequent cause of marginal gingivitis is the presence of bacterial plaque buildup due to lack of adequate oral hygiene.

#### Symptoms

A patient with acute gingivitis may complain of the following:

- Sore or swollen gums
- Bleeding gums

#### Signs

Upon examination for gingivitis, you may observe:

- A painful reaction or gingival bleeding when finger pressure is applied
- Red, swollen gingiva with a loss of stippling

- Heavy plaque and calculus deposits in the affected area

#### Treatment

To treat marginal gingivitis, include the following in the emergency treatment plan:

- Perform the emergency treatment guidelines.
- Give the patient oral hygiene instructions; refer to *Dental Technician, Volume 2*, NAVEDTRA 12573, chapter 3, "Preventive Dentistry."
- Have the patient rinse with a warm saline solution.
- Gently scale the teeth to remove soft debris and any obvious supragingival calculus.

### NECROTIZING ULCERATIVE GINGIVITIS

Necrotizing ulcerative gingivitis (NUG) is a severe infection of the gingival tissue, commonly referred to as trenchmouth. It may result from untreated marginal gingivitis, poor dietary habits, smoking or alcohol consumption, a rundown physical condition of the patient, or a combination of these factors.

#### Symptoms

A patient may present the following symptoms when NUG is present:

- The same symptoms as that of marginal gingivitis
- A bad taste in the mouth
- Pain when eating or brushing
- Excessive bleeding

#### Signs

Upon examination for acute gingivitis, you may observe the following signs of NUG:

- Same as those of marginal gingivitis, but more severe.
- Heavy plaque and calculus deposits.
- Ulceration and cratering of the interdental papillae. Frequently, so much of the papillae is lost that the triangular area between the crowns of the teeth present a "punched out" appearance.
- A gray-white membrane covering the gingiva.
- A foul odor from the oral cavity.
- Pus oozing from the gingiva.
- Areas of gingival recession.

- Elevated temperature.

## **Treatment**

Perform the emergency treatment guidelines. If the patient has an elevated temperature (101° or above), the dentist should treat the patient. If you are authorized to treat the patient, the treatment plan will be the same as for marginal gingivitis.

## **PERIODONTITIS**

Periodontitis is an inflammation of the gingiva that involves the crest of the alveolar bone and the periodontal ligament above the alveolar crest. It usually results from untreated marginal gingivitis. It is marked by the gradual loss of attachment of the periodontal tissues. Periodontitis may affect the entire dentition or only localized areas.

## **Symptoms**

A patient may present some of the following symptoms if periodontitis is suspected:

- A “deep, gnawing pain” in the affected area
- Itching of the “gums”
- Sensitivity to heat and cold
- Bleeding “gums”
- Food sticking between the teeth
- Loose or elongated teeth
- A toothache with the absence of caries
- An uneven bite
- Increased spacing between the anterior teeth

## **Signs**

Upon examination you may observe the following sign of periodontitis:

- Heavy plaque and calculus deposits
- Gingival inflammation, bleeding, or discoloration (bluish-red)
- Localized or generalized gingival bleeding
- Ulcerated or cratered papilla
- Tooth mobility

## **Treatment**

Perform the emergency treatment guidelines. The emergency treatment plan will be the same as for marginal gingivitis and NUG.

## **PERIODONTAL ABSCESS**

A periodontal abscess is caused by an infection of the periodontal tissues. It is usually the result of a long-continued irritation by food debris, deep deposits of calculus or a foreign object packed in the sulcus or inter-proximal spaces.

The symptoms and signs for periodontal abscesses are similar to those for periapical abscesses.

## **Treatment**

The emergency treatment plan for periodontal abscesses may include:

- Performing the emergency treatment guidelines
- Gently probing the affected area with a scaler or an explorer to establish drainage. Probe the space between the tooth surface and the gingival tissue.
- If probing does not establish drainage, have the patient apply hot saline water rinses to the affected area.

## **PERICORONITIS**

Pericoronitis is an inflammation of the gingiva around a partially erupted tooth. During eruption, the tooth breaks through the gingiva tissue, and sometimes a small flap of tissue remains over the crown of the tooth. Debris accumulates beneath the tissue flap resulting in an acute inflammation. Inflammation can also result from constant contact between the tissue flap and the tooth in the opposing arch. Pericoronitis most often affects mandibular third molars.

## **Symptoms**

A patient with pericoronitis may complain of the following:

- Pain when chewing
- A bad taste in the mouth
- Difficulty in opening the mouth
- Swelling in the neck or in the area of the affected tooth
- A fever

## Signs

Signs of pericoronitis you may observe upon examination are as follows:

- A partially erupted tooth
- Red, inflamed tissue around a partially erupted tooth
- Pus oozing from under an overlaying tissue flap
- A painful reaction when finger pressure is applied
- Swelling in the cheek near the affected tooth
- Enlarged lymph nodes
- Elevated temperature

## Treatment

In the treatment of pericoronitis, you may perform the following emergency procedures:

- Follow the emergency treatment guidelines.
- Irrigate under the tissue flap with a warm saline solution (figure 6-5).
- Gently clean the area with a sonic scaler or hand scaler.
- Instruct the patient to rinse with a warm saline solution every 2 hours.
- Contact dental officer if patient is febrile or if lymph nodes are palpable. The dental officer will determine the need to prescribe antibiotics.



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Figure 6-5.—Irrigating beneath a tissue flap.

## OTHER ORAL CONDITIONS

This section describes emergency conditions resulting from inflammation of the oral mucosa, postexodontic complications, and trauma to the teeth and their supporting structures.

### STOMATITIS AND RECURRENT LABIAL HERPES

“Stomatitis” is a general term used to denote inflammation of the oral mucosa. Two types of stomatitis are common in dentistry, they are herpetic gingivostomatitis and aphthous stomatitis. Herpetic gingivostomatitis usually occurs on the masticatory or keratinized tissues, while aphthous stomatitis usually occurs on the lining or nonkeratinized tissue. Both conditions are marked by the formation of small blisters and ulcers on the oral mucosa.

Recurrent labial herpes is caused by a virus that produces the so-called fever blister or cold sore. They are usually found on the lip and can easily be transmitted to others through casual contact.

### Symptoms

A patient with recurrent labial herpes may complain of the following symptoms:

- A painful swelling
- A fever blister, cold sore, or canker sore
- Pain when eating or drinking
- A fever, headache, or rundown feeling (for herpetic gingivostomatitis ONLY)

### Signs

Upon examination of a patient with recurrent labial herpes, you may observe the following signs:

- Red, swollen areas with blisters or small craters formed in the center
- Blisters or craters covered with a grayish-white or yellowish membrane

### Treatment

Perform the emergency treatment guidelines and follow instructions given by the dentist. Instruct the patient NOT to smoke, eat acidic or hot foods, or drink alcohol or use products that contain alcohol such as mouthrises that will dry out the mouth.

## **POSTEXTRACTION HEMORRHAGE**

Postextraction hemorrhage may occur any time from a few hours to several days after the extraction of a tooth. The bleeding from the extraction site may be light or heavy. Any form of hemorrhage is considered serious, so inform the dentist as soon as possible.

### **Symptoms**

A patient with postextraction hemorrhage may complain of the following symptoms:

- Bleeding that starts, or fails to stop, after an extraction
- Large amounts of blood in the mouth
- Weakness in conjunction with blood loss
- Blood on the pillow after sleeping

### **Signs**

When you examine a patient for postextraction hemorrhage, you may observe the following signs:

- Blood oozing or flowing from a recent extraction site
- Blood or a large blood clot in the patient's mouth

### **Treatment**

Perform the emergency treatment guidelines and notify the dentist. Until the dentist arrives, monitor the patient's vital signs and watch for changes in his or her condition. To help stop the bleeding, place a pack of moistened sterile gauze over the extraction site and instruct the patient to bite down firmly.

## **POSTEXTRACTION ALVEOLAR OSTEITIS**

Postextraction alveolar osteitis is a condition commonly referred to as a dry socket. It normally results when a blood clot fails to form or washes out of the socket of a recently extracted tooth. This condition is very painful.

### **Symptoms**

A patient who has recently had a tooth extracted may complain of the following:

- Severe constant pain that can run from the ear to the lower jaw
- Loss of blood clot

### **Signs**

Upon examination of the patient, you may observe the following signs:

- The absence of a blood clot
- Food visible in the socket
- Alveolar bone visible in the socket
- A foul odor in the mouth
- An elevated temperature

### **Treatment**

To provide emergency treatment for postextraction alveolar osteitis, you may perform the following precautions:

- Perform the emergency treatment guidelines.
- Gently rinse the socket with a warm saline solution.
- Moisten a small strip of iodoform gauze with eugenol. Blot the gauze dry on a 2 × 2 gauze pad. Place the strip of iodoform gauze loosely in the socket. Do not exert pressure on the socket.
- Instruct the patient to return the next day for a dressing change

## **FRACTURED TEETH**

Pain from fractured teeth usually results from exposed dentin, or irritation of the pulp tissue as a result of trauma. You may also observe lacerations of the gingiva, lips, and cheeks. Except in a few rare cases, the dental officer will treat all tooth fractures. If authorized, the Dental Technician's primary duty is to lessen the pain and, if possible, prevent further injury to the patient until the dentist arrives to provide more definitive emergency treatment. You must be able to recognize the four different types of tooth fractures as illustrated in figure 6-6.

### **Symptoms (Type I—Enamel Fracture)**

A patient may complain of the following:

- Rough or sharp area on a tooth
- Pain when eating or drinking
- Sensitivity to heat, cold, or air

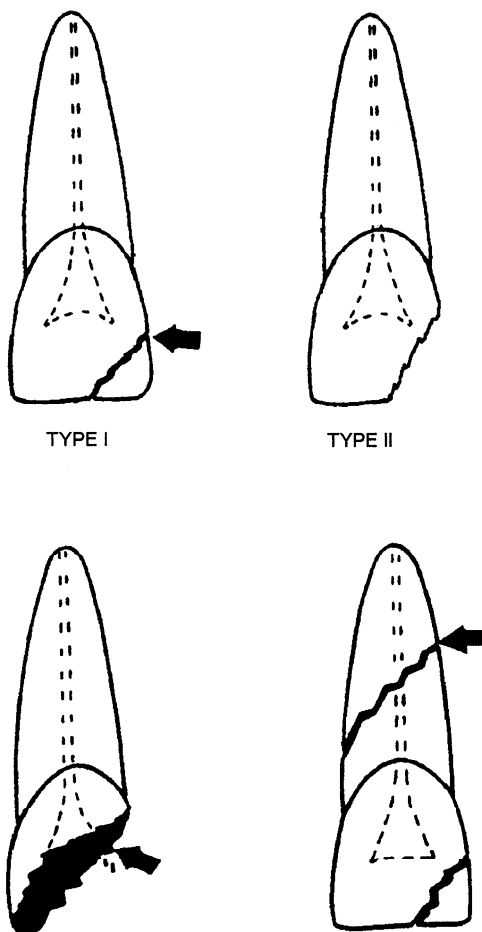


Figure 6-6.—Types of tooth fractures.

### Signs

Upon examination of a type I fracture, you may observe:

- A slight chip or fracture of the tooth enamel layer only, or with possible minimal dentin involvement
- No exposure of the dentin or pulp

### Treatment

Perform the emergency treatment guidelines. The following is a typical treatment plan that a dental officer might authorize you to perform to treat a type I fracture:

1. Smooth sharp edges of the chipped area with sandpaper strips or disk to eliminate irritation of the tongue and lips.
2. Carefully dry the chipped area with a cotton roll or pellets.

3. Apply small coats of cavity varnish over the chipped area with cotton forceps and cotton pellets.
4. Instruct and caution the patient not to consume hot or cold liquids and food. Extreme heat or cold may damage the tooth pulp.

### Symptoms (Type II—Enamel/Dentin Fracture)

A patient with a type II tooth fracture may complain of the following:

- Very rough or sharp edges
- Severe pain from heat, cold, or air
- Toothache

### Signs

Upon examination of a type II fracture, you may observe the following:

- Extensive fracture involving the enamel and dentin layers
- No pulp exposure

### Treatment

Perform emergency treatment guidelines. Except in rare cases, the dental officer will provide emergency treatment. If for some reason he does not treat the patient, the dental officer could authorize the assistant to cover the exposed dentin with a temporary type paste or place a temporary crown.

The procedures for covering a type II with zinc oxide and eugenol paste or other temporary paste are as follows:

1. Isolate area with cotton rolls.
2. Carefully dry the fractured tooth off with cotton rolls or 2 x 2 gauze. (Do not use direct air with the 3-way syringe.)
3. Coat all exposed dentin with a zinc oxide and eugenol paste or other temporary material, including light cured glass ionomer cement.
4. Advise the patient that this is a temporary procedure to relieve pain and sensitivity. The coat of zinc oxide and eugenol may come off the fracture.
5. Instruct patient to eat a bland diet and avoid extremely hot and cold foods, liquids, or sticky foods, and not to chew on the fractured tooth.

Procedure for placing a temporary crown on a type II fracture:

1. Select a plastic crown form. Trim the form with scissors to adapt it to the fractured crown. Ensure that the entire fracture will be covered.
2. Also ensure the incisal edge is not in occlusion with the opposing teeth, while fitting the plastic crown.
3. Place two or three small holes in the incisal edge of the crown form with a sharp explorer.
4. Fill the crown form with a **thin** mix of calcium hydroxide or zinc oxide and eugenol.
5. Gently place the crown form over the fractured crown. You will see any excess material expressed from the holes of the incisal edge while placing the crown.
6. Remove any excess material from and around the crown with gauze and cotton pellets
7. Instruct the patient to eat a bland diet and avoid extremely hot and cold foods or liquids and sticky foods.

### Symptoms (Type III—Enamel/Dentin Fracture With Pulp Exposure)

A patient with a type III tooth fracture may complain of the following:

- Severe, throbbing pain
- Very rough or sharp edges
- Severe pain from heat, cold, or air
- Inability to chew food

### Signs

Upon examination of a type III fracture, you may observe:

- Extensive fracture with the pulp exposed
- Most or all of the crown is fractured off
- Bleeding from crown fracture

### Treatment

Perform emergency treatment guidelines. In almost all cases of a fracture this severe, the dental officer will treat the patient. Only in rare cases would the Dental Technician treat the patient. The following is a treatment plan that the dental officer might authorize to treat a type III fracture.

1. Place a crown form over the affected tooth. Refer back to this procedure under the treatment for type II fractures. At times, it may be impossible to place a crown form over a fractured tooth. The pressure of the crown form against the pulp tissue may cause the patient pain or there may not be enough tooth structure left for retention of the crown. If this occurs, a splint rather than a crown form is placed on the tooth as shown in figure 6-7.

2. To make the splint, prepare a large mixture of zinc oxide and eugenol as described in *Dental Technician*, NAVEDTRA 12573, chapter 4, "Restorative Dentistry." Add cotton fibers from a cotton pellet to the mixture for strength. The mixture should have a dough-like consistency for molding the splint.

3. Place the splint so it covers the affected tooth and the teeth immediately adjacent to it (fig. 6-7). Ensure that the mixture is placed well up on the lingual and facial aspects of the gingival tissue. Gently compress the splint between your finger and thumb to lock it into the interproximal spaces.

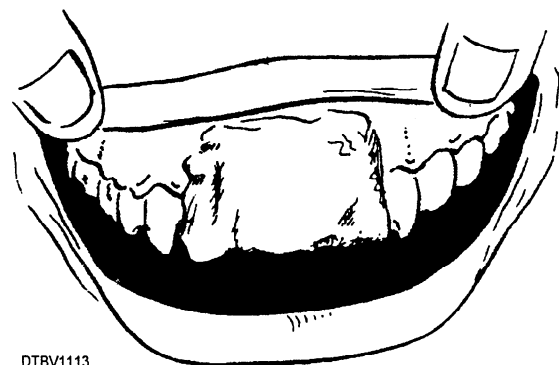
4. Trim the splint from the incisal edges of the teeth. Check the occlusion to see if the splint is interfering with the patient's bite.

5. Advise the patient to let the splint harden for several hours before attempting to eat. Tell the patient to return to sick call ASAP for more definitive care.

### Symptoms (Type IV—Root Fracture)

A patient with a type IV tooth fracture may complain of the following:

- Severe pain from heat, cold, air
- Inability to eat anything without severe pain
- A tooth that is moving or loose



DTBV1113

Figure 6-7.—Properly placed splint.

## Signs

Upon examination of a type IV fracture, the dental officer may direct you to take a radiograph of the tooth to determine if there is a fracture of the root. You may observe:

- A fractured root (as seen in the patient's X-ray), which may be further complicated by a fracture of the crown
- Tooth mobility
- Other facial trauma associated with the accident

## Treatment

Perform emergency treatment guidelines. Because of the severity, almost all cases of type IV fractures will be treated by the dental officer. Only in very rare cases, will the Dental Technician provide treatment. In such rare cases, the dental officer might authorize the DT to place a splint in the same way as for the type III fracture.

## TRAUMATICALLY EXTRACTED TEETH

If a tooth has been traumatically extracted from the socket, notify the dentist as soon as possible. The dental officer may instruct you to replace the tooth back in the socket after rinsing it with sterile saline. Time is of the essence for the replantation to be a

success. Perform emergency treatment guidelines and control hemorrhaging until the dentist arrives.

## FRACTURES OF THE MANDIBLE AND MAXILLA

The dentist will treat this type of injury. Your responsibility is to prevent further injury and to lessen the pain while waiting for the dentist. A person who has a fractured jaw may suffer serious interference with breathing. One of the most important phases of emergency care is to clear the upper respiratory passage of any obstruction. Fractures are usually the result of a high-velocity accident (e.g., the face striking the dashboard of a car). Of all the facial bones, the nasal bones, followed by the mandible, are the most frequently injured.

Less common is a fracture of the maxilla. It can be distinguished from a mandibular fracture because the fractured maxilla will cause severe malocclusion consisting of an open bite. The face will also look elongated. Both the mandible and maxilla fractures are treated in the same manner until a dentist arrives.

## Symptoms

Symptoms for fractures of the mandible and maxilla may include some of the following:

- Difficulty in breathing, talking, eating, or swallowing
- Pain when the mandible or maxilla is moved

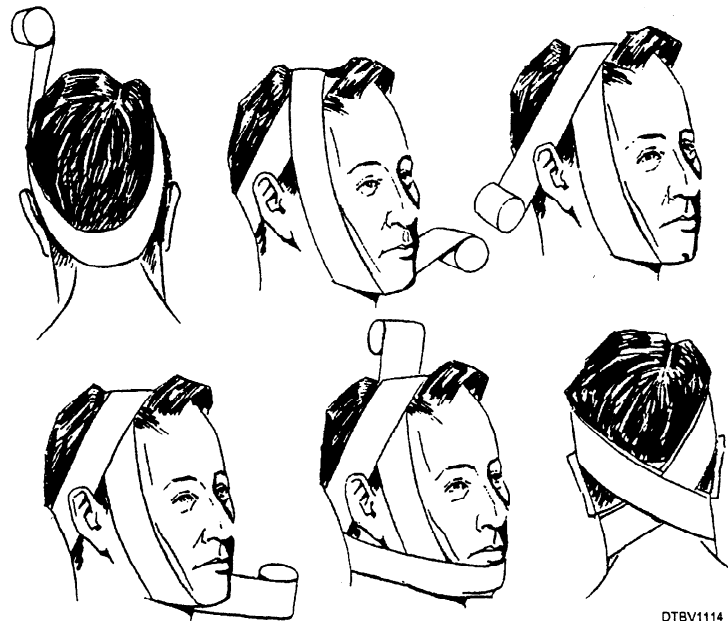


Figure 6-8.—Bandaging to immobilize both mandible and maxilla.



An inability to move the mandible or maxilla

Bleeding from the gums and around the teeth

A complaint from the patient that the teeth do not meet right

A complaint that the lower lip is numb (mandibular fracture)

## Signs

Upon examination you may observe:

- Facial swelling
- Abnormal occlusion
- Fractured bones on dental radiographs ordered by the dentist

- Abnormal movement of mandible or maxilla

## Treatment

Emergency treatment for fractures of the mandible and maxilla may include performing emergency treatment guidelines and the following:

- Reporting the patient's condition to the dentist.
- Immobilizing the injured area by applying an elastic bandage as shown in figure 6-8. Ensuring that you have a pair of scissors standing by to cut the bandage off if the patient starts to vomit or has respiratory difficulties.

Applying ice packs to reduce swelling of the injured area and to lessen the pain.



## CHAPTER 7

# ORAL PHARMACOLOGY

Pharmacology is a basic medical science that deals with the study of drugs. Drugs are chemical compounds used in the prevention, diagnosis, and treatment of diseases and other abnormal conditions. This chapter covers some of the drugs used in dentistry.

As a Dental Technician, you will be required to assist in procuring, labeling, and storing drugs. You must also be aware of what drugs the dental officer prescribes and uses during dental procedures. Certain drugs and medicines used in dentistry have side effects on patients, which could turn into a possible medical emergency. Misused or mislabeled drugs can also present a real hazard to your patient's safety. You must have full knowledge of what drugs and medicines are being used in your clinic, hospital, or department. Only authorized personnel should prescribe, dispense, and administer drugs and medications. The *Manual of the Medical Department*, chapter 21, gives guidance on pharmacy operation and drug control.

### DRUG STANDARDS

Many textbooks are available that describe commercially available drugs used in dentistry and medicine. They provide standards for drugs of therapeutic usefulness and pharmaceutical necessity, and also list composition, action and use, administration and dosage, precautions and side effects, dosage forms available, and common (generic) name of the drugs. Your command library is required to have these textbooks available for use.

### MEDICATION AND ADMINISTRATION

The quantity of a drug to be prescribed at one time or the total quantity administered and method of administration of drugs are dependent on several factors. This section will cover some of the methods of administering and some of the factors affecting dosage calculations that a dental officer will use.

### DOSAGE

The amount of medication to be administered is referred to as dose. Doses are listed as an average

therapeutic dose and are known as "usual adult doses." The following terms are used in connection with doses.

#### Therapeutic Dose

The therapeutic dose is also referred to as the normal adult dose, the usual dose, or average dose. It is the amount needed to produce the desired therapeutic effect.

#### Dosage Range

Dosage range is a term that applies to the range between the **MINIMUM** amount of drug and the **MAXIMUM** amount of drug required to produce the desired effect. Many drugs, such as antibiotics, require large initial doses that are later tapered to smaller amounts. A **TOXIC** dose is the amount of drug that will produce symptoms of poisoning; while a **MINIMUM LETHAL** dose is the least amount of drug that can produce death.

### FACTORS AFFECTING DOSAGE

With the administration of medicines used in dentistry, the dental officer must consider many factors with each patient that affects the dose, method of administration, and frequency of the dose. Although a dental officer prescribes or administers the amount to be given, you need to know how and why these quantities are determined. Two primary factors determine or influence the dose: age and weight.

#### Age

Age is the most common factor that influences the amount of a drug to be given. Infants, children, and elderly patients are more susceptible to drug action and as a general rule, should receive smaller doses than others.

#### Weight

In the calculation of dosages, weight has a more direct bearing on the dose than any other factor, especially in the calculation of pediatric doses.

## METHODS OF ADMINISTRATION

In dentistry, drugs are introduced into the body by different routes, each serving a specific purpose. We will cover parenteral, oral, inhalation, and topical administration of drugs next.

### Parenteral

Parenteral medications are those introduced by injection. All drugs used by this route must be pure and sterile. Always check the solution to ensure it has not expired and is clear in color. Several types of parenteral administration can be used in dentistry.

- **Intravenous**—The drug is introduced directly into the vein. Example: Intravenous sedation. Guidance to dental treatment facilities for the administration of outpatient anesthesia services in intravenous (IV) sedation to dental patients can be found in BUMEDINST 6710.67.
- **Infiltration**—This method that is commonly used to anesthetize maxillary teeth. The dental needle and anesthetic are placed into the mucosa along the side of the tooth (facial aspect) and alveolus that is being treated. This technique is possible because the porous composition of alveolus cancellous bone allows the anesthetic to soak through the bone and anesthetizes the apices of the teeth. It is also used in procedures such as biopsy, gingivectomy, frenectomy, and the excision of abnormal tissue.
- **Block**—Because the mandibular bone is very dense, infiltration techniques cannot always be used to achieve adequate anesthesia. A block technique is the most effective means to achieve anesthesia of the mandibular teeth. A dentist will use various types of blocks to anesthetize specific areas. When performing a block technique, the dentist will place the needle and anesthetic into the mucosa and aim them near a specific nerve where the solution is deposited. The area of the nerve is blocked and all surrounding areas the nerve branches off to are also anesthetized. When a **mandibular block** (inferior alveolar nerve block) is performed, the patient will experience anesthesia on half of the mandible, including the teeth and lower lip.
- **Periodontal ligament injection**—If this procedure is needed, it can be used instead of an infiltration injection. The needle and anesthetic are placed directly into the periodontal ligament along the side of the tooth, where the solution is deposited under pressure. This injection is very painful.

### Oral

Oral administration of medications comes in the form of tablets, capsules, liquids, and suspensions. Dental patients may receive medications by this method preoperatively (before) or postoperatively (after) a dental procedure. Another route closely associated with oral administration is **SUBLINGUAL**. The drug is placed under the tongue and is rapidly absorbed directly into the blood stream. An example is nitroglycerin sublingual tablets.

### Inhalation

Inhalation is the introduction of medication through the respiratory system in the form of a gas, vapor, spray, or powder. The three major types are vaporization, nebulization, and gas inhalation. The most common type of gas inhalation used in dentistry is nitrous oxide sedation and will be discussed later in the chapter.

### Topical

Topical agents are applied to a particular surface area of the skin being treated. Examples of topical agents are ointments, creams, lotions, shampoos, paste, gels, and liquids. Dental topical agents will be discussed in this chapter under anesthetics.

## DRUG CLASSIFICATIONS

The definition of a drug is any chemical substance that has an effect on living tissue but is not used for food. Drugs are used on or administered to humans or animals as an aid in the diagnosis, treatment, or prevention of disease or other abnormal conditions, for the relief of pain or suffering, or to control or improve any physiological or pathological condition. A drug may be classified in various categories, depending upon different criteria. Examples are general, chemical, and therapeutic.

- **General**—Drugs are grouped according to their source, whether animal, vegetable, or mineral in composition.
- **Chemical**—Medications are grouped by their chemical characteristics. Examples are acids, bases, or salts.
- **Therapeutic (Pharmacological)**—Drugs are classified according to their action on the body. A drug may have more than one action.

The drug classifications can be further divided into two groups: noncontrolled and controlled drugs.

### **Noncontrolled Drugs**

Noncontrolled drugs are referred to as non-prescription, over the counter drugs (OTC), (i.e., aspirin, and mild analgesics). These drugs are effective for relieving most mild dental pain.

### **Controlled Drugs**

All prescription drugs are to be treated with respect; certain groups considered to have a potential for abuse, such as narcotics, stimulants, and sedatives require special handling and security measures. Controlled substances are those drugs listed in the Controlled Substance Act of 1970 that is administered by the Drug Enforcement Administration (DEA) of the Justice Department. Controlled drugs are categorized into five schedules. MANMED, chapter 21, describes the schedules. Ethyl alcohol (used to fuel laboratory torches), although not included in any schedules of the Controlled Substances Act, must be received and accounted for, and dispensed in the same manner as schedule II substances described in MANMED, chapter 21.

## **DRUG NOMENCLATURE**

The term *drug nomenclature* implies that there are several names that can be used to identify a drug. Normally drugs have three names: chemical, generic, and trade (brand).

- Chemical name—Describes the chemical and molecular structure. The chemical name of a common dental local anesthetic called acetamide is 2-(diethylamino)-N-(2,6-dimethylphenyl)-monohydrochloride ( $C_{14}H_{22}N_2O.HCL.H_2O$ ).

- Generic name—Describes the common name of the drug. The above example has the generic name of lidocaine hydrochloride.

- Trade name—This name is given by the manufacturer, and is also called the brand name.

## **DRUGS USED IN DENTISTRY**

The drugs listed here are some of those commonly used in dentistry and are grouped according to

pharmacological classes. Only a brief summary is possible here and the Dental Technician who desires more complete study of each drug should refer to reference books in the command library.

### **ACIDS**

Acids are very caustic and present a sour taste. Extreme care must be taken when handling acidic substances. Follow all safety precautions on Material Safety Data Sheets (MSDS) for each product. A common acid used in dentistry is phosphoric acid, and comes in the forms of solutions or gels. It can be used in etching procedures with composite restorations, sealants, and orthodontic brackets.

### **EMOLLIENTS**

Emollients are bland or fatty substances that may be applied to the skin to make it more pliable and soft, and can also serve as a lubricant in dental procedures.

#### **Cocoa Butter (Theobroma Oil)**

Cocoa butter is an excellent emollient with a pleasant odor. It is ideal for the treatment of chapped or cracked lips, and can also be used as a lubricant in rubber dam procedures.

#### **Petrolatum (Petroleum Jelly)**

Petrolatum is highly occlusive and a good emollient. It can be used as a lubricant when handling sticky dental materials, and has several uses in the prosthetic laboratory.

### **DISINFECTANTS, ANTISEPTICS, AND GERMICIDES**

These drugs and chemicals are primarily intended for the prevention of infections by destroying microorganisms or preventing their growth. The differences among them are based primarily on the degree of activity and how they are used. Complete details on their uses is covered in chapter 10, "Sterilization and Disinfection."

### **ANTIBIOTICS**

Antibiotics are chemical compounds that stop the growth of or destroy different types of bacteria and other micro-organisms. They are used in dentistry to treat oral infections. They are also prescribed as a

prophylactic (ward off disease) measure to prevent infective endocarditis (or IE) and in other medical conditions. Patients having history of infective endocarditis, rheumatic heart disease, artificial heart valves, and some heart murmurs are at high risk when involved in dental procedures that are likely to cause bleeding. They are prescribed a large dose of antibiotics before treatment and a smaller dose 6 hours after the initial dose. In all cases the dental officer will review the patient's health history and will prescribe an antibiotic if needed. Many types of antibiotics are available; listed are a few groups that are used.

### **Penicillin**

Penicillin is one of the most important of the antibiotics. It is derived from a number of *Penicillium* molds commonly found on breads and fruits. It is one of the most effective and least toxic of the antimicrobial agents used in dentistry.

### **Cephalosporins**

Cephalosporins are a group of antibiotics that are structurally and pharmacologically related to the penicillin. Because the cephalosporins are structurally similar to penicillins, some patients who are allergic to penicillin may be allergic to a cephalosporin drug. So, special caution is necessary when taking cephalosporins.

### **Tetracyclines**

The tetracyclines, introduced in 1948, were the first truly broad-spectrum antibiotics. Administration to children and pregnant women is not indicated because it may produce discoloration of the teeth and slow bone marrow growth.

### **Erythromycin**

Erythromycin has a bitter taste and is destroyed by gastric acids, and usually comes in the form of a coated tablet. Erythromycin is one of the drugs of choice when penicillin is contraindicated. Many patients cannot tolerate the nausea and stomach upset commonly associated with erythromycin, so the dentist may have to prescribe an alternate drug.

## **NON-NARCOTIC ANALGESICS AND ANTIPYRETICS**

Analgesics are drugs that relieve pain without producing unconsciousness or impairing mental

capacities. Many of these drugs also have an antipyretic and/or an anti-inflammatory effect. Antipyretics are drugs that lower increased body temperatures. Analgesics can be used to relieve pain from toothache, or can be prescribed for dental postoperative pain relief.

### **Aspirin**

Aspirin is an economical analgesic, antipyretic, and anti-inflammatory agent used for mild to moderate pain. It is contraindicated in peptic ulcer disease. It acts as a gastric mucosal irritant and has an anticoagulant (inhibits blood clotting) effect.

### **Acetaminophen**

This drug is similar to aspirin, but has no anti-inflammatory action. It is available as tablets, elixir, drops, or capsules and is useful for patients who are sensitive to aspirin.

### **Ibuprofen**

Ibuprofen is indicated for the relief of mild to moderate pain. It is used as an anti-inflammatory agent for dental pain associated from post surgical or operative procedures. It is not to be given to patients in the third trimester of pregnancy or anyone with a history of gastrointestinal bleeding.

## **OPIUM AND ALKALOIDS**

Alkaloid-based compound names end in *-ine*. Examples include atropine, caffeine, and nicotine. The most important alkaloids of opium are morphine and codeine. All of the opiate derivative drugs are very addictive and require strict control.

### **Morphine Sulfate**

Morphine sulfate is a drug indicated for the relief of severe pain and used preoperatively to sedate patients, treat myocardial infarctions, and is used in casualty care. It is contraindicated in patients with head injuries, acute alcoholism, or convulsive disorders.

### **Codeine Sulfate**

Codeine sulfate is like morphine, but has one-sixth of the analgesic power and one-fourth of the respiratory depressant of morphine. It is used as a pain reliever in dentistry for moderate to severe dental pain.

## **Meperidine Hydrochloride (Demerol)**

This is a synthetic analgesic similar to morphine. In dentistry it is used for moderate to severe pain and as a preoperative medication.

## **VASODILATORS**

These drugs produce vasodilation by relaxing and enlarging the diameter of the blood vessels and smooth muscle of the arteries, thereby lowering the blood pressure.

### **Amyl Nitrite**

Amyl nitrite is primarily used in casualty care to treat blood agents. This will be discussed in chapter 13. Other uses are for urological conditions.

### **Nitroglycerin**

Nitroglycerin is indicated for the treatment and management of acute and chronic angina pectoris. Administration of this drug will be discussed in *Dental Technician, Volume 2, NAVEDTRA 12.573, chapter 9*.

## **VASOCONSTRICTORS**

Vasoconstrictors are the opposite of vasodilators; these drugs produce constriction of the blood vessels with consequent rise in blood pressure. In dentistry, epinephrine is used in some dental anesthetics, rarely in gingival retraction cord processes, to help control diffuse bleeding, and can be used to treat severe allergic reactions, such as anaphylactic shock. In local anesthetics, small amounts of epinephrine are added in dental carpules, with ratios ranging from: 1:50,000, 1:100,000, or 1:200,000 parts of epinephrine to anesthetic solutions.

## **HEMOSTATICS**

Hemostatics are any agents, mechanical or chemical, that arrest bleeding. They are used to control hemorrhage from minute vessels or tissues by stopping bleeding or by forming of a clot. Examples of mechanical and chemical agents will be discussed in *Dental Technician, Volume 2, NAVEDTRA 12573, chapter 5, "Oral Surgery Assistance."*

## **ANTICOAGULANTS**

This group of drugs delays or prevents blood coagulation. A common anticoagulant used in dental I.V. sedation is heparin sodium.

## **ANESTHETICS**

The word *anesthesia* means a partial or total absence of sensation to stimuli, such as cold, heat, or painful irritation. In dentistry the words numb, frozen, or asleep are examples of how the mouth can feel when the anesthetic is administered. Dental anesthesia comes in many forms such as gas, local, and topical to control pain and relax patients.

### **Nitrous Oxide**

Control of anxiety and pain associated with dental care can be accomplished by administering local anesthesia and sedation. The most commonly used gas in dentistry is nitrous oxide sedation. It may produce a condition where the patient may laugh and become quite talkative. Nitrous oxide is supplied in blue steel tanks. Inhalation sedation with a mixture of 40% nitrous oxide and 60% oxygen (N<sub>2</sub>O-O<sub>2</sub>), delivered through a gas machine produces a conscious sedation that is a safe and effective means to manage the behavior, anxiety, and pain of many dental patients before and during a dental procedure. The advantages of N<sub>2</sub>O-O<sub>2</sub> sedation are:

- Rapid onset of action.
- Good control of the depth of the sedation.
- Rapid and complete recovery.

Guidance to dental treatment facilities for the administration of nitrous oxide-oxygen (N<sub>2</sub>O-O<sub>2</sub>) inhalation conscious sedation for dental outpatient services can be found in BUMEDINST 6710.68.

### **Local Anesthetics**

Most dental procedures require cutting or painful manipulation of living tissue. To make these procedures comfortable for the patient, the dental officer will inject local anesthetic agents for pain control. Local anesthetics temporarily prevent the conduction of sensory impulses such as pain, touch, and thermal change from a body part along nerve pathways to the brain. The dental officer can select regions of the mouth he would like to lose sensation to complete the dental procedure. About 15 different local anesthetics are available for dental use. These anesthetic solutions can be chemically classified into two different categories: amides and esters.

- **Amides**—An organic compound that comes from ammonia. Examples of amide solutions are lidocaine, bupivacaine, and mepivacaine.

- **Esters**—Are compounds formed from alcohols and acids by the removal of water. Ester compounds are rarely used in dentistry today. Examples of ester solutions are procaine and propoxycaine.

The two most common local anesthetics used in dentistry today are 2% lidocaine hydrochloride and 2% mepivacaine. Both solutions take effect quickly, and provide a complete anesthetic effect of the dental pulp, tissues, and surrounding bone for up to 90 minutes. The use of vasoconstrictors with local anesthetics has been discussed earlier. Both lidocaine and mepivacaine are available with or without epinephrine.

### **Topical Anesthetics**

In dentistry topical anesthetic agents are used to temporarily anesthetize (numb) the tiny nerve endings located on the surfaces of the oral mucosa. This can reduce the discomfort of dental injections and eliminate the gag reflex when performing radiographic, periodontal, and prosthetic impression procedures. You must be aware that the concentration of topical anesthetic solutions are much higher than injectable anesthetics. Also topical anesthetics take longer for the full effect compared to injectable anesthetics. One to five minutes after application is the recommended time for topical anesthetics to reach their full effectiveness. Whenever you are using topical anesthetics, you must have permission from the dental officer. Follow all safety precautions and manufacturer's instructions. The three most commonly used topical anesthetics in dentistry are ointments, sprays, and liquids.

#### **OINTMENT TOPICAL ANESTHETICS.—**

You may be asked by the dental officer to place an ointment topical anesthetic at an injection site before injection of dental anesthesia. Always follow the manufacturer's instructions before use. To start this procedure, take a sterile 2-inch × 2-inch gauze and gently wipe and dry the area of the mucosa where the topical anesthetic is to be placed. Next take a sterile cotton tipped applicator and open the container and place a small amount of the ointment on it. Always use a sterile applicator each time you use the ointment to prevent contamination and replace the cover when not in use. Place the cotton portion of the applicator with the ointment on the area to be anesthetized. Patients must be told NOT to swallow any of the anesthetic. Have the saliva ejector or high-speed evacuator (HVE) standing by to remove any fluids the patient may have accumulated while the topical anesthetic is taking effect. After the dental officer has completely

anesthetized the patient, use the 3-way syringe and HVE to rinse the patient's mouth completely, paying attention to the area where the topical anesthetic and anesthesia have been placed and injected.

**TOPICAL DENTAL SPRAY.—**The use of topical dental sprays is an effective means to assist patients, who may have an exaggerated gag reflex to complete dental procedures. Always consult with a dental officer, when treating a patient who has a gag reflex. It may even be documented on his/her health history form. Use of lidocaine spray in some cardiac patients or children could cause problems. Certain patients are very sensitive to any objects placed in the oral cavity, especially posterior X-rays, and prosthetic impressions. Special care and time must be given to these patients to ensure the patient does not have a bad experience, such as gagging or vomiting, during the procedure. The time you spend to make your patient comfortable will benefit your patient and the quality of the procedure you are doing. When using a topical spray, follow the directions the dental officer will give you, along with the manufacturer's instructions.

**LIQUID TOPICAL ANESTHETICS.—**Liquid topical anesthetic come in the form of a viscous (thick) liquid. They produce the same effect as spray topical anesthetics by numbing the oral mucosa and the mouth, but in addition can be used to gargle to anesthetize the pharynx. Under the direction of a dental officer, the patient takes the liquid and swishes it around in the mouth, which is removed by a saliva ejector HVE or by spitting. It is useful for patients who need to be anesthetized for gag reflexes when taking prosthetic impressions or dental radiographs. In addition the dental officer may prescribe liquid topical anesthetics to patients for the temporary relief of pain from ulcers, wounds, and periodontal treatment in the mouth.

### **Miscellaneous Drugs**

Numerous other drugs are used in dentistry. Some drugs, for example, are used as antisialagogues. Such drugs as atropine sulfate, scopolamine hydrobromide, and methantheline bromide reduce a patient's salivary flow, thereby providing a drier field of operation. Other drugs are used in specialized areas of dentistry and will be discussed, where appropriate, in later chapters.

### **PROCURING DRUGS**

For a patient to receive drugs, both controlled and noncontrolled, the dental officer will use the DOD Prescription (DD 1289) or Polyprescription



(NAVMED 6710/6). Many dental treatment facilities, are able to prescribe drugs and medications through an automated pharmacy system (computerized). This saves the patient valuable time by not having to stand in line and wait for prescriptions. All drugs prescribed are to be documented by the dentist in the patient's Dental Health Record on the SF 603/603A. Instructions for preparation of outpatient prescriptions and automated pharmacy procedures can be found in the MANMED, chapter 21.

### **LABELING DRUGS**

Most drugs for direct patient use have cautions or warnings preprinted on the label warning the user of

hazards of handling involved. When no label is on a drug, you must clearly place a label indicating its name, proper warnings, and its strength. Powerful and dangerous drugs require special labeling. The information on these special labels should be typed or printed in **RED** with the caution warning above the name. Listed below are examples of cautions you might encounter.

- **POISON**
- **CAUSTIC**
- **FLAMMABLE/VOLATILE**

It is your responsibility to know every precaution of use, handling, and storage for each drug or chemical you come in contact with for the safety of yourself and your patient.



## CHAPTER 8

# NUTRITION AND DIET

The important role of nutrition and diet in overall health is widely recognized. As a member of the Navy, and as a Dental Technician, you must be healthy so you can perform your professional duties. Part of maintaining a healthy lifestyle starts with eating a well-balanced diet and exercising. Many people in the Navy and Marine Corps do not have a proper daily diet and you may be responsible for providing counseling on nutrition to your dental patients. Some patients may need a little motivation. If you are healthy and enthusiastic, the knowledge you share with them on nutrition and diet may be more credible and may help them to adopt a healthier lifestyle.

### ESSENTIAL NUTRIENTS

An essential nutrient is defined as one that must be provided by food because the body cannot synthesize it at a rate sufficient to meet our needs. Nutrients can be divided into six main classes: carbohydrates, fat, protein, minerals, vitamins, and water. Good food sources contain substantial amounts of nutrients in relation to caloric contents and contribute at least 10 percent of U.S. Recommended Dietary Allowance for the nutrient in the selected serving size. Most of us can get enough of these nutrients each day by eating a variety of foods from the five major food groups. The six classes of nutrients are described as follows:

- **Carbohydrates** include starches, sugars and dietary fiber. Starch and sugar supply the body with energy. Dietary fiber provides bulk to the diet, which promotes regularity.

- **Proteins** are the building blocks of the body. Proteins are needed for growth, maintenance, and replacement of body cells. They also form hormones and enzymes used to regulate body processes. Extra protein is used to supply energy or is changed into body fat.

- **Fats** provide energy and help carry fat soluble vitamins. Fats also add flavor to foods. Some fats help form cell membranes and hormones.

- **Vitamins** are organic substances needed by the body in very small amounts. They do not supply energy, but help release energy from carbohydrates,

fats, and proteins. They also help in other chemical reactions in the body.

- **Minerals** are inorganic compounds found in foods, body structures, and compounds in the body that regulate body processes. Minerals are also needed in relatively small amounts and do not supply energy. Minerals are used to build strong bones and teeth, and to make hemoglobin in red blood cells. They help maintain body fluids and help other chemical reactions in the body.

- **Water** is often called the “forgotten nutrient.” It is needed to replace body fluids lost in urine and sweat. Water helps to transport nutrients, remove waste, and regulate body temperature.

### COMPLEX CARBOHYDRATES

One gram of carbohydrates provides four calories. A calorie is not a nutrient. It is a measure of the energy supplied by food when it is used by the body. Complex carbohydrates, such as starches, are in breads, cereals, pasta, rice, dry beans and peas, and other vegetables, such as potatoes and corn.

### SIMPLE CARBOHYDRATES

Simple carbohydrates are found in sugars, honey, syrup, jam, and many desserts. Sugar can contribute to tooth decay and should be used in moderation.

### PROTEINS

One gram of protein provides 4 calories. Protein is found in both animals and plants. All protein is made up of small building blocks called amino acids. There are approximately 20 amino acids. Our body can make all but 9 of these. The 9 that we can't make are called “essential amino acids.” We must get them from food, and we need all 9 at one time so our body can function properly. The only foods that contain all 9 are animal foods (meat, milk, eggs, etc.). For this reason, animal foods are called “complete” proteins. Plants (grains such as rice, corn, beans, and wheat) each contain several but not all 9 essential amino acids.

## FAT AND CHOLESTEROL

A diet high in fat, especially saturated fat and cholesterol, contributes to elevated blood cholesterol levels in many people. For many, eating diets lower in saturated fat and cholesterol reduces high blood cholesterol levels. Adults over the age of 30 should have a serum cholesterol level of under 200 mg/dL. Health experts agree that less than 30% of our total calories per day should come from fat. Reducing dietary fat is also a good way to limit calories. Decreased fat intake results in fewer calories without a reduction in most nutrients. All types of fat provide 9 calories per gram. Fats come from animal and vegetable sources such as meat, milk, cream, butter and cheese. Cooking oils, salad dressings, and nuts are also dietary sources of fats.

## VITAMINS

There are 13 vitamins, and they fall into one of two categories: fat soluble and water soluble.

### Fat Soluble Vitamins

Fat soluble vitamins are vitamins the body can store (in fat). Excess amounts may have toxic effects. Fat soluble vitamins include A, D, E, and K.

**Vitamin A**—Vitamin A is involved in the formation of and maintenance of healthy skin, hair, and mucous membranes. Vitamin A helps us to see in dim light and is necessary for proper bone growth, tooth development, and reproduction. Good sources of vitamin A include yellow, orange, dark-green vegetables, and fruits, as well as, liver, eggs, cheese, butter, and milk.

**Vitamin D**—Vitamin D promotes calcium and phosphorous absorption and is required for the formation of healthy bones and teeth. Good sources include fortified milk, egg yolk, liver, tuna, and cod liver oil. Vitamin D is produced in the body on exposure to sunlight.

**Vitamin E**—Vitamin E protects vitamin A and essential fatty acids from oxidation in the body cells and prevents breakdown of body tissues. Good sources include vegetable oils, fortified cereals, whole grain cereals and bread, nuts, wheat germ, and green leafy vegetables.

**Vitamin K**—Vitamin K includes a group of vitamins that promote normal clotting of the blood and helps maintain normal liver functions. Good sources are green leafy vegetables, liver, soybean, and other vegetable products.

## Water Soluble Vitamins

Water soluble vitamins include vitamin C, vitamin B-6, vitamin B-12, folate, thiamin, riboflavin, niacin, pantothenic acid, and biotin. For the most part, water soluble vitamins are not stored. Thus, they should be taken in adequate amounts each day.

## MINERALS

Minerals are inorganic compounds that are necessary in very small amounts for proper growth, development, and overall health. They make up a major portion of bones and teeth, making them rigid in their composition. Some of the major minerals are calcium, phosphorus, iron, potassium, zinc, and magnesium.

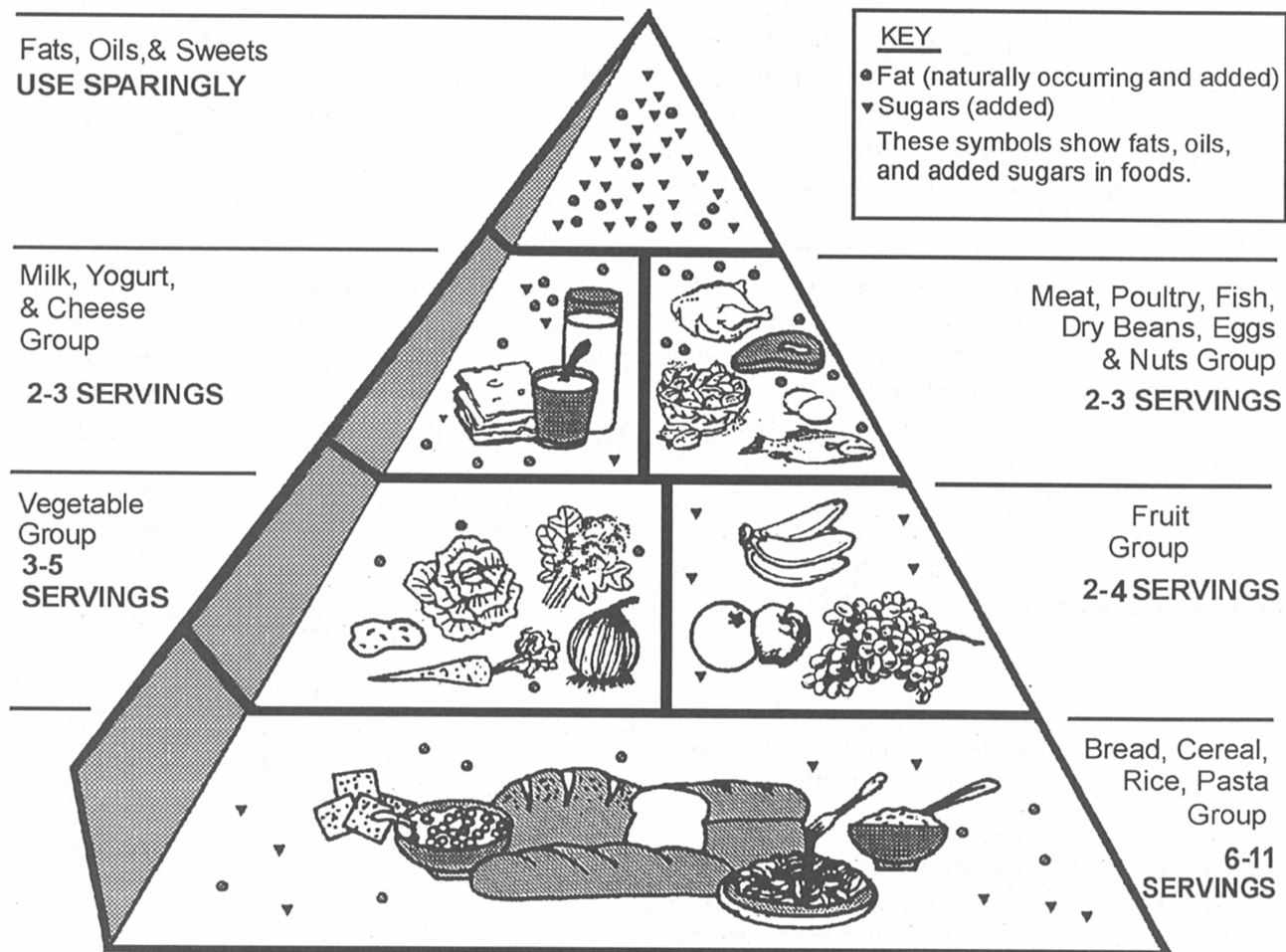
## FOOD GUIDE PYRAMID

The food guide pyramid (fig. 8-1) emphasizes foods from the five food groups shown in the sections of the pyramid. Each of these groups provide some, but not all, of the nutrients we need. For good health we need them all.

The food pyramid graphically communicates the message of the Dietary Guidelines for Americans. Diets should be built upon a base of complex carbohydrates and less fats. The placement of the food groups starting at the base of the pyramid conveys the current recommendations. These recommendations are as follows:

- Eat more grains, vegetables, and fruits.
- Eat moderate amounts of lean meats and dairy foods.
- Use sweets, fats, and oils sparingly.

It is recommended that you eat a diet that is high in complex carbohydrates and low in protein and fat. Your diet should consist of at least 5 combined servings of fruits and vegetables each day. Avoid added fat when possible. Eat at regular intervals when possible, and avoid snacking late at night. For detailed information on nutrition, consult *Navy Nutrition and Weight Control Guide*, NAVPERS 15602; and the *Fat, Cholesterol and Calorie List for General Messes*, NAVSUP 580.



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Figure 8-1.—Food guide pyramid.

### PREVENTIVE DENTISTRY AND NUTRITION

It is known that bacteria in dental plaque uses the nutrients in sugary type foods to produce acids. (Dental plaque is discussed in chapter 5, “Oral Pathology,” and in *Dental Technician, Volume 2*, chapter 3, “Preventive Dentistry.”) Foods that contain carbohydrates (high sugar content) are referred to as being cariogenic (conducive to the production of dental caries). Dental caries may start when poor oral hygiene is present. The decay process begins when dental plaque and the acid produced from cariogenic

foods are left on the teeth for extended periods. Eventually, the acid demineralizes or breaks down enamel and dentin.

To reduce the possibility of dental decay, you should limit the ingestion of sweets to mealtime, and brush and floss thoroughly after meals. Some of the less cariogenic snack foods include fruits and vegetables. However, the least cariogenic snack foods are limited to skim milk, sugar free gum, sugarless soft drinks, sugarless gelatins, and a few others. **Ideally, caries may be avoided by properly brushing and flossing right after eating.**



## CHAPTER 9

# INFECTION CONTROL

Infection control involves taking steps to prevent the spread of infectious agents. Your command will develop standard infection control policies and written protocols following BUMEDINST 6600.10. COs and OICs must appoint in writing an infection control officer (ICO) to assist in implementing the infection control program. Material in this chapter and in chapter 10 are taken from BUMEDINST 6600.10, *Dental Infection Control Program*. Some of the information may be different from what your command policies and procedures are for infection control. COs and OICs may adapt the policies and procedures from BUMEDINST 6600.10 to meet their local conditions and criteria. **Compliance with BUMEDINST 6600.10 is mandatory.** If your command has significant variations from BUMEDINST 6600.10, the ICO must document in the infection control manual the reasons for those changes.

All dental personnel must be aware of sources and methods of transmission of pathogenic micro-organisms and infectious diseases. The emergence of the human immunodeficiency virus (HIV) epidemic, along with recent reports about health care workers who have acquired an HIV infection through occupational exposure, has generated much fear and worry within all the health professions, including dentistry. Healthcare personnel are caught in a conflict between concern for their patient's needs on the one hand and fear of acquiring HIV infection on the other.

Adding to this dilemma is the problem of the hepatitis virus (HBV) infection, a major infectious occupational health hazard in all the healthcare professions. Each year, several thousand healthcare workers become infected with the HBV. The Center for Disease Control (CDC) estimates that HBV infection in healthcare personnel actually results in some 600 hospitalizations and 200 deaths annually. These concerns have led to a renewed interest in the problem of infection control in the dental health care environment.

### CLASSIFICATIONS OF MICRO-ORGANISMS

Microbiology is the study of microscopic life forms referred to as micro-organisms. They are so

small that they can only be seen with the aid of a microscope. Micro-organisms are always present in our environment; most live in warm, dark surroundings where adequate food supply exists. The oral cavity is one such area where enormous numbers of micro-organisms commonly exist and multiply. A *pathogen* is an organism capable of causing disease. Disease producing organisms are said to be pathogenic. Other micro-organisms that are not considered pathogenic can produce infections under favorable conditions. Micro-organisms are classified as bacteria, bacterial spores, viruses, protozoa, and fungi.

### BACTERIA

*Bacteria* are one-celled plants that lack chlorophyll (the chemical that provides the green coloring to plants). A single drop of water may contain as many as two billion medium-sized bacteria. Some diseases caused by bacteria are dental decay, periodontal disease, and tuberculosis.

The three main types and shapes of bacteria are as follows:

1. **Cocci**—spherical and shaped like small beads
2. **Bacilli**—rod-shaped
3. **Spirochetes**—spiral-shaped

### Gram Positive and Gram Negative Bacteria

Certain antibiotics treat different types of bacterial infections. A liquid dye called gram stain is used on the bacteria to determine if they are gram negative or gram positive.

Bacteria that are stained by the dye and turn a dark purple color under microscopic study are called gram-positive bacteria. If no color exists after staining and viewing, the bacteria is called gram negative. A dental officer may submit a bacterial culture to the medical laboratory to determine if it is gram positive or negative before prescribing an antibiotic to treat an infection.

## Bacterial Spores

Bacteria are very resistant to all environments. A protective coating on the surface helps the bacteria evade the defense mechanisms of the body and generally makes it more durable.

Not all bacteria will take on the form of a spore's shell-like coating to withstand unfavorable conditions. Bacteria in a spore state remain alive but passive, and they are resistant to the effects of heat, drying, and most bactericidal chemicals. They will remain capable of becoming virulent (strongly pathogenic) again under favorable conditions. However, under unfavorable conditions, they will either die or remain dormant in a spore state until another opportunity for growth presents itself.

## Viruses

Viruses are micro-organisms that are much smaller than bacteria. Viruses vary in size, from being the size of a single protein molecule to the size of a more complicated bacterial cell. They can be so small that they can be seen only through an electron microscope.

Viruses cannot live long or reproduce outside of a living body (host). They must be able to enter and live in specific cells. For descriptive purposes, they are customarily divided into three subgroups, based on host specificity:

1. Bacterial viruses
2. Animal viruses (including those that attack humans)
3. Plant viruses

Some of the most common diseases caused by viruses are colds, smallpox, measles, rubella, herpes simplex, AIDS, infectious hepatitis, and serum hepatitis. Viruses are usually not affected by therapeutic treatment with antibiotics. Generally, therapeutic treatment is not used to combat a viral infection, but used to treat a secondary bacterial infection that may develop.

Most viruses are susceptible to immersion in boiling water for at least 20 minutes. There are two major exceptions to this rule, infectious hepatitis and serum hepatitis. Because of these exceptions to heat resistance, autoclaving for a minimum of 20 minutes at 270°F, or dry heat sterilization for 90 minutes at 320°F are the only safe procedures for control of these two viruses.

## PROTOZOA

Protozoa are single-celled animals that do not have a rigid cell wall. Some protozoa cause parasitic diseases but not all are pathogens. Most species are harmless, living on dead organic matter or bacteria. Protozoa that are pathogenic survive freely in nature and must be spread by a carrier.

Most protozoa pass through a life-cycle, meaning that they have definite stages of development. These stages vary for each species and are usually very complicated. Malaria is an example of a disease that is caused by protozoa.

## FUNGI

Fungi, like bacteria, are plants that lack chlorophyll. They are free-living organisms that are smaller than protozoa. Mold and yeast forms of fungi have firm cell walls and resemble plants more than animals.

Molds usually form cells in long chains or threads that grow into tangled masses. Some threads of the mass bear clusters of seedlike spores that, when dry, are easily blown into the air like dust. Each microscopic seed is capable of growing new mold upon settling in a suitable place. Mold spores are easily destroyed by heat. The most common infections in humans because of mold are athlete's foot and ringworm. The mold penicillium is very common in nature and contributes to the spoilage of food. The drug penicillium is derived from this mold.

## INFECTION CONTROL TERMS AND DEFINITIONS

The following terms and their definitions will help you understand the material that is in this chapter and in chapter 10, "Sterilization and Disinfection," Volume 1:

**Asepsis**—The prevention of contact with micro-organisms.

**Automated washer processor**—Washer, sterilizer, dishwasher, or other mechanical washing device.

**Barrier technique**—The use of rubber, plastic, foil, or other fluid resistant materials to cover surfaces and protect them from contamination.

**Bioburden**—The number of micro-organisms contaminating an object. Also known as bioload or microbial load.



**Biological control**—An unprocessed biological monitor from the same lot as the test monitor. When cultured, serves as a control by verifying the viability of the unexposed organisms.

**Biological monitor**—A bacterial endospore test designed to assess whether sterilization has actually occurred. Also known as biological indicator or biological spore test.

**Bloodborne pathogens**—Pathogenic micro-organisms that are present in human blood and capable of causing disease in humans.

**Bowie-Dick Type Test**—A diagnostic test of a prevacuum sterilizer's ability to remove air from the chamber and detect air leaks. This is not a sterility assurance test.

**Chemical disinfection**—The destruction or inhibition of most viruses and bacteria while in their active growth phase. The process does not necessarily kill all spores nor can it be verified by a monitor.

**Chemical indicator**—Chemical dyes used to determine whether the conditions required for sterilization are met. Also known as internal or external indicators, dosage indicator, or process indicator.

**Contaminated**—The presence or reasonably expected presence of blood or other potentially infectious material on an item or surface.

**Contaminated laundry**—Laundry that has been visibly soiled with blood or other potentially infectious materials.

**Culture**—The reproduction and growth of micro-organisms or living tissue cells in or on a nutrient medium.

**Dental item classification**—Dental items are classified as critical, semicritical, or noncritical based on the pathways through which cross-contamination may occur and the location and technique of instrument use.

**Critical items**—Instruments and materials that penetrate the skin, mucous membranes, or bone. These items must be sterile before use. Examples include surgical instruments, periodontal knives, and suture needles.

**Semicritical items**—Instruments, equipment, or materials that frequently contact mucous membranes, but cannot be sterilized because of their design or inability to withstand heat. At a minimum, these items

require high-level disinfection. Examples include some radiographic positioning devices and plastic impression trays.

**Noncritical items**—Instruments, equipment, or materials that do not normally penetrate or contact mucous membranes but which are exposed to splatters, sprays, or splashing of blood, or are touched by contaminated hands. These items require intermediate-level disinfection. Examples include the dental unit and chair.

**Engineering controls**—Equipment or methods that isolate or remove bloodborne pathogens from the workplace. A few examples include: use of the rubber dam; use of the high-volume evacuator during production of splash, splatter, and aerosols; adequate ventilation and air circulation; puncture-proof sharps containers; closing the lid of ultrasonic cleaners during operation; and use of cassettes to minimize handling of instruments during transport and sterilizing process.

**Exposure incident**—A specific eye, mouth, or other mucous membrane, nonintact skin, or percutaneous exposure to blood or other potentially infectious materials.

**Exposure time**—The total continuous elapsed time during which the sterilizer is operating at preselected sterilizing parameters, such as temperature and pressure.

**Infectious micro-organisms**—Organisms capable of producing disease in a host.

**Infectious waste**—Termed “regulated waste” and defined as liquid or semiliquid blood or other potentially infectious materials (OPIM); contaminated items that would release blood or OPIM in a liquid or semiliquid state if compressed; items caked with dried blood or OPIM that are capable of releasing those materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or OPIM. Also included as OPIM are saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

**Invasive procedure**—A surgical entry into the tissues, cavities, organs, or repair of major traumatic injuries. This includes the manipulation, cutting, or removal of any oral or perioral tissue during which bleeding occurs, or the potential for bleeding exists. Routine restorative or related dental procedures are not invasive procedures.

**Micro-organisms**—Bacteria, fungi, viruses, and bacterial spores.

**Nosocomial infection**—An infection originating in the environment of a hospital or freestanding dental treatment facility (DTF).

**Personal protective attire**—Specialized barrier attire worn by an employee to protect against a hazard.

**Occupational exposure**—Reasonably anticipated skin, eye, mucous membrane, or parenteral exposure to blood or other potentially infectious materials that may result from performance of your duties, despite the appropriate use of protective attire or equipment.

**Saturated steam sterilization**—A process that uses steam heat under pressure for sufficient length of time to kill all forms of micro-organisms.

**Sanitary sewer system**—A sewer system connected to a sewage treatment plant.

**Spray-wipe-spray**—An acceptable method of cleaning and disinfecting. Presently there is no agent on the market with the Environmental Protection Agency (EPA) registration that cleans and disinfects in one step. Therefore, the importance of cleaning as a separate step from disinfection and sterilization cannot be overemphasized.

**Sterile, sterility**—Free from all living micro-organisms.

**Sterilization**—Process that destroys all types and forms of micro-organisms.

**Sterilization area**—The area of a health care facility designed for housing sterilization equipment and conducting sterilization procedures.

**Sterilizer (gravity displacement type)**—A type of sterilizer in which incoming steam displaces via gravity, the residual air through a port or drain usually in or near the bottom of the sterilizer chamber. Common exposure techniques: 30 minutes at 121-123°C (250-274°F) and 15 to 17 pounds per square inch (psi); or 15 minutes at 132-135°C (270-274°F) and 30 to 32 psi. Always follow manufacturer's recommended settings.

**Sterilizer (prevacuum type)**—A type of sterilizer that relies on one or more pressure and vacuum evolutions at beginning or end of the cycle. This method of operation results in shorter cycle times because of the rapid removal of air from the chamber and the load by a vacuum system. Operating temperatures are 132-135°C.

**Unit dose**—The quantity of materials or supplies required to treat a single patient.

**Universal precautions**—A protocol for infection control that treats all human blood and body fluids as if known to be infectious for HIV, HBV, and other bloodborne pathogens.

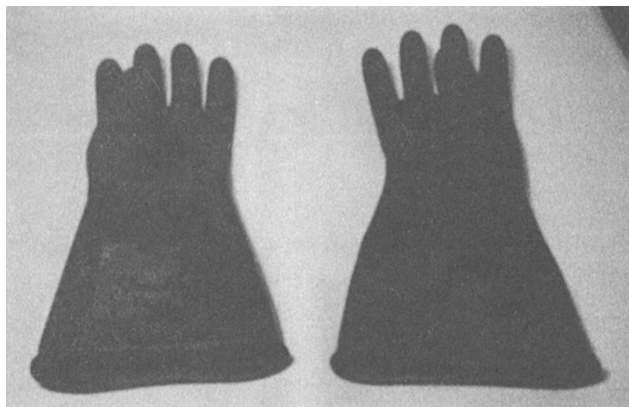
**Work practice controls**—Controls that reduce the likelihood of exposure by altering the way one performs a task such as having patients brush their teeth or using antiseptic mouthwash before beginning a procedure; using the rubber dam whenever possible, disinfecting the isolated teeth, and using a disinfectant mouthwash before and after applying the dam; heavy duty, puncture-resistant utility gloves (fig. 9-1) are used when handling instruments, and while cleaning and disinfecting instruments during the sterilization process; using an accepted and safe technique for recapping needles; and disposing of sharps before beginning cleanup procedures at the conclusion of treatment.

## UNIVERSAL PRECAUTIONS

Identifying potentially infectious patients by medical history, physical examination, or readily available laboratory tests is not always possible. A period of up to several weeks often exists between the time a person becomes infected with a virus and the time when a laboratory test can detect the antigens or antibodies that form. In an HIV-infected individual, this period could be 6 months or more. Consequently, even if a patient tests negative, he or she may still be infectious. Dental personnel must assume that all body fluids and contaminated instruments and materials are infectious and use universal precautions to protect themselves and the patients.

## IMMUNIZATION AND TESTING

Dental personnel providing direct patient care, including civilian employees, volunteers, dental laboratory, and repair personnel who are directly exposed to blood and saliva, must receive an HBV vaccine. Also, all active duty healthcare personnel will receive HIV and tuberculosis testing and or screening on an annual basis during each calendar year.



**Figure 9-1.—Heavy-duty utility gloves.**

## **MEDICAL HISTORY REVIEW**

A thorough review of each patient’s current medical history is mandatory before initiating any dental examination or treatment procedure.

## **BARRIER TECHNIQUES AND PROTECTIVE ATTIRE**

An effective approach to disease prevention is to reduce exposure to potentially dangerous micro-organisms that may contaminate the body. A method called the “barrier technique” provides a physical barrier between the body and source of contamination. Barrier techniques include the use of personnel protective equipment (PPE) and surface covers. PPE provides protection from contamination to the body with the use of a mask, eyeglasses, gloves, and clothing.

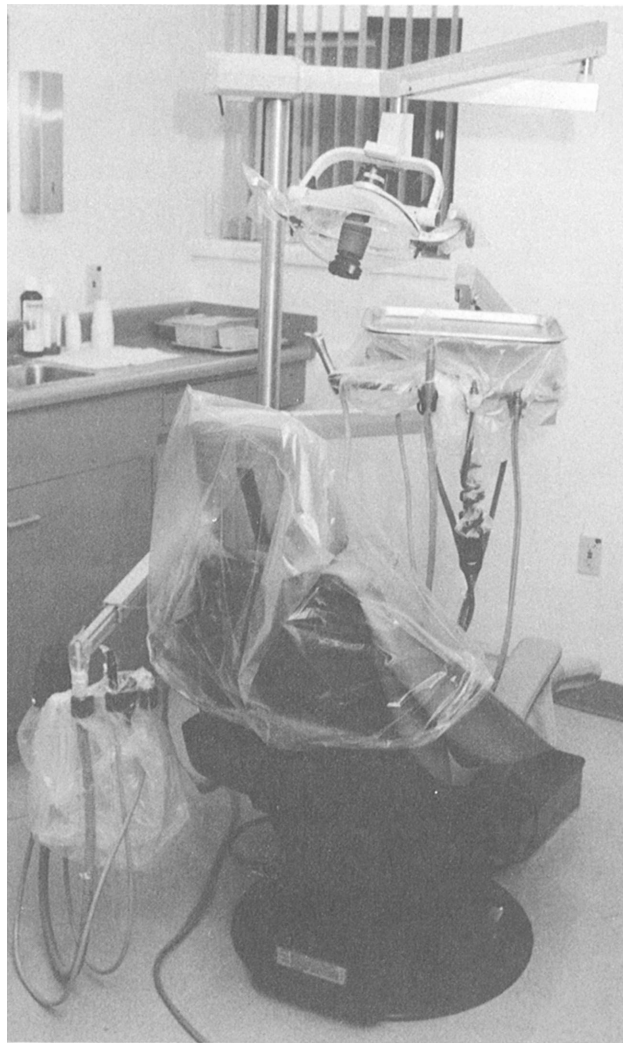
Barrier covers prevent contamination of areas that are exposed to aerosols, splatter, or contaminated

fingers during patient treatment. If not covered, these same areas would require adequate disinfection after treatment; otherwise, they would be sources of cross-contamination for the next patient. To protect surfaces against contamination by blood or OPIM, use the following disposable materials:

- Plastic wrap or bags
- Aluminum foil
- Impervious backed paper

These barrier covers (fig. 9-2) can also be used on areas in the dental treatment room (DTR) that are difficult to disinfect, such as light handles, dental control units, switches, headrests, bracket and instrument trays, three-way syringe bases and controls, or X-ray tube heads. Using surface covers as protective barriers has several advantages over disinfecting the surfaces.

- Preparation and clean up of the DTR is accomplished with greater efficiency.



**Figure 9-2.—Plastic barrier covers in a DTR.**

- Headrest covers, plastic wrap or bags, aluminum foil, or impervious backed paper can be placed and removed on the surfaces easier and faster than disinfecting.
- A reduction in the amount of cleaners and disinfectants otherwise used.
- Enhanced longevity of equipment because of reduced contact with corrosive, caustic, or staining compounds in disinfectants.

The disadvantages of using barrier covers are the increased cost of disposables and additional amount of solid waste.

### **Gloves**

Wear gloves for all patient contact activity. Complete all treatment on each patient and wash and reglove before beginning treatment procedures on another patient. Gloves torn or punctured during patient treatment should be replaced immediately.

Since washing increases the porosity of gloves up to 60 percent, repeated use of a single pair of gloves is not permitted. Also petroleum-based hand lotions should not be used before donning gloves.

Many types of gloves are available for use in the dental clinic. The four most common are as follows:

**Sterile surgical gloves**—They are the highest quality, most expensive, and best fitting. They are used for surgical or invasive procedures (bloody) where maximum protection against infection must be provided for the patient and the provider.

**Procedural gloves**—They are manufactured the same as sterile surgical gloves; however, these gloves are nonsterile and are not individually wrapped in pairs. Procedural gloves offer the highest quality and best fit at a greatly reduced cost when sterile surgical gloves are not required.

**Latex examination gloves**—These are the least expensive type of nonsterile gloves that are commonly used in routine dental procedures. They are available in a variety of sizes and come with or without cornstarch for ease in putting them on and off. Some individuals may develop hypersensitive reactions either to the latex material or the cornstarch. If this occurs, latex powderless gloves should be worn. If a true latex allergy exists, it should be documented in the staff member's medical record.

### **Clinical Apparel**

Wear reusable or disposable clinical apparel, such as smocks, scrubs, laboratory coats, or other personal protective attire when treating patients or working in areas where contaminated or potentially contaminated materials may be present. When surgical procedures are performed involving reasonable exposure to blood or OPIM, additional personnel protective equipment or apparel, such as long-sleeved gowns, is required. Forearms must be covered if one reasonably assumes that they will be splattered with saliva or blood. All dental personnel must take the following precautions regarding the use of clinical apparel:

- Wear clinic apparel only in the DTF.
- Change clinic apparel daily and when visibly soiled.
- Turn in soiled linen at the end of the work period and place them in a soiled linen receptacle (fig. 9-3).
- Do not leave dirty clinic attire in personal clothing lockers or spaces overnight.

### **Face Mask and Shield**

Wear a face mask or a full-length face shield with a face mask during any patient treatment. Wear a mask in the DTR and central sterilization room (CSR) where aerosols are a problem, especially on the dirty side of the CSR. Personnel must change face masks in the following situations:

- After each patient or when the mask is visibly soiled.
- When involved in other activities such as prosthetic laboratory and equipment repair procedures where airborne particles or dusts are produced.
- When sorting laundry.
- During decontamination procedures.
- When cleaning spills of infectious wastes.

### **Protective Eyewear**

Wear protective eyewear when assisting or providing treatment or other procedures that may cause a splash, splatter, or airborne particles. Eyewear or goggles must have solid side shields to provide maximum protection. Patients must be provided approved protective eyewear. Disinfect patient eyewear after treatment.

### **Protective Headwear**

Wear disposable protective headwear during surgical procedures such as periodontal, endodontic, and oral surgery. Headwear must fit the head to minimize exposure of the head and hair to potential splashing or spraying of blood or airborne particles.

### **Eating, Grooming, Drinking, and Smoking**

Eating, grooming, drinking, and smoking are permitted only in designated areas separate from DTRs. Follow all BUMED and command instructions pertaining to this matter.

## **INFECTION CONTROL IN THE DTR**

Infection control in the DTR is your responsibility. There are many precautions and procedures involved with infection control practices. The implementation of aseptic techniques is required when preparing for patient treatment, during



**Figure 9-3.—Soiled linen receptacle.**

treatment, and after the patient is dismissed. There can be no short cuts or deviation from your command's written procedures and guidelines on infection control. They must be done correctly. You must be able to accomplish the following infection control procedures:

- Prepare the DTR for treatment.
- Assist the dental officer during treatment.
- Disinfect the DTR between patients.
- Secure the DTR at the end of the day.
- Perform housekeeping duties.
- Sort laundry.
- Dispose of infectious waste.

### **PREPARATION OF THE DTR**

In accordance with BUMEDINST 6600.10, the *Dental Infection Control Program*, the following procedures should be used. As a dental assistant, it is your responsibility to ensure that your DTR is

properly prepared to treat dental patients. All dental personnel must strictly adhere to the procedures explained next.

### **Unit Water Supply System**

At the beginning of each workday, flush each of the unit water lines and hoses for at least 1 minute, beginning with the cup filler and cuspidor even if their use is not anticipated. Potable water supplies may contain up to 100 bacterial colony forming units per millimeter (cfu/ml), and water in dental units, at times, can contain in excess of 1,000,000 cfu/ml. This microbial contamination comes from the retraction of contaminated water and saliva through the dental handpiece and the growth of bacteria in the unit water lines. Although most incoming water is chlorinated, chlorine loses its potency as the water lies stagnant in the unit tubing. Under the right circumstances, these bacteria will multiply and may become pathogenic.

## Working Surfaces

Open instrument trays, packs, or cassettes and leave wrapping material **underneath** as a barrier for the work surface. To protect surfaces against contamination by blood, you should cover and use barriers for areas that are difficult to disinfect.

## Infection Control During Dental Treatment

Aerosols in the work environment present a potential health hazard for both the dental staff and patient. The long term effect is cumulative and may be harmful. The use of high-volume evacuators (HVEs) and rubber dams during all dental procedures generating aerosols will reduce the volume of aerosols and decrease the level of micro-organisms. Aerosol levels can also be lowered and minimize the potential risk by employing the following procedures:

- Clean cavity preparations with water, air, or an air and water combination.
- Cover ultrasonic tanks when in use.

The dental officer may direct you to have patients brush their teeth or rinse with a mouthwash **before** treatment. This will reduce the microbial concentration of their oral flora (saliva). Three 10-second rinses will temporarily reduce a patient's microbial count by up to 97 percent. Many dentists are now using a 0.12 percent chlorhexidine gluconate preoperative rinse that also significantly decreases the amount of microbial count of an aerosol.

The following procedures should be used with all dental patients for infection control:

- Be sure to wash your hands before donning and after removal of gloves.
- Wear sterile gloves for all invasive surgical procedures.
- Use nonsterile gloves for examination and other nonsurgical dental procedures.
- Use a rubber dam whenever possible. Swab isolated teeth with an antimicrobial mouthwash to reduce aerosolization of oral bacteria.
- Use disposable suction, saliva ejector, and irrigation tips.
- Autoclave all instruments that can withstand heat sterilization.
- Sterilize rotary cutting instruments such as burs and diamonds before using.

- Use the unit dose concept when dispensing supplies for each treatment setup. This is mandatory.
- Use sterilizable cassettes, tray sets, or packs for instruments.
- Place the proper amount of supplies in each setup before sterilizing.
- Store opened packages of supplies in closed drawers or cabinets in the DTR (in a covered container if practical).
- Use clean forceps to dispense only enough supplies for immediate use.
- **Never** use your hands to dispense items from bulk storage containers.
- Use of bottled irrigation solution for surgical and nonsurgical procedures is considered sterile only for that patient if aseptic techniques are maintained.
- Record expiration dates on all opened containers.

Before leaving the DTR, all personnel will remove and discard gloves and masks worn during patient treatment, **except** when transporting contaminated items to the CSR or to the prosthetic laboratory if authorized by your Command Infection Control Officer.

To prevent transfer of secretion to and contamination of a patient's chart, remove gloves and wash hands (unless cover gloves are worn) before writing in dental records, viewing radiographs, or taking photographs.

## Disinfecting the DTR Between Patients

You have just finished with a patient, and the dental officer is 15 minutes behind schedule and your last patient for the morning is waiting in the reception area. You are in a hurry to set up for the patient. **Stop, slow down, and think!** Disinfecting your DTR for your next patient takes time and must be done correctly. Always wear gloves while handling nonregulated waste materials and instruments or cleaning contaminated surfaces. Place all nonregulated, nonsharp, disposable materials in designated containers lined with plastic bags. Use foot operated containers if they have lids.

The ultimate goal of an aseptic technique is to break the chain of infection and eliminate the possible transmission of infectious disease between patients

and between patients and staff. Use the following information when breaking down your DTR and setting up for your next patient.

**DENTAL INSTRUMENTS.**—You must never lay contaminated instruments directly on countertops or work surfaces. Rewrap cassettes, packs, or trays in the original wrap and place individually packaged instruments in a leakproof covered container to transport to the CSR.

**LIQUID REGULATED WASTE.**—Place all regulated liquid wastes in designated leakproof containers identified either by the color red or by a biohazard label. Pour liquid regulated wastes into the sanitary sewer system through clinical sinks (not handwashing sinks) or unit cuspidors unless local or state regulations prohibit this practice.

**THREE-WAY SYRINGE TIPS.**—Disposable syringe tips are preferred. Sterilizable syringe tips may also be used if disposable syringe tips are not available.

**DISPOSABLE SHARPS.**—Treat used disposable sharps, such as needles, scalpel blades, carpules, disposable syringes, used burs, and broken instruments as **regulated waste**. Handle these items with extreme care to prevent any unintentional injury and the possible spread of bloodborne diseases. Place used disposable sharps in puncture resistant containers specifically designed for needles and other sharp items. The universal symbol for biohazard must appear on these containers. Do not recap, bend, break, or otherwise manipulate needles by hand. In the dental setting, because a patient may require a second injection of local anesthetic, and most syringes are not disposable, recapping is sometimes necessary. Use the following guidelines when recapping:

- Never recap a needle using a two-handed technique.
- Use one of the commercially available sheath holders, or use the “scoop” technique.
- If using the scoop technique, the cap is scooped up from the tray with the needle tip using only one hand.
- Never allow uncovered needles to remain on the instrument tray.

**DENTAL HANDPIECES.**—Many dental clinics with CSRs will have you remove the contaminated handpieces you have used to complete a procedure and turn them into the CSRs along with your instruments. The CSR technician will handle, disinfect, lubricate, and sterilize the dental handpieces. This saves the

dental assistant valuable time and avoids any excess aerosols that occur during the disinfection and lubrication procedure.

If your command requires you to perform handpiece maintenance in the DTR, you should remove handpieces after each patient, then lubricate and run them for **30 seconds**. (This will also serve to purge the tubing as stated previously.) This procedure removes any potentially infectious material from retraction of coolant water during previous treatment. Many manufacturer’s require lubrication of handpieces before and after sterilization. To prevent cross-contamination, follow these procedures:

- Use two separate containers of lubricant—one marked for lubrication before sterilization and another marked for after sterilization.
- Lubricate handpieces with one end in a headrest cover to capture the aerosol contaminants or use one of the many commercial products for cleaning and lubricating handpieces.

For disinfecting **nonautoclavable** handpieces while wearing gloves, use the following procedures:

- Submerge two gauze sponges per handpiece in a high level, EPA registered disinfectant. Squeeze out any excess.
- Use one sponge to wipe the handpiece and discard.
- Wrap the second sponge around the handpiece and return it to the holder for the period of time specified by the manufacturer.
- Before reuse, wipe the handpiece thoroughly with potable water to remove residual disinfectant.

If the handpiece is autoclavable, perform the following:

- Remove the handpiece from the couplings, clean, and lubricate following the manufacturer’s instructions.

### **Barrier Clean Up**

After you complete the previously mentioned procedures, remove and discard the disposable coverings or barriers contacted during patient treatment while you are still gloved. It is important to remove the surface covers carefully to prevent contamination of the covered areas. This is accomplished by turning the soiled outer side toward the inside, or inside-out.



You must clean and disinfect the previously covered surfaces between patients **only** when the integrity of the physical barriers has been compromised or when the surface is visibly soiled. For example, if moisture is absorbed through the cover to the underlying surface, then the purpose of the barrier is defeated, and the surface must be disinfected.

### **Cleaning Unprotected Areas**

Using the spray-wipe-spray technique, clean and disinfect all unprotected “high touch” areas with an intermediate-level, EPA-registered disinfectant. Remove all debris and particulate matter before disinfection. To be effective, the disinfectant must remain in contact with the surfaces for the time specified by the manufacturer. **Do not use** 2 percent glutaraldehyde as a surface disinfectant because of its caustic vapors and high cost.

### **Bringing Contaminated Items to the CSR**

After completion of the above procedures, you can now take all metal and heat stable items to the CSR for sterilization. Ensure all instruments and equipment are handled properly and no sharp objects are protruding through packs or cassettes while transporting items to the CSR.

### **Preparing for the Next Patient**

When you return to the DTR from the CSR and if your room is clean, remove your gloves and wash your hands and other exposed skin surfaces with an antimicrobial soap. When discarding a face mask after removing gloves and washing hands, handle the mask only by the elastic or cloth tie strings. Never touch the mask itself. Plan the above process carefully for efficient use of time. Replace clean disposable barriers and set up clean handpieces and instruments for the next patient.

### **EXPOSURE INCIDENT**

Dental personnel who sustain percutaneous inoculation of serum or saliva by accidental puncture, or splashing while handling contaminated instruments, equipment, or supplies must receive immediate medical evaluation to comply with local military treatment facility (MTF) guidelines. Refer to the *Nosocomial Infection Control Manual for Ambulatory Care Facilities*, NEHC-TM89-2, and

report the incident as a mishap to the command safety officer using OPNAVINST 5102.1.

### **SECURING THE DTR**

To secure the DTR at the end of the day, follow all steps as mentioned under the “Disinfecting the DTR Between Patients” heading.

Flush the high-volume evacuator (HVE) system with at least one quart of water. Clean the system with an HVE system cleaner at least once each week. Use the system cleaner more often if indicated by problems.

Spray-wipe-spray the countertops, dental unit, chair, and dental light. Flush each unit waterline and hose for 30 seconds.

If unit has a self-contained water delivery system, follow manufacturer’s instructions for flushing and air purging the lines.

### **HOUSEKEEPING**

Although micro-organisms are normal contaminants of walls and floors, these surfaces are rarely associated with transmitting infection to staff and patients; however, all facilities must remain clean. Any infection control instruction will determine and implement a written schedule for cleaning and a method of disinfection based upon location within the facility, type of surface, type of contaminant present, and tasks or procedures performed in a given area.

The OSHA and NAVOSH requirements for housekeeping include sections on equipment, laundry, and infectious waste disposal.

#### **Equipment**

OSHA and the Navy require that all DTFs ensure a clean and sanitary workplace. Work surfaces, equipment, and other reusable items must be decontaminated with an EPA-registered disinfectant upon completion of procedures when contamination occurs through splashes, spills, or other contact with blood and OPIM. Observe and perform the following procedures:

- Clean uncarpeted floor and other horizontal surfaces regularly and when spills occur. Use mops with a detergent and an EPA-registered disinfectant or a detergent with sodium hypochlorite (1:100 dilution). Mops must not be used for more than 1 day without cleaning.

- Clean walls and blinds only if they are visibly soiled.

- Inspect, clean, and disinfect on a regular basis, all bins, pails, cans, and similar receptacles intended for reuse and having the potential for contamination with blood or OPIM. Clean and disinfect these containers immediately or as soon as possible upon visible contamination.

- Noninfectious waste refuse containers are not considered infection control hazards. Line them with plastic bags, leave them uncovered, and do not allow them to overflow. Remove hinged doors on cabinet refuse containers and hinged lids on freestanding containers since they present an increased potential for cross-contamination.

- Do not pick up broken glassware directly with your hands. Instead, use mechanical means such as a brush and dust pan, vacuum cleaner, tongs, cotton swabs, or forceps.

## Laundry

Bed linens, towels, smocks, trousers, and other protective attire are considered **ordinary laundry** unless they are visibly soiled by blood or OPIM. Ordinary laundry should be sorted wearing gloves and processed following your command's laundry policy.

**Contaminated laundry** is any laundry soiled with blood or OPIM, including saliva and will be packed in a red biohazard container or bag, or in a leakproof plastic bag with a biohazard label, before shipment to the laundry. When sorting laundry, you should wear gloves and other appropriate personnel protective attire. Bag contaminated laundry at the location of use. **Do not sort or reuse soiled laundry in patient care areas.** If your command has on-site laundry service, follow instructions contained in BUMEDINST 6600.10, *Dental Infection Control Program*.

## Regulated Waste Disposal

Infectious waste, now termed "regulated waste" in the DTR is defined as any disposable material with blood or saliva on which, if handled, would release or express blood or saliva. If there is doubt as to the infectiousness of the material in question, contact the ICO or supervisor.

**HANDLING.**—Regulated waste must be placed in closable, leakproof containers or bags that are labeled as a biohazard (fig. 9-4). The container may be in the DTR or in a central area in the clinic. If a

centralized area is used as the regulated waste depository for the clinic, the regulated waste from each DTR must be transported to this central area. If headrest covers from the DTR are used to transport the regulated waste to the depository, they must be closable and identified with a biohazard label.

The ICO should ensure that all DTRs within a clinic and all clinics within a command handle regulated waste in a uniform manner.

**RECORDKEEPING.**—The ICO should implement a practical system to monitor disposal of infectious waste. This system includes date, type of waste, amount (weight, volume, or number of containers), and disposition.

Further guidance for infectious waste can be found in BUMEDINST 6600.10, *Dental Infection Control Program*, and BUMEDINST 6280.1, *Management of Infectious Waste*.

## HANDWASHING

Handwashing is one of the most important procedures in preventing the transfer of micro-organisms from one person to another. The purpose of handwashing is to remove these micro-organisms from the folds and grooves of the skin by lifting and rinsing them from the skin surface. Good handwashing techniques and use of gloves are essential before anticipated exposure to patients' blood or body fluids.

The skin harbors two types of flora, **resident** and **transient**. Resident organisms have these characteristics:

- Can survive and multiply on the skin.
- Can be cultured repeatedly from the skin.
- Are usually of low virulence and are not easily removed.

Conversely, transient bacteria have these characteristics:

- Do not survive and multiply on the skin.
- Are not firmly attached to the skin.
- Are effectively removed by rubbing of the hands together and rinsing them under running water.

## HANDWASHING AGENTS

There are many commercial handwashing products available for use in clinics. Because of the variety, we will discuss the two main handwashing

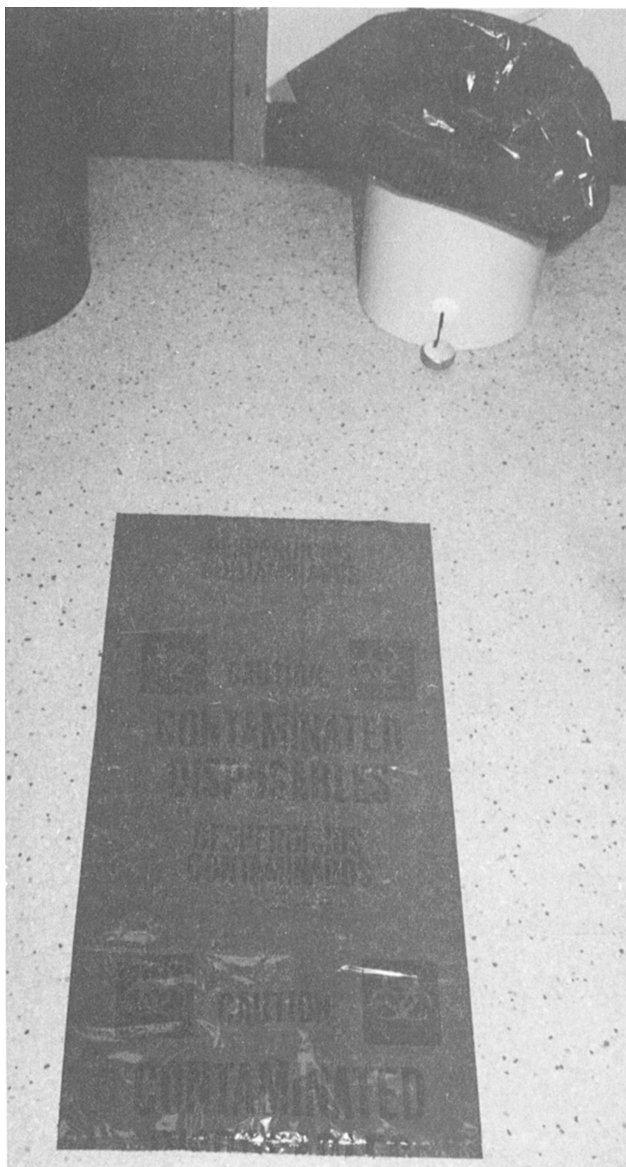


Figure 9-4.—Contaminated disposable bag with biohazard label.

agents used in the Navy, **water-based** cleaning agents and waterless handwashing agents.

#### **Water-Based Cleaning Agents**

Water-based cleaning agents include chlorhexidine, iodophors, and alcohol among the active antimicrobial ingredients approved for handwashing. Products which use aqueous quaternary ammonium compounds, such as those containing dilute benzalkonium chloride, are not approved. Outbreaks of nosocomial infection associated with the use of

aqueous quaternary ammonium compounds have been documented. Two of the most common water-based cleaning agents are iodophors and chlorhexidine gluconate.

**IODOPHORS.**—These are water soluble complexes of iodine with organic compounds that are effective against all gram-positive and gram-negative bacteria and viruses. Iodophors usually do not have a long-acting germicidal action and, if used frequently, may cause severe drying of the skin.

**CHLORHEXIDINE GLUCONATE.**—This antiseptic is usually marketed as 4 percent chlorhexidine gluconate with 4 percent isopropyl alcohol in a sudsy base. Chlorhexidine gluconate is an effective antiseptic for reducing transient and resident microbial hand flora, and has a sustained antimicrobial effect. It does not appear to affect the skin adversely. Also, it is approved as a surgical scrub.

### **Waterless Handwashing Agents**

Waterless handwashing agents contain 70 percent isopropyl alcohol and virtually disinfect the skin in 20 seconds. They are effective against tubercle bacilli, fungi, and viruses. Unfortunately, they are volatile, flammable, evaporate quickly, and dry the skin. Alcohol-based, waterless handwashing agents may be used in areas where handwashing sinks are not readily available.

### **HANDWASHING EQUIPMENT AND SOAP DISPENSERS**

All patient care areas should have sinks with electronic or mechanical elbow, foot, or knee action faucet control for asepsis and ease of function.

The use of no hand (no touch) actuated soap dispenser controls is preferable. Maintenance for refillable handwashing agent dispensers is to empty, disassemble, and clean them weekly. Do not use bar soaps in bathrooms or clinical and common areas.

### **HANDWASHING GUIDELINES**

All personnel involved in patient care must wash their hands, wrists, and forearms with a disinfectant soap and water at the following times:

- At the beginning of each day.
- Between patients, before and after going to lunch, after taking a break, after using the bathroom, or any time they become contaminated.
- Before gloving, after degloving, and before regloving.
- At the end of the day.

### **HANDWASHING TECHNIQUES**

Dental staff personnel involved in patient care must follow a rigid handwashing protocol including the following practices:

- Removing all jewelry and other ornaments from the hands and wrists
- Trimming the fingernails and cuticles. Nails should be no longer than the finger tips to avoid puncturing gloves. Do not use false fingernails since contamination may occur from fungal growth between the false and natural nails. Also, do not wear nail polish since micro-organisms can hide in small cracks in the finish.
- Wetting the hands under warm, running water and applying the necessary amount, if antimicrobial soap is required, to work up a lather. Vigorously rub the hands together, fingers entwined. This creates friction and loosens dirt and micro-organisms. Clean under the fingernails using a nail brush. Continue scrubbing the wrists and lower forearms. Visibly soiled hands may require more time.

Surgical teams must scrub their hands up to the elbows with an antimicrobial surgical product for the time specified by the manufacturer. After scrubbing, dry with a sterile towel.

When washing times are too short or technique is poor, these problems may occur:

- Fingertips, thumbs, and the areas between the fingers are washed poorly or may be skipped entirely.
- The dominant hand is generally washed less thoroughly than the nondominant hand.
- Microbe counts under the fingernails have been found to remain high even after surgical scrubs.

Rinse soap off by placing hands under warm running water. If the sides of the sink are touched, you must repeat the handwashing. Dry hands with paper towels. If the sink does not have an electronic elbow, foot, or knee action faucet control, use a dry paper towel when turning off the faucet.

# STERILIZATION AND DISINFECTION

Concerns about transmitting infectious agents, such as hepatitis virus (HBV) and human immunodeficiency virus (HIV), have caused the dental community to become more aware of the need to sterilize and disinfect instruments, materials, and other equipment to protect providers and patients. In this chapter, we will explain the sterilization and disinfection process with which you, as a dental assistant, will be involved. We will also give you an overview of the procedures so you can effectively carry out your duties.

The highest level of contamination control is sterilization because it results in the total destruction of all forms of microbial life. A variety of sterilization methods and many types of liquid chemical disinfecting agents are available. Heat sterilization is preferable for all equipment and materials that can withstand high temperatures. Heat sterilization is effective, relatively easy to use, comparatively inexpensive, and readily monitored for effectiveness. Sterilization and the availability of sterile products for use in dental healthcare delivery depend on many factors. The most critical factors are as follows:

- Proper and efficient sterilization facility design
- Sound infection control practices before, during, and after sterilization
- The effectiveness of the actual sterilization process

## PHYSICAL DESIGN

Dental Treatment Facilities (DTFs) must have a central sterilization room (CSR) or a central sterilization area. Centralization of sterilization activity is safer, provides more efficient use of materials and personnel, and standardizes execution and monitoring procedures. We will explain the critical design elements that make up a CSR area next.

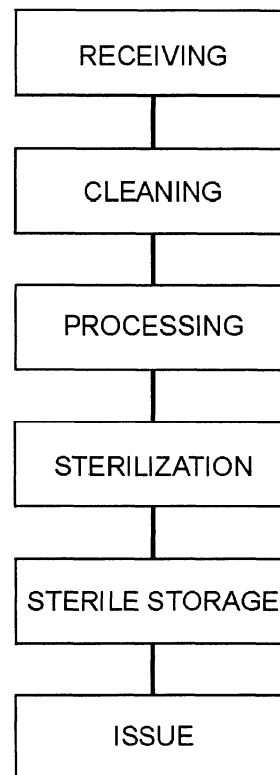
### Dedicated Work Areas

The design and outfitting of a sterilization area must include work areas for receiving, cleaning, processing, sterilizing, storing, and issuing of instruments and equipment.

### Functional Flow of the Sterilization Process

Most large dental clinics will have a permanent CSR technician assigned to the sterilization area. As part of your indoctrination, you may be temporarily assigned in the CSR so you can learn your command's sterilization processes. All CSRs should have a functional flow system where equipment, instruments, and materials are first introduced into the receiving area, and work their way through to the issue area in a specific order. Figure 10-1 illustrates a CSR functional flow chart that all personnel should adhere to while working in the CSR.

Once you are physically in an area of the CSR, you must not go backwards or skip an area. This will compromise the entire sterilization process. Do not process contaminated instruments, materials, or equipment in an area that may contaminate the sterilized items.



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Figure 10-1.—CSR functional flow chart.

## Traffic Control

Controlled access to the sterilization areas minimizes the potential for transfer of microorganisms between contaminated items, patients, and staff. These areas must be off limits to anyone not involved in the sterilization process.

## Receiving and Cleaning

Ideally, these areas will be physically separate from the remainder of the sterilization area. If physical separation is not obtainable, proper outfitting and equipment selection are critical. Commands should purchase equipment that minimizes the handling of contaminated materials and instruments. There may also be an area equipped with the utilities necessary for operating dental handpieces as shown in figure 10-2. Some commands require that the disinfection, cleaning, lubrication, and sterilization of dental handpieces take place in the CSR instead of the dental treatment room (DTR). Check to see what your command's policies are on where handpiece maintenance should take place.

## Processing

A processing space should have ample work surface for the volume of materials processed. All inspecting, sorting, wrapping, and packaging of contaminated materials occur here.

## Sterilization

The space requirements for the sterilization process should be determined by the available size, the degree of sufficient access for the loading and unloading, and the ability to service the sterilizer.

## Sterile Storage and Issue

To protect and maintain all sterile items, the storage and issue areas should not be in the immediate vicinity of the contaminated processing areas.

## THE STERILIZATION PROCESS

The sterilization process takes place in a CSR. There are many benefits to the centralized approach. Centralized instrument decontamination and sterilization are usually safer and more cost effective than instrument processing in the DTR. The



**Figure 10-2.—Operating a dental handpiece in CSR.**

elimination of large numbers of small capacity ultrasonic baths and tabletop sterilizers in each DTR can be replaced by the central sterilization approach that has larger capacity centralized equipment.

Whether a centralized or individual sterilization area is used, contaminated instruments and equipment must be processed as described next.

### Management of Contaminated Instruments

Following the completion of a patient's treatment, the dental assistant will take the contaminated instruments and equipment directly to the CSR technician in the receiving area of the CSR. Figure 10-3 illustrates a contaminated instrument pack that has been placed in the designated drop-off location in the receiving area. The CSR technician should take the contaminated instruments and equipment and set them in the receiving area that has been designated as a temporary hold area until they can be processed.

Do not rinse, scrub, or unnecessarily handle contaminated instruments or materials in DTRs or other patient treatment areas. In the most extenuating circumstances, only the CO (designee) or the infection control officer (ICO) under written direction may make exceptions to this requirement. This does not include handpiece maintenance that will be performed in the CSR or DTR depending on your clinic's policy.

### Instrument Cleaning

You should take contaminated instruments from the receiving area wearing heavy duty puncture-resistant gloves while handling all potentially contaminated items. Break down all packs and place disposable items and contaminated linens in appropriate containers. All contaminated, reusable items must be decontaminated by immersion in an Environmental Protection Agency (EPA) registered disinfectant before further handling. This step can be eliminated if these items are cleaned in an ultrasonic cleaner (bath) with an EPA-registered disinfectant that also is approved as an ultrasonic cleaning solution. Process instruments using one of the following methods. They are discussed in order of preference.

#### **AUTOMATED WASHER PROCESSOR.—**

The automated washer processor is the safest method and provides an effective cleaning process. It is commonly used in hospitals or very large dental clinics. Contaminated instruments are placed in cassettes or baskets. Then they are run through the unit's cycle of cleaning, rinsing, and disinfection at temperatures high enough to provide at least a high level of disinfection. This results in a "not touch" system in which the potential for injury during instrument processing is greatly reduced.

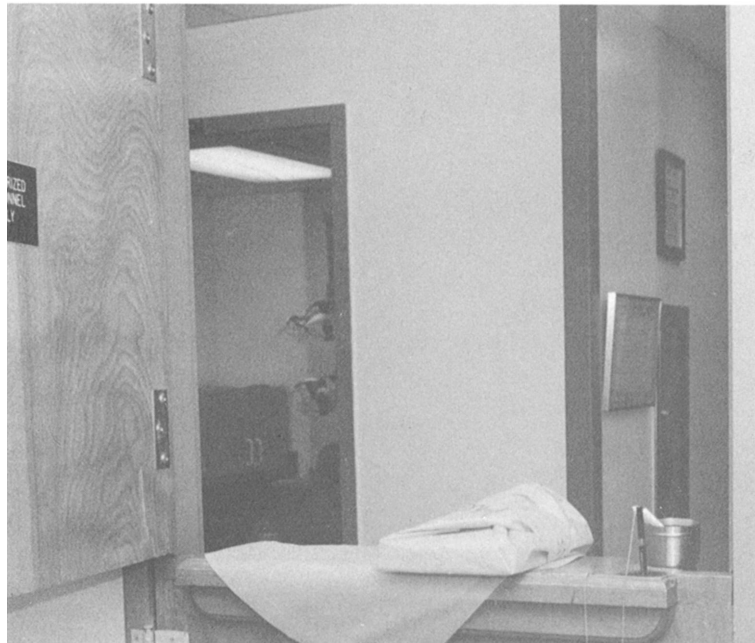


Figure 10-3.—Contaminated instrument pack placed at the entrance of the receiving area in the CSR.

**ULTRASONIC CLEANING.**—This process is safer and more effective than manual scrubbing. The ultrasonic cleaner eliminates the possibility of accidental puncture wounds on the hands that frequently occur with manual scrubbing. It also eliminates the splatter of organism-laden debris generated by scrubbing with a brush. The ultrasonic cleaner uses electrical energy to generate sound waves. When the sound waves travel through the liquid, millions of tiny bubbles form and burst continuously. This process is called a “*cavitation*” effect. The bursting bubbles scrub everywhere the liquid can penetrate. Intricate surfaces and difficult access areas, such as burs, endodontic files, serrated instrument handles, and hinged instruments, are cleaned more thoroughly and rapidly. The usage life of cutting instruments, such as burs and endodontic files, is extended by thoroughly removing debris that interferes with the cutting surfaces.

There are several sizes of ultrasonic cleaning units. Figure 10-4 illustrates small and large size ultrasonic cleaners. The ultrasonic cleaner should be located in the processing area of the CSR. The manufacturer’s instructions must be followed when using ultrasonic cleaners. These instructions should be posted or readily available in locations where the units are used.

The following general guidelines are common to the proper use of all ultrasonic cleaners:

- Always keep the ultrasonic cleaner reservoir 1/2 to 3/4’s full with ultrasonic solution at all times.
- The solution must completely cover the items for the ultrasonic action to occur.
- Avoid the use of disinfectants, plain water, and nonultrasonic soaps or detergents.
- Cleaning solutions must be changed at least daily or sooner, if visibly contaminated.

When using the ultrasonic cleaner follow these guidelines

- Place instruments into a perforated or wire mesh basket and rinse under water first.
- Place basket holding the instruments into the ultrasonic cleaner unit filled with solution.
- Never place items directly on the bottom of tanks. This would reduce the amount of ultrasonic waves produced and could damage the unit.
- Always close the lid or cover on the unit when in use to decrease aerosols and avoid splattering of the solution onto adjacent surfaces.
- Limit ultrasonic cleaning time to 5 minutes to avoid damage to instruments. Follow manufacturer’s instructions for exact cleaning times for different models.
- Longer cleaning times may be required for some nonmetallic instrument cassettes.

Never use your hand to remove instruments from the unit. Instead, use the basket to lift the instruments from the solution, drain, and rinse them under running water. Be sure to rinse the instruments thoroughly to remove all the remaining solution. Inspect the instruments for remaining blood or debris, then dry thoroughly.

**MANUAL SCRUBBING.**—Although manual scrubbing is time consuming and presents an increased potential for contamination injury, this method is effective for cleaning instruments when automated washer processors or ultrasonic cleaning units are not available. Triple-sink modules allow personnel to perform in an orderly sequence multiple functions such as prerinsing, soaking, washing, and final rinsing. While wearing heavy-duty utility gloves, face mask, plastic apron, and eye protection, place instruments in



Figure 10-4.—Small and large size ultrasonic cleaners.



a disinfecting solution, allow them to soak, and then scrub them under water to avoid generating splatter.

## PRESTERILIZATION PROCESSING

You are still in the processing area of the CSR and have just finished cleaning your instruments using one of the three methods of cleaning discussed previously and letting them dry as shown in figure 10-5. Perform the following procedures in the sterilization process next.

### Inspection and Sorting of Instruments

After drying, you must inspect items closely for wear, breakage, and cleanliness. Sort instruments according to sets or packs. This is the prestaging area where your instruments are sorted before wrapping and packaging.

### Wrapping and Packaging

Wrapping and packaging is the last step just before the sterilization process. Many different types of sterilizers, packaging, and wrapping materials are used in the CSR.

Before terminal (final) sterilization, wrap or package all critical and semicritical items individually or in sets. Ensure you place consumable supplies (fig.

10-6) that are required by your command in each particular pack before wrapping such items as needles, cotton rolls and pellets, gauze, aluminum foil for dental light handles, internal indicators, and towels.

Dental instruments are usually placed in packs, on trays or cassettes, before placing them into the sterilizer. The most common wrapping materials and containers are paper, paper/plastic, nylon tubing, and cloth. Aluminum foil, closed metal trays, and perforated cassettes may also be used. The packaging or wrapping materials that you select depends on the compatibility of what type of sterilization method you are using. Table 10-1 shows various sterilization packaging materials and their suitability to withstand steam or dry heat sterilization. Always refer to the sterilizer manufacturer's instructions for suitability.

Paper materials are available in the form of bags or flat disposable wraps. Both types are sealed with adhesive indicator tape. The combination paper/plastic peel packs (fig. 10-7) are available in varied sizes of preformed bags or rolls of varied widths that can be cut to the desired length. Either type can be sealed with the adhesive indicator tape or self-sealed.

Heat sealed plastic or nylon tubing should only be used as an overwrap after the pack has been sterilized. Heat sealed overwrapping will extend a 30 day shelf life to 180 days.

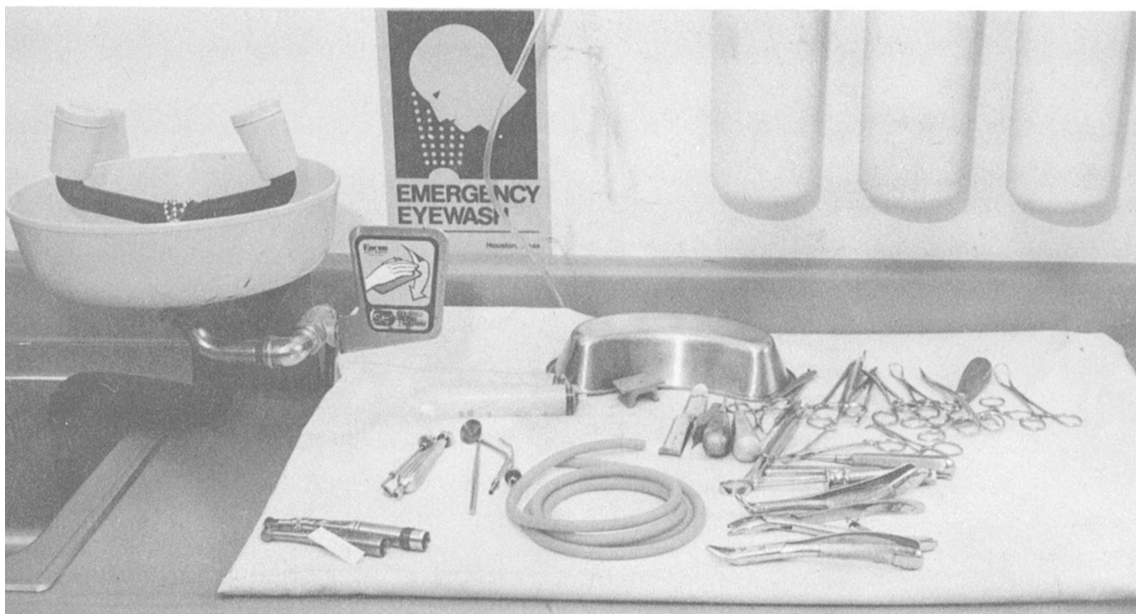


Figure 10-5.—Instruments drying in the processing area.



**Figure 10-6.—Consumable supplies.**

**Table 10-1.—Sterilization Packaging Materials and Suitability for Steam or Dry Heat Sterilization**

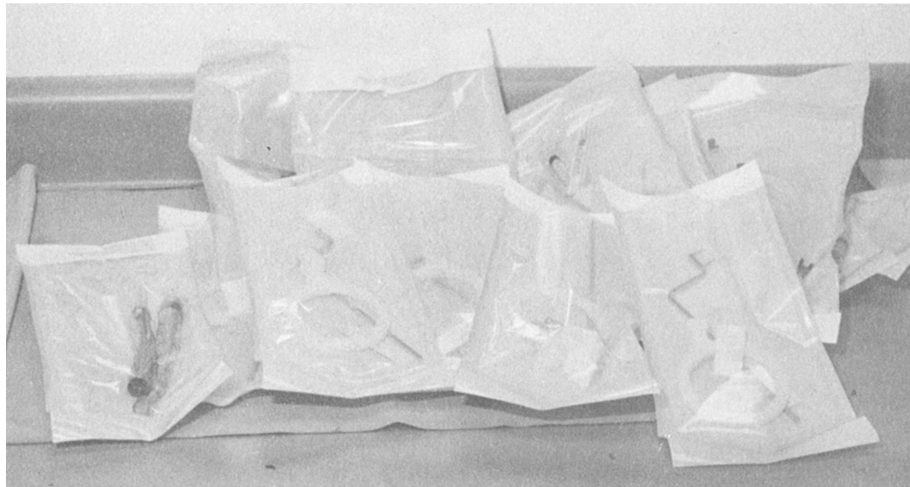
MATERIAL	NATURE	THICKNESS OR GRADE	SUITABLE FOR	
			STEAM	DRY HEAT
Muslin	Textile	140 count	Yes	Yes
Jean cloth	Textile	160 count	Yes	No
Broadcloth	Textile	200 count	Yes	No
Kraft brown	Paper	30-40 lb.	Yes	No
Kraft white	Paper	30-40 lb.	Yes	No
Glassine	Coated paper	30 lb.	Yes	No
Parchment	Paper	Patapar 27-2T	Yes	No
Crepe	Paper	Dennison wrap	Yes	No
Cellophane	Cellulose film	Week sterilizable	Yes	No
Polyethylene	Plastic	1-3 mils	No	No
Polypropylene	Plastic	1-3 mils	No*	No
Polyvinyl	Plastic	1-3 mils	No	No
Nylon	Plastic	1-2 mils	No*	No
Polyamide	Plastic	1-2 mils	No*	No
Aluminum	Foil	1-2 mils	No	Yes
Peel packs	Paper with plastic		Yes	No
Test tubes	Glass with heat resistant caps		No	Yes

\*Specifically not recommended due to difficulty in eliminating air from packs.

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The practical use of some semicritical items may preclude wrapping or packing. Basic guidance in proper wrapping techniques includes the following:

- Using trays or cassettes to reduce the possibility of puncturing the wrapping material and risk of injury during post-treatment handling.
- Wrapping loosely to allow steam to circulate freely throughout the pack. Arrange items so that all surfaces receive direct exposure to the sterilization agent.
- Opening all hinged instruments during packaging to allow steam to penetrate these areas.



**Figure 10-7.—Paper/plastic peel packs.**

Using proper wrapping material for instrument sets. The use of muslin wraps are discouraged.

Cloth and nonwoven wraps are sealed with external indicator tape as illustrated in figure 10-8. The indicator tape will change color if exposed to the sterilization elements.

When wrapping instrument packs with indicator tape, always turn the tabs down on the tape. This provides a folded edge to aid in opening the package and removing the tape.

Launder muslin towels after each use and inspect for tears or pinholes.

Follow the manufacturer’s time and temperature settings on sterilizers for the types of wrapping material used.

Using internal and external chemical indicators or multi-parameter integrators (measures temperature, steam and time).

### Expiration Dates

After the packs, instruments, and supplies are wrapped or placed into containers and sealed, they must be labeled with the identification number of the sterilizer, the preparer’s initials, and the dates of sterilization and expiration before they are placed in the sterilizer. To label, use an ink marker, preprinted indicator tape, or a marking device that won’t run or fade when exposed to sterilization.

The shelf life or expiration date of sterilized items is the period during which an item is considered safe for use. Shelf life can be **time-related** or

**event-related.** Your command ICO will determine what method your sterilization program will use.

**TIME-RELATED.**—Time-related shelf life is identified with an exact expiration date. After this date, the item is considered to be outdated and should not be used. Table 10-2 lists the different wrapping methods and their time-related shelf life in accordance with BUMEDINST 6600.10.

**EVENT-RELATED SHELF LIFE.**—The use of the event-related method presumes continued sterility until the package is damaged, wet, or torn. It is a well-recognized standard for items in good quality, self-sealed or hermetically (airtight) sealed, packaged in paper or plastic, or sequentially-wrapped and sealed

**Table 10-2.—Time-Related Shelf Life of Sterilized Items**

<b>WRAPPING METHOD</b>	<b>TIME-RELATED SHELF LIFE</b>
Paper envelope (sealed with sterilization tape)	365 days
Nonwoven blue wrap	30 days
Nonwoven blue wrap, plastic covered, heat-sealed	365 days
Peel plastic packs, heat-sealed or self-sealed	365 days
Parchment paper or Dennison wrap	30 days
Glass test tubes with screw caps	indefinite



**Figure 10-8.—Cloth and nonwoven wraps with external indicator tape.**

in dust covers within a few hours after sterilization. If this method is used, the command policy must be clearly defined and consistently used throughout the DTF. When using the event-related method, all sterilizers must be biologically monitored at least weekly.

### **Sterile Storage**

Sterility of dental materials, instruments, and supplies is much harder to maintain than it is to achieve. There is little value in precise sterilization procedures if instruments are contaminated upon completion of the process. Items must be dry before they are handled or stored. The time required for drying depends on the type of packs in the load and the sterilizing agent used. Freshly sterilized items are never placed on metal or cold surfaces. Packages become damp from the condensation that occurs and become contaminated.

All sterile supplies, including sterile reusable dental items, must be stored in a manner that will preserve their sterility until used. The following factors affect this process:

- Environmental conditions including cleanliness? proper ventilation, and control of excess heat and humidity are important.
- The location where sterile supplies are stored should not be in a manner that may contribute to the increased possibility of contamination. Figure 10-9

shows an acceptable sterile storage cabinet containing sterilized packs and instruments.

- Sterile items should not be stored in patient treatment or decontamination areas unless they are protected by enclosures, such as drawers or cabinets.
- Sterile and clean patient treatment items may be stored in the same drawers or cabinets, as long as there is no possibility of nonsterile items being used inadvertently when sterility is required.
- Sterile items should not be stored with items not intended for clinical use (e.g., office and cleaning supplies).
- Items must not be stored on the deck, under sinks, in window sills, adjacent to heating and air conditioning vents, or in any area where undetected contamination may occur.

When storing sterilized items, arrange them according to expiration date, placing items with later dates toward the rear. Check supplies periodically to determine any need for resterilizing. Items must be resterilized if the wrapper becomes wet, if the pack touches the deck, if there is any question of contamination, or if the safe storage period has expired.

### **STERILIZATION METHODS**

Because of the composition of many of the items used in dentistry, no single sterilization method is

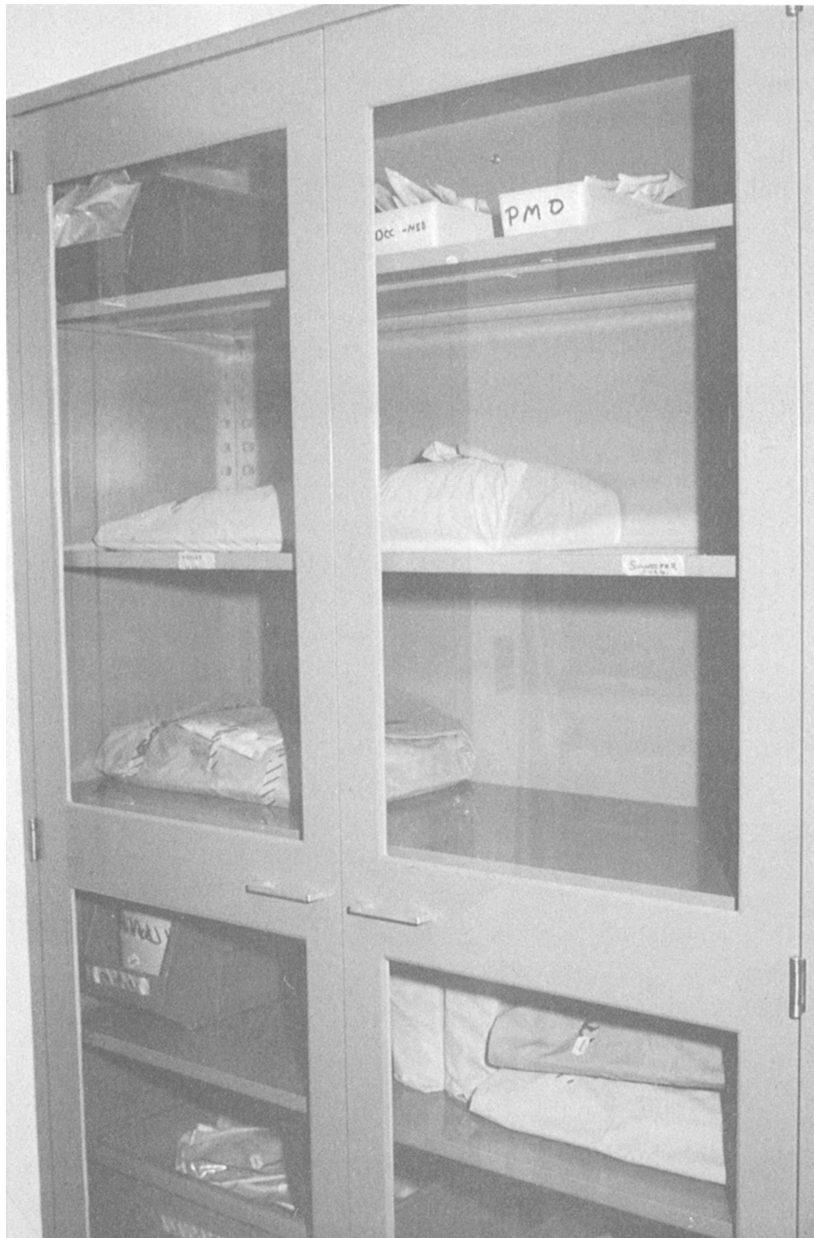


Figure 10-9.—Sterile storage cabinet.

suitable for all dental items. As a basic dental assistant, you will need to know several approved methods of sterilization.

### Steam Heat Sterilization

Steam under pressure (saturated steam) is the most effective means of sterilization for almost all items used in dentistry. To achieve sterility, moist heat under pressure must come in contact with all surfaces of all items for the appropriate length of time. To effectively sterilize items using saturated steam, the temperature of the steam throughout the load must be high enough

to destroy the most resistant micro-organisms in the time allotted for sterilization. For example, some spores can withstand temperatures above the normal boiling point of water (212°F or 100°C); so the relationship of temperature to spore killing power is critical. Steam temperature and exposure time, not pressure, are crucial components of this process. Pressure is used only to raise the temperature of the steam and, in itself, has nothing to do with microbial killing action. At 15 pounds per square inch (psi), the boiling point increases to 121°C (250°F), a temperature at which all known organisms are killed.

In addition to the high temperature, steam must be saturated so that it will quickly release heat through condensation when it comes into contact with a cool object. Sterilization will not occur unless all air is eliminated from the chamber at the beginning of the process and periodically throughout sterilization. The packaging of supplies and loading of the sterilizer must be done so that steam comes in contact with all areas or surfaces of the items being sterilized.

*Flash sterilization* is defined as the sterilization of unwrapped items in a gravity displacement or prevacuum sterilizer with recommended minimum exposure times and temperatures. Steam sterilization by this unwrapped method is not recommended. It should be used only for emergency sterilization.

### Types of Steam Sterilizers

A steam sterilizer, also known as an “autoclave,” is a pressure-type vessel with a door or cover, valves to control the entry and exit of steam and air, and monitoring devices to allow the operator to observe conditions inside. It is designed to hold items and allow steam under pressure to penetrate these items. Steam sterilizers are available in many sizes, ranging from portable countertop to the fixed room-size sterilizer. Two of the most common types of steam sterilizers used in the Navy are the gravity displacement and prevacuum sterilizers.

**GRAVITY DISPLACEMENT.**—Once this sterilizer is loaded and the door is closed as shown in figure 10-10, steam is admitted through an inlet and the sterilization process begins. A typical standard for steam sterilization is achieved at 250°F or 121°C after 20 to 30 minutes at 15 psi. It is important to refer to the manufacturer’s instructions for operation, since exposure times can vary according to the design of the particular sterilizer.

You should observe the following precautions when loading the sterilizer chamber:

- **Do not overload.** The passage of steam from the top of the chamber to the bottom should not be blocked.
- Place all packages on edges, with large packs at the bottom of the chamber, and small packages in an upper layer crosswise to the lower layer. This allows free passage of steam.
- If mixed loads of metal items and linen are sterilized together, the linen is placed on the upper shelf and the metal items on the lower.

- Articles that require the same amount of time and the same final steps should be sterilized together.
- Enclosed fluids are sterilized separately because the pressure must be slowly released.
- Load all packages at the same time when you are ready to sterilize.

A standard operation chart for the correct exposure period of all supplies should be prepared and posted for easy daily reference. It is important to note that sterilizing conditions are based on temperature rather than on pressure. Effective steam sterilization and exposure time are measured from the moment the thermometer in the discharge line indicates the desired preset temperature. The pressure inside the sterilizer is not an indication of positive sterilization because other factors determine the pressure inside the sterilizer. Pressure merely maintains temperature.

**PREVACUUM STEAM STERILIZER.**—The prevacuum steam sterilizer (fig. 10-11) was designed to help overcome the trapping of air in the chamber. Trapping of air is one of the greatest dangers encountered when using saturated steam under gravity cycles. When errors are made by improperly packaging items or overloading the sterilizer chamber, cool air pockets may form resulting in items not being sterilized. The speed and efficiency of the steam sterilizer may be improved by removing air from the chamber with a powerful pump, creating a nearly perfect vacuum before steam is introduced into the chamber. This procedure allows fast and more positive heat to penetrate the entire sterilizer load. The improved sterilizer is referred to as the prevacuum steam sterilizer.

Full heating of the loads is faster in the prevacuum sterilizer than in the gravity displacement sterilizer. For example, wrapped instruments can be sterilized at 270°F (131°C) after 4 minutes exposure in a prevacuum steam sterilizer. Consult the manufacturer’s instructions for specific details on operation and user maintenance information.

The **Bowie-Dick** type test was developed for prevacuum sterilizers to determine if the air has been removed from the chamber during the prevacuum stage. Air must be removed so that steam can penetrate the load instantaneously. It must be understood that this is not a test for adequate exposure to heat in terms of time-at-temperature. A commercially prepared Bowie-Dick type test can be used by carefully reading and following the manufacturer’s instructions. All



**Figure 10-10.—Gravity displacement steam sterilizer.**

Navy prevacuum sterilizers will be tested daily using the Bowie-Dick type test.

### **Level One Maintenance**

The interior of the steam sterilizer should be cleaned each day before being heated. This simple procedure can easily be accomplished by using a mild detergent to wash the surfaces. Follow the wash with a thorough rinse of plain water. Unless this is done, the chamber walls will collect mineral deposits and may become greasy. Do not use wire brushes, steel wool, or any type of abrasive cleaning compounds on the sterilizer. The manufacturer's directions must be

followed to maintain a properly functioning sterilizer. If the sterilizer does not appear to function properly, dental equipment repair personnel should check it at once. Sterilizers should be spot checked frequently for leaks in lines and improperly functioning gauges, dials, thermometers, doors, drain strainers, and valves.

### **Dry Heat Sterilization**

The least expensive form of heat sterilization of instruments is dry heat. Destruction of microorganisms by dry heat in a DTF is accomplished by using a unit that has been tested and approved by the FDA as a commercial sterilizer.



**Figure 10-11.—Prevacuum steam sterilizer.**

Dry heat is suitable for sterilizing metal instruments that rust or dull in the presence of water vapor. A disadvantage is that the high temperatures destroy many rubber and plastic based materials, melt the solder of most metal impression trays, and weaken some fabrics, as well as discolor other fabrics and paper materials.

A complete cycle involves heating the dry heat oven (fig. 10-12) to the appropriate temperature and maintaining that temperature for the proper time interval. Depending on the location, dry heat ovens can use one of the following heating elements to achieve sterilization:

- Conduction (direct contact with a heat source)
- Radiation (long electromagnetic waves)
- Convection (heated air)

Because dry air is not as efficient a heat conductor as moist heat at the same temperature, a much higher temperature is required for sterilization. One of the most common problems with the use of dry heat sterilization is the failure to properly time the exposure. A typical dry heat cycle is 90 minutes at 320-345°F, plus the time required to preheat the

chamber before beginning the sterilization cycle. A common misuse of the dry heat method occurs when the oven door is opened, and an instrument is quickly removed during the timed cycle. This interrupts the cycle and timing must begin all over again.

Advances in the design of the dry heat oven resulted in the development of the dry heat convection unit, which uses forced air at higher temperatures. This method of rapid heat transfer achieves sterilization in 12 minutes at 375°F (190°C) for wrapped items and in 6 minutes for unwrapped items. Biological monitoring will be performed weekly. Consult the manufacturer's instructions of each type of dry heat sterilizer for specific details on its operation and user maintenance.

### **Chemical Vapor Sterilization**

This process uses a mixture of chemicals, including alcohol, formaldehyde, ketone, acetone, and water, that are heated under pressure to form a sterilizing gas. Sterilization requires 20 minutes at 270°F with 20 psi when instruments are either unwrapped or bagged following the manufacturer's instructions.





Figure 10-12.—Dry heat sterilizer.

Advantages to chemical vapor sterilization are as follows:

- No corrosion, rusting, and dulling of instruments since water content is only 15 percent (if instruments are dry when placed in chamber).
- Prevents destruction of dental items, such as endodontic files, orthodontic pliers, wires and bands, burs, and carbon steel instruments.
- Instruments are dry at the end of the cycle.

The major disadvantage of this sterilization method is the requirement for adequate ventilation. Chemical vapors, particularly formaldehyde, can be released when the chamber door is opened, leaving a temporary but unpleasant odor in the area.

Chemical vapor sterilization is not routinely used in Navy dentistry. Consult the manufacturer's instructions for specific details on operation and required user maintenance.

### **Ethylene Oxide Sterilization**

Ethylene oxide (ETO) gas uses relatively low temperatures for sterilization. Using a heated unit, sterilization can be achieved in 2-3 hours at 120°F. However, a lengthy aeration time must follow each cycle.

Materials such as suction tubing, handpieces, radiographic film holders, and prosthetic appliances may be sterilized without adverse effects. Follow the manufacturer's instructions for safety precautions, operation, and maintenance. Because of the serious Occupation Safety Health Agency (OSHA) problems with ETO gas, COs of Naval Dental Clinics (NDCs) should not purchase new ETO equipment. Large naval hospitals with ETO capabilities in their CSR may use them to sterilize nonheat stable dental instruments and equipment.

### **Liquid Chemical Sterilization**

The Food and Drug Administration (FDA) classifies chemical disinfectants that are sporicidal as disinfectants, the FDA classifies all sterilants. Since monitoring the liquid sterilization process is virtually impossible, treat these products as high-level disinfectants rather than sterilants. Be sure to follow the manufacturer's directions exactly.

### **Bead and Salt Sterilizers**

Use bead and salt sterilizers only during the endodontic procedure for sterilization of clean metallic instruments. Do not use them to sterilize instruments between patients. Clean contaminated instruments with an alcohol saturated gauze to remove blood and debris before inserting into the bead and salt

sterilizers. Monitor and record at least weekly the temperature in the sterilizer well. If using salt in place of beads in the sterilizer, line the well with aluminum foil to prevent corrosion.

## **CRITICAL CATEGORY ITEMS REQUIRING STERILIZATION**

All critical category items require sterilization. Table 10-3 lists a variety of different dental instruments and materials and shows what type of sterilization or disinfection is effective and preferred for each particular item. It also lists methods that are effective and acceptable, effective but risk damage, and ineffective with risk of damage to materials. Sterilize critical category items before turning them in for service or repair.

**Following BUMEDINST 6600.10, sterilize critical category items as follows:**

**Surgical instruments**—Effective and preferred methods of sterilization are the steam autoclave, dry heat oven, chemical vapor, or ethylene oxide.

**Handpieces**—Handpieces include: low-speed motor attachments, sonic scaler, and tips. Follow manufacturer's instructions. See table 10-3, for recommended method of sterilization. Follow manufacturer's instructions for the cleaning of the fiber optic bundle.

**Burs and diamonds**—Clean burs and diamonds and dry before sterilizing. Many burs and diamonds are used only for single patient use. One accepted method of sterilization for burs and diamonds are to place them in a screw cap glass test tube (fig. 10-13) or an aluminum foil wrapped bur block and dry heat sterilize for 90 minutes at 320-345°F. Place a chemical indicator in each tube or wrapped bur block. At least weekly, place a biological monitor in one tube or foil wrapped block during the first load of the day, retrieve and send for culture testing following the manufacturer's recommendations.

**Endodontic files and Gates-Glidden burs**—Arrange sets in file blocks and seal in peel packs before autoclaving. When additional files or burs are necessary, take them from a new package or from a file storage box and sterilize them in a bead or salt sterilizer before use. Use endodontic broaches once and discard into a sharps container. *Dental Technician, Volume 2*, NAVEDTRA 12573, chapter 7, illustrates and explains endodontic broaches.

## **STERILIZATION MONITORING**

Any number of factors can reduce the effectiveness of sterilizers. Overloading and improper wrapping can prevent adequate penetration into the instrument surface. Improper timing, temperature variations, worn gaskets and seals, and sterilizer malfunctions can prevent sterilization. Heat sterilization methods are generally reliable and effective. Nevertheless, regular monitoring of sterilization cycles is necessary to detect inadequate process conditions caused by human error or equipment malfunction.

### **Types of Sterilization Monitors**

Commands should base selection of sterilization monitors on reliability, appropriateness to the process, safety, and cost effectiveness. Many types of monitors are available. The three most commonly used sterilization monitors in the Navy DTFs are biological monitors, internal indicators, and external indicators.

**BIOLOGICAL MONITORS.**—Biological monitors are designed to assess whether sterilization actually occurred. These systems consist of bacterial endospores impregnated in paper strips or sealed in glass ampules or plastic vials.

**INTERNAL INDICATORS.**—Internal indicators are chemical dyes that change color when exposed to steam, dry heat, or chemical vapor for a specified period of time. When placed inside an instrument pack, they determine whether the conditions necessary for sterilization have been met.

**EXTERNAL INDICATORS.**—External indicators are chemical dyes that change color upon short exposure to sterilizing conditions. They are generally printed on packaging materials or supplied in tape form and are necessary to distinguish processed packages from those that have not been cycled. External indicators are not sensitive enough to be processed as an internal indicator and should not be used.

### **Biological Monitoring**

After endospore tests are processed through a sterilization cycle, they must be incubated according to the manufacturer's instructions. A pH indicator in the medium changes color when the ampule of endospores germinate and produce acids. This visually identifies a failure in the sterilization process. As a minimum,

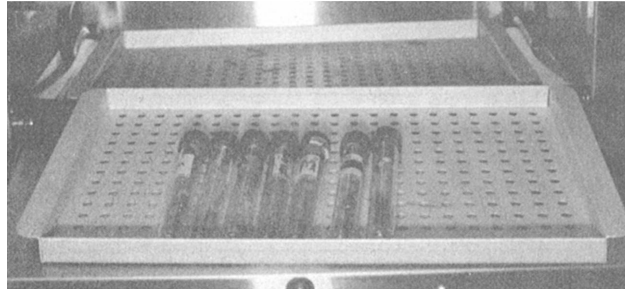
Table 10-3.—Sterilization and Disinfection of Dental Instruments and Materials

	Steam Autoclave	Dry Heat Oven	Chemical Vapor	Ethylene Oxide	Chemical Disinfection	Other Methods / Comments
Angle attachments*	+	+	+	++	+	
Burs						
Carbon steel	—	++	++	++	—	
Steel	+	++	++	++	+	
Tungsten-carbide	+	++	+	++	+	
Condensers	++	++	++	++	+	
Dappen dishes	++	+	+	++	+	
Endodontic instruments (broaches, files, reamers)						Hot salt or glass bead sterilizer for 10 - 20 seconds at 218°C (425°F)
Stainless steel handles	+	++	++	++	+	
Stainless with plastic handles	++	++	—	++	—	
Fluoride gel trays						
Heat-resistant plastic	++	—	—	++	—	
Non-heat resistant plastic	—	—	—	++	—	Discard (++)
Glass slabs	++	++	++	++	+	
Hand instruments						
Carbon steel	—	++	++	++	—	
Stainless steel	++	++	++	++	+	
Handpieces*						Autoclavable preferably
Autoclavable*	(++)*	—	(+)*	++	—	
Contra-angles*	—	—	—	++	+	
Nonautoclavable*	—	—	—	++	+	Combination synthetic phenolics or iodophors (—)
Prophylaxis angles*	+	+	+	+	+	
Impression trays						
Aluminum metal	++	+	++	++	—	
Chrome-plated	++	++	++	++	+	
Custom acrylic resin	—	—	—	++	+	
Plastic	—	—	—	++	+	Discard (++) , preferred
Instruments in packs	++	+	++	++	—	
		Small packs		Small packs		
Instrument tray setups						
Restorative or surgical	+	+	+	++	—	
	Size limit		Size limit	Size limit		
Mirrors	—	++	++	++	+	
Needles						
Disposable	—	—	—	—	—	Discard (++) , Do not reuse
Nitrous oxide						
Nose piece	(++)*	—	(++)*	++	(+)*	
Hoses	(++)*	—	(++)*	++	(+)*	
Orthodontic pliers						
High quality stainless	++	++	++	++	+	
Low quality stainless	—	++	++	++	—	
With plastic parts	—	—	—	++	+	
Pluggers	++	++	++	++	+	
Polishing wheels and disks						
Garnet and cuttle	—	—	—	++	—	
Rag	++	—	+	++	—	
Rubber	+	—	—	++	+	
Prostheses, removable	—	—	—	+	+	
Rubber dam equipment						
Carbon steel clamps	—	++	++	++	—	
Metal frames	++	++	++	++	+	
Plastic frames	—	—	—	++	+	
Punches	—	++	++	++	+	
Stainless steel clamps	++	++	++	++	+	
Rubber items						
Prophylaxis cups	—	—	—	++	—	Discard (++)
Saliva evacuators, ejectors						
Low melting plastic	—	—	—	++	+	Discard (++)
High melting plastic	++	+	+	++	+	
Stones						
Diamond	+	++	++	++	+	
Polishing	++	+	++	++	—	
Sharpening	++	++	++	—	—	
Surgical instruments						
Stainless steel	++	++	++	++	+	
Ultrasonic scaling tips	+	—	—	++	+	
Water-air syringe tips	++	++	++	++	+	
X-ray equipment						
Plastic film holders	(++)*	—	(+)*	++	+	
Collimating	—	—	—	++	+	

The table is adapted from Accepted Dental Therapeutics and Dentist's Desk Reference: Materials, Instruments and Equipment.

\* As manufacturers use a variety of alloys and materials in these products, confirmation with the equipment manufacturers is recommended, especially for handpieces and attachments.

- ++ Effective and preferred method.
- + Effective and acceptable method.
- Effective method, but risk of damage to materials.
- Ineffective method with risk of damage to materials.

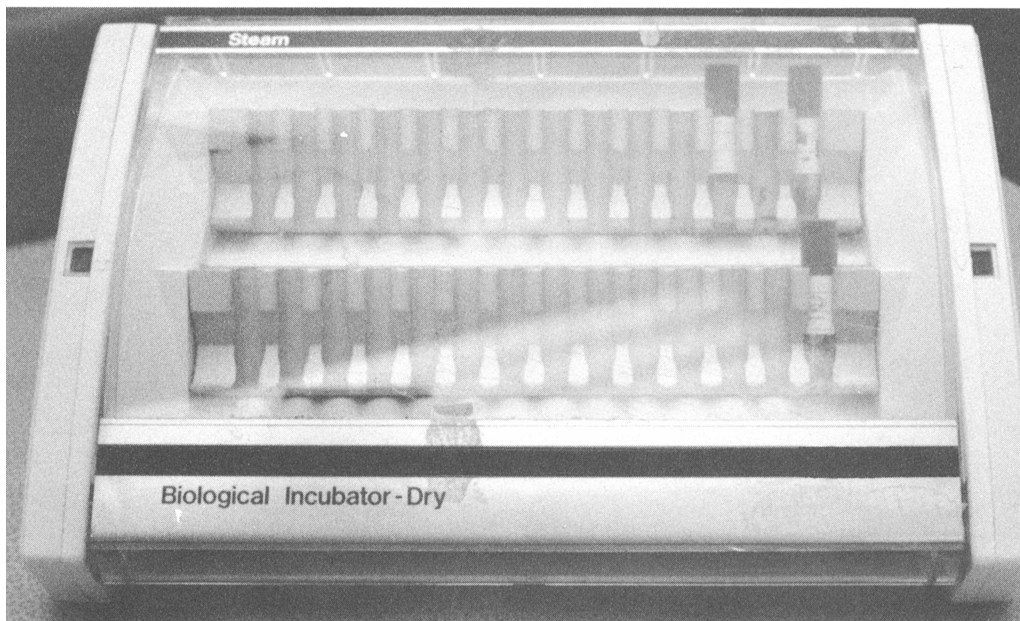


**Figure 10-13.—Burs in glass test tubes.**

perform biological monitoring weekly. Figure 10-14 shows a biological incubator with endospore tests.

**TEST PROCEDURE.**—Since biological monitoring systems are designed for specific sterilization methods, you must be sure to use a system compatible with the sterilization method used. The following test procedures should be used to ensure effectiveness of the sterilization process:

- The use of a “test pack” is most practical while processing an instrument pack.
- Biological spore strips or ampules should be placed between several layers of folded wrapping material, and then the test pack is double-wrapped in the normal manner.
- Always follow the biological monitor manufacturer’s directions for the placement of the test pack within the sterilizer.
- As a general rule, the biological spore strips or ampules should be placed within an area of the sterilizer that is least accessible to the sterilizing agent that is being used.
- If using steam under pressure sterilizers, place the test pack in the lower front of the sterilization chamber.
- If using tabletop units, place the test pack in the center of the load.
- For each test, use an unprocessed monitor for a control.



**Figure 10-14.—Biological incubator.**

**EVALUATION CRITERIA.**—After the completion of the sterilization cycle, open the test pack and evaluate the dosage indicator to see if it passes or fails the cycle. If it passes, you can distribute the sterile goods and continue the biological test procedure. If it fails, follow the procedures under guidelines for internal and external indicators.

**POSITIVE RESULTS.**—When positive biological monitoring occurs, you must follow these guidelines:

- Notify the ICO and record the test results in the sterilization log.
- If another sterilizer is available, perform the following actions:
  - Retrieve and resterilize all items sterilized since the last negative test of that sterilizer tested positive.
  - Process a test pack with both a chemical and biological monitor and secure the sterilizer from further use until the results of the biological and chemical tests are read.
  - If the results of the biological and chemical tests indicate negative growth or pass the sterilization test, the sterilizer can be placed into service.
  - If the results from the test still indicate positive growth or failure of sterilization, the sterilizer must be secured and dental repair personnel notified.
- If another sterilizer is not available, perform the following actions:
  - Notify dental repair personnel.
  - Retrieve and resterilize all items processed since the last negative test. Use a test pack with a biological and chemical monitor in each load when resterilizing all items that came up positive from the last test.
  - If a chemical monitor in the test pack indicates a pass of the sterilization test, these loads can be distributed if necessary. The ideal situation is to have adequate instruments and equipment to be able to hold these items for 48 hours after a negative biological test and then distribute.
  - If the biological test again fails, secure the sterilizer and notify dental repair personnel, and the ICO.

- Make a narrative entry in the log of each action taken and the results as they occur.
- Retest the sterilizer using biological monitors.
- Confirm exposure of the biological monitor to sterilization process.
- Review the sterilization log for recent repairs or maintenance.

**GUIDELINES FOR INTERNAL AND EXTERNAL INDICATORS.**—Use internal indicators inside and external indicators on the outside of each instrument pack. When using glass test tubes during dry heat sterilization, ensure an internal indicator is in each test tube before the screw top is secured. When any indicator of a load test pack fails, resterilize it with a new test pack containing both chemical and biological monitors. Be sure to closely monitor the temperature, pressure, and sterilizing time of the load. Watch the timer to be sure it does not start before the correct temperature is reached. Watch for steam leaks from the sterilizer during the sterilization cycle. If the indicator again fails, notify the ICO and dental repair personnel. Log in the results from the failure, and secure the sterilizer from use until the results of the biological monitor can be evaluated.

Follow the manufacturer's instructions when reading the indicators. Please be aware that internal and external indicators are not replacements for biological monitoring. Only biological monitoring can tell you whether or not sterilization has actually occurred.

**LIQUID STERILANTS.**—Since liquid sterilants cannot be biologically monitored, their use is discouraged. In using these agents, the key is the time that instruments and equipment are in contact with the sterilizing agents. Test strips for concentration levels must be used according to manufacturer's instructions.

## **DISINFECTION**

Disinfection is a less lethal process than sterilization, which kills disease causing microorganisms. This does not include the destruction of resistant bacterial spores. Disinfection is achieved by either chemical or heat means. Selecting an appropriate chemical germicide or heat disinfection method depends on what requirements need to be met

for that particular product. The following are some of the criteria for effective chemical disinfection:

- The degree of microbial kill or deactivation required
- The composition and texture of the item being treated
- The technical requirement and ease of use of the available agents

Regardless of the product selected, there is no single chemical or heat agent available today that will meet all these criteria. As always, follow label directions precisely. Give strict attention to the proper use of the product regarding mixing, dilution, method and duration of the application, temperature requirements, shelf-life, and if applicable, reuse life.

### LEVELS OF DISINFECTION

The EPA classifies disinfectants as high, intermediate, or low level, based on the effectiveness and contact time of the solution and the biocidal activity of an agent against bacterial spores, mycobacterium tuberculosis, lipid and nonlipid viruses, and vegetative bacteria. Table 10-4 describes the level of disinfection required to kill the micro-organism named.

### FACTORS INFLUENCING GERMICIDAL PROCEDURES

The factors associated with the micro-organisms, as well as those associated with the surrounding physical and chemical environment, influence the antimicrobial efficiency of the germicides. They are described next.

#### Nature of the Material

The easiest surface to disinfect is a smooth, nonporous, and cleanable one. If the materials are incompatible with disinfectant, damage and corrosion can occur.

#### Bioburden

Under a given set of circumstances, the higher the level of microbial contamination, the longer the required exposure to the disinfectant is needed. Additionally, resistant micro-organisms require longer exposure times.

**Table 10-4.—Micro-organisms and Levels of Disinfection**

Level of Bacterial Activity	Bacterial Spores	Tubercle Bacillus	Nonlipid Viruses	Lipid Viruses	Vegetative Bacteria
High	Maybe	Yes	Yes	Yes	Yes
Intermediate	No	Yes	Yes	Yes	Yes
Low	No	No	No	Yes	Yes
In the absence of gross organic contamination.					

### Organic Debris Present

Blood, saliva, and other organic material may contribute to the failure of a germicidal process by either direct inactivation of the disinfectant or the actual layering of the micro-organisms on the instruments or equipment, thereby preventing penetration of the germicide.

### Type and Concentration of the Germicide

Generally, when all other variables are constant, the higher concentrations of a chemical agent are more effective and require a shorter time to disinfect. Use of dilutions other than those specified by the manufacturer adversely affect some intermediate-level disinfectants, specifically iodophors. In all instances, follow the manufacturer's recommendations.

### GENERAL CATEGORIES OF LIQUID CHEMICAL AGENTS

A large variety of liquid disinfectants are available today, and it is probable that many new ones will become available in the future. When selecting a product, make sure that the label has an EPA registration number on it. Table 10-15, is a guide to chemical agents for disinfection and sterilization. Since they may be subject to change, be sure to read the manufacturer's instructions before using. Next, we will discuss the four most commonly used chemical agents, glutaraldehyde and chlorine dioxide based solutions, iodophors, and phenolics.

#### Glutaraldehyde-Based Solutions

These agents are available in several formulations differing in pH, concentration, use in dilution, and exposure time. They are classified as high-level disinfectants or sterilants.

Always wear impermeable gloves and protective eyewear when handling these solutions. Irritation of the hands is common and personnel are always at risk of splashes occurring whenever liquids are being

Table 10-5.—Guide to chemical agents for disinfection and sterilization.

Chemical Classifications	Disinfectant <sup>1,2</sup>			Sterilant <sup>1,2</sup>
Products	Dilution	Time	Temperature (20°C = 68°F) (25°C = 77°F)	Dilution, Time, Temperature
<u>Surface or Immersion</u>				
Chlorine compounds				
Alcide LD	10:1:1	3 minutes	20°C	NA <sup>4</sup>
Exspor	4:1:1	3 minutes	20°C	4:1:1, 6 hours, 20°C
Bleach (5.25% sodium hypochlorite)	1:10	10 minutes	20°C	NA
Iodophors				
Biocide	1:213	10 minutes	20°C	NA
Surf-A-Cide				
ProMedyne-D	1:213	25 minutes	25°C	NA
Combination synthetic phenolics				
Multicide				
Omni II	1:32	10 minutes	20°C	NA
Vitaphene				
<u>Immersion</u>				
2% Glutaraldehyde acidic <sup>5</sup>				
Banicide concentrate	1:40	30 minutes	20°C	1:10, 10 hours, 25°C
Banicide				
Sterall	1:4	30 minutes	20°C	Full strength, 10 hours, 25°C
Wavicide				
2% Glutaraldehyde neutral <sup>5</sup>				
Glutarex	Full strength	----	---- <sup>3</sup>	Full strength, 10 hours, 20°C
2% Glutaraldehyde alkaline <sup>5</sup>				
Cidex activated dialdehyde	Full strength	45 minutes	25°C	Full strength, 10 hours, 25°C
Cidex 7	Full strength	90 minutes	25°C	Full strength, 10 hours, 25°C
Germ-X	Full strength	----	---- <sup>3</sup>	Full strength, 10 hours, 20°C
Asepti-Steryl 28				
Dentacide				
Glutall				
Omnicide	Full strength	45 minutes	20°C	Full strength, 10 hours, 20°C
Orthcide				
Sporex				
Vitacide				
Steril-Ize	Full strength	45 minutes	25°C	Full strength, 10 hours, 20°C
CoeCide XL				
K-Cide				
Maxicide				
Metricide 28	Full strength	20 minutes	20°C	Full strength, 6 hours, 20°C
Procicide 14		(10 minutes)	25°C)	
Procide 30				
Protec-top				
Veratex				
<ol style="list-style-type: none"> <li>1. Always use disinfectant and sterilant products according to the instructions specified on the product label.</li> <li>2. The conditions listed reflect the time required for tuberculocidal activity for reused solution, if such use is possible, at the minimum temperature and maximal dilution specified on the EPA approved product label. Tuberculocidal test methods may vary. Consult label or manufacturer for specifics.</li> <li>3. Data not available at time of publication.</li> <li>4. Not approved for use as sterilants.</li> <li>5. Alternate conditions, such as increased temperatures or fresh solution as opposed to reused solution, may decrease disinfection time. Consult label instructions for alternate uses.</li> </ol>				

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handled, so direct physical contact between glutaraldehyde solutions and human tissues should be avoided. When using these agents, they require proper ventilation because their vapors are extremely toxic.

Immersed items must be rinsed with sterile water before using. Glutaraldehydes of 2 to 3.2 percent are FDA-registered. These solutions are not recognized as acceptable surface disinfectants because of the

excessive amounts of exposure time required, corrosiveness, skin sensitization, and odor.

### **Chlorine Dioxide-Based Solutions**

Chlorine dioxide is an effective surface disinfectant or sterilant. These solutions may be used for high-level disinfection of semicritical items that are not subject to corrosion. It has a rapid action of 3 minutes for disinfection or 6 hours for sterilization. As with sodium hypochlorite (bleach), there are several disadvantages: chlorine dioxide must be discarded daily; has a 24-hour use life as a sterilant; and does not readily penetrate organic debris.

It must be used with protective eyewear and gloves because it is extremely irritating to the eyes and skin. It should always be placed in closed containers, and you must ensure adequate ventilation when using for surface disinfection. In addition, it corrodes aluminum containers.

### **Iodophors**

Iodophors are classified as intermediate-level disinfectants or can be used as antiseptics if the product label claims tuberculocidal (lethal to mycobacterium tuberculosis) activity. They are compounds consisting of iodine and usually detergents to which the iodine quickly binds. Iodophor preparations are less irritating to tissues, cause less allergies, and do not normally stain skin or clothing. They should not be used on white or pastel vinyls that are subject to staining from repeated exposure to iodine. Their biocidal activity is accomplished within 10 to 25 minutes of exposure. To ensure tuberculocidal activity, fresh solutions must be prepared daily. As iodophors lose effectiveness, the color changes from amber to clear. Iodophors become somewhat unstable at high temperatures and can have a rapid loss of antimicrobial activity when inactivated by hard water and alcohol. Distilled or at least softened water is recommended to dilute the iodophors before using. Iodophors are EPA-registered and ADA-accepted as surface disinfectants. They may not be used as sterilants.

Iodophor antiseptics are useful in the preparation of oral mucosa for local anesthesia, surgical procedures, and handwashing. Not only does the iodophor remove the microbial populations from the skin, but also a residual antimicrobial effect remains on the scrubbed areas. Although iodophors are used as both antiseptics and disinfectants, the same product is never used for both.

### **Phenolics**

Phenolics are also classified as an intermediate-level disinfectant, provided the product label indicates a claim to tuberculocidal activity. They act as good surface spray cleaners and are effective in the presence of detergents. Phenolics are useful on metal, glass, rubber, and plastic, and are less toxic and corrosive than glutaraldehyde solutions. However, they create a film accumulation, can degrade certain plastics, and etch glass with prolonged exposure. They are very irritating and contact with skin and mucous membranes should be avoided. To prevent skin and eye irritation, protective gloves and eyewear must be worn during their use.

### **SEMICRITICAL CATEGORY ITEMS REQUIRING CHEMICAL DISINFECTION**

Examples of semicritical items requiring chemical disinfection are three-way syringe tips, high-volume evacuator (HVE) and saliva ejector tips, radiographic positioning devices. For the chemical disinfection of semicritical items, use the following procedures:

- Follow the manufacturer's instructions.
- Thoroughly wipe the item with absorbent material saturated with an EPA-registered disinfectant.
- Allow the disinfecting solution to remain in contact with the item for the length of time specified by the manufacturer.
- Whenever possible, all semicritical items that can withstand sterilization should be sterilized.

Although nitrous oxide masks and breathing tubes fall into the semicritical category, if they are autoclavable, clean and sterilize them using steam heat. If not autoclavable, wipe after each use with two separate gauze pads saturated with a high-level disinfectant. If breathing tubes are not autoclavable, after each use, rinse inside and outside with running water, wipe and flush with a high-level disinfectant, and rerinse with water.

**Note:** All semicritical category items should receive high-level disinfection as shown in table 10-3.

### **NONCRITICAL CATEGORY ITEMS REQUIRING CHEMICAL DISINFECTION**

Examples of noncritical category items requiring chemical disinfection are the following: dental



delivery systems (DDSs), consisting of a chair, unit, and light; portable dental units; surgical table and chair; and X-ray apparatus. For the chemical disinfection of noncritical category items, use the following procedures:

- Disinfect the DDS at least daily.
- Use disposable barriers since they reduce the number of surfaces requiring disinfection.
- Change paper or plastic headrest and bracket tray covers after each patient. If headrest covers are not available, disinfect the headrest after each patient.
- Disinfect hand-operated controls, switches, and handles after each patient.

- Follow the manufacturer's instructions when disinfecting the lamp head and protective shield.
- Flush HVE and saliva ejector tubing and cuspidor weekly with a central evacuation system cleaner. Use more often as needed. Follow the manufacturer's instructions.

Anesthetic cartridges for nonsurgical use should be dispensed under unit dose guidelines to prevent contamination of bulk supplies. Use only individual dose dental carpules and discard them after use. Always follow the manufacturer's instructions. Since disinfectants can diffuse through the diaphragm and contaminate the anesthetic solution, do not store cartridges in these agents.

**Note:** All noncritical category items require at least intermediate-level disinfection as shown in table 10-4.



# DENTAL SAFETY AND EQUIPMENT SAFETY

## SAFETY

This chapter is divided into two sections, dental safety and dental equipment. You must be knowledgeable of several safety concerns associated with the dental treatment facility (DTF). In the first section of this chapter, we will discuss dental safety. The various areas of safety include such things as hazardous materials, gases, chemicals, mercury, and other environmental hazards. In the second section, we will cover dental equipment and preventive maintenance.

## HAZARDOUS MATERIALS

The Federal Occupational Safety and Health Administration (OSHA) establishes regulations regarding the rights of employees to know the potential dangers associated with hazardous chemicals in the workplace. The goal is to reduce the risk of injury or illness caused by hazardous' chemicals in the workplace.

Accomplishing this goal requires information and communication; therefore, OSHA issued *The Hazard Communication Standard*. This standard helps protect your right to work in a safe and healthful environment. It requires you to not only be informed about hazardous chemicals in your workplace, but also to be trained to work safely with these materials. Each DTF is guided by BUMED instructions to develop, implement, and maintain a written hazard communication program. This includes labeling, material safety data sheets (MSDS), and employee training. We will briefly cover labeling, MSDS, and some general handling precautions.

### Labeling and MSDS

Dental products considered hazardous should come from the manufacturer with a label identifying the chemicals and containing an appropriate hazard warning. You must pay attention to these warnings. The manufacturer must supply material safety data sheets (MSDS) for products that contain a hazardous chemical. An up-to-date file of these sheets must be maintained and available to all employees. You should take time to study these sheets because they contain

valuable data concerning precautions and the safe handling of each product.

### General Precautions for Handling Materials

If you know the general precautions for handling materials, you can easily prevent hazardous situations or accidents. Whenever you handle chemicals, follow the manufacturer's instructions. Know and use proper cleanup procedures. You must dispose of all hazardous chemicals according to the MSDS instructions and applicable local, state, and federal regulations. For your own protection, you should avoid skin contact with chemicals and minimize chemical vapor in the air whenever possible. Wear protective eyewear, gloves, and a mask to protect yourself. Never leave chemical bottles open. If you do, vapors can escape into the air and chemicals can be easily spilled when bottles are left open. Do not use a flame near flammable chemicals. Eating, smoking, or drinking is prohibited in areas where chemicals are used. Eating can cause chemicals to be ingested and smoking can cause chemicals to ignite or explode.

## GAS AND CHEMICAL HAZARDS

A variety of gases and chemicals are used or produced in dental facilities. It is important for you to be aware of the hazards and to take the necessary precautions.

### Gases

You must label, store, and use canisters of gases, such as oxygen, nitrogen, and propane, according to published standards. The use of nitrous oxide conscious sedation requires special training and the use of personal protective equipment by personnel during the administration of the gas.

### Toxic Vapors

Toxic vapors can be generated when mixing impression and denture materials. Using adhesive, solvents, acids and chemical sterilizers, mixing radiographic processing solutions, and mixing some disinfectant agents can emit toxic vapors. Besides the

danger from the vapors, direct contact with many materials, such as etchant acids, radiographic solutions, endodontic materials, or bleaching agents can cause chemical burns of the skin or eyes.

### **Chemical Storage**

Proper storage of chemicals is critical for safety. The type of container and cabinet, security, and proximity to other chemicals, materials, heat, or open flame are areas that need consideration and control.

### **How to Eliminate Hazards**

Proper ventilation can eliminate hazards associated with most gases and chemicals. Instructions must be written for the safe use, storage, clean up, and disposal of hazardous or contaminated items. Storage rooms must be properly furnished and maintained. Personnel protective equipment, such as a mask, shields, rubber gloves, rubber or plastic aprons, eyewear and eyewash stations must be available. Next we will discuss some of the specific chemicals used in dentistry and their precautions.

### **Organic Chemicals**

Examples of organic chemicals include alcohols, ketones, esters, solvents, and monomers, such as methyl methacrylate. When using these chemicals, you should avoid skin contact and excessive inhalation of vapors. Always work in a well-ventilated area with these types of chemicals. When not in use, keep containers tightly closed and stored on flat, sturdy surfaces. After each use, clean the outside surfaces of the containers to prevent residual material from contacting the next user.

### **Radiographic Chemicals**

These chemicals are used to process radiographs. When handling these chemicals, always work in well-ventilated areas, and wear protective eyewear, plastic apron, and rubber gloves to avoid skin contact. When mixing the solution, minimize your exposure to the dry powder. If spills of these chemicals occur, clean them up at once. If you should come in direct contact with these chemicals, wash the chemicals off with large amounts of water and a pH-balanced soap. Store radiographic solutions and chemicals in tightly covered containers in a cool, dark place.

### **Acid Etchants**

These solutions and gels are used for acid etch techniques. When using or handling these products, always wear protective eyewear and rubber gloves to avoid skin contact. Always handle acid-soaked items with forceps or gloves. If spills occur, use a commercial acid spill kit. In the event of eye or skin contact, rinse the area with large amounts of running water.

### **Flammable Liquids**

Many items used in dentistry are flammable. Solvents such as acetone and alcohol are examples. When using flammable liquids, always have adequate ventilation, never use where sparks or flames are present, and have a fire extinguisher available. You must store flammable liquids and bulk quantities in tightly covered containers in an approved flammable storage locker.

### **Gypsum Products**

These products, which include dental plaster and stone, are considered hazards because of their powder form and of the dust particles created when they are in use. When handling the powder form or trimming cast, use protective eyewear, a mask, and work in areas with an exhaust system. It is important to minimize your exposure to the powder during handling.

### **MERCURY CONTROL**

To minimize personnel exposure and environmental contamination of elemental mercury in DTF's, follow the handling procedures in BUMEDINST 6260.30.

Mercury, which vaporizes at room temperature, is a significant health hazard if a sufficient amount is ingested, absorbed through the skin, or inhaled. The potential for personnel exposure to elemental mercury vapor has been greatly reduced by the use of pre-encapsulated amalgam.

Because of the health hazard potential of mercury, control procedures for the handling and disposal of amalgam, or mercury-contaminated items are mandatory.

Dental amalgam is an inter-metallic compound comprised of various proportions of silver, copper, tin, and zinc alloy mixed with pure mercury. This mixture of metals forms a compound that is stable both

physically and chemically and will not break down into the original elements.

## **Personnel Hygiene**

Proper mercury handling and hygiene procedures are required for all dental personnel and will be emphasized during training and indoctrination periods. Before working with mercury-bearing materials (amalgam or scrap amalgam), personnel must remove all jewelry that could potentially become contaminated and permanently damaged. Eating, smoking, or drinking is not permitted while working with mercury-bearing materials. The use of patient examination gloves should be used to minimize skin contact. You should always wash your hands after working with mercury-bearing materials before leaving the DTR.

## **Work Surfaces**

Work surfaces are made of impervious (non-porous) material, usually made of stainless steel or plastic laminate.

## **Handling**

Personnel should use a no-touch technique for handling amalgam. After trituration (mixing) of the pre-encapsulated amalgam, personnel should use an amalgam well for loading the amalgam carrier. Personnel must also use water spray and the high-volume evacuator when cutting or grinding amalgam restoration. Collect all amalgam scraps before removing the rubber dam.

Amalgamators that completely enclose the capsule during amalgamation (mixing) should be used. The amalgamator enclosure should be inspected weekly for mercury globules and cleaned. The amalgamator should be disassembled only by a qualified dental repair specialist. Amalgamators, capsules, and other items that may be contaminated with mercury should be stored in an impervious catch tray. These items must be checked at least weekly for mercury droplets.

## **Amalgam Scraps (Waste)**

Amalgam scraps are left over pieces of amalgam generated from dental procedures. During the placement of amalgam in a tooth, the amalgam is a soft and malleable compound that quickly turns into a solid

hard mass. When amalgam turns solid, it is no longer useful for dental procedures and must be stored in a solids container.

Dental amalgam scrap is stored in a **dry state** in an approved solid container without any vapor suppressant solution and is not considered a hazardous waste. It is also necessary to clean the solids strainer (collector) of the dental evacuation system and recover any scrap amalgam that has been evacuated (suctioned) during dental procedures. Place any scrap amalgam from the solids strainer into a solids container. The following containers are approved to store scrap amalgam:

- Surgical needle jar with cover.
- Urine specimen cup with cover.

It is very important to keep the dental scrap amalgam cover in place to prevent spillage when not in use. When the container becomes full, follow your clinic procedures for turning in scrap amalgam for disposal.

## **Floors**

Vinyl sheeting is the preferred floor covering material for DTRs; carpet is not permitted. The use of pre-encapsulated amalgam products has not precluded dental waste or scrap from falling to the floor and being crushed into crevices; therefore, seamless floors are preferred. Floors should be kept clean and free of amalgam debris.

## **Mercury Decontamination and Spill Cleanup Procedures**

A mercury decontaminant should be readily available for immediate mixing and application to a contaminated surface. The decontaminant works by binding with the elemental mercury. If larger droplets of mercury are present, the decontaminant only reacts with the outer surface of the droplet forming a shell. This shell can easily be broken, releasing elemental mercury. Care must be taken during removal of large droplets.

When mercury contamination occurs, it must be cleaned up immediately with a mercury decontamination kit. Follow the manufacturer's instructions for use of these kits. Use the following guidelines for mercury cleanup and decontamination:

- Do not eat, drink, or smoke during cleanup procedures.

- Wear patient examination gloves during cleanup.
- Place collected mercury in a sealed, suitable liquid- and vapor-tight container, and remove to a designated area for disposal as mercury waste.
- Scrub contaminated surfaces with mercury decontaminant to convert any trapped mercury.
- Clean thoroughly any equipment or instrument, such as amalgamator, that becomes contaminated with mercury with a mercury decontaminant.
- Contact the cognizant industrial hygiene office to test the decontaminated area and equipment for residual mercury.

## Mercury Disposal

Mercury and mercury compounds will not be dumped into any body of water including open seas or oceans, or intentionally released into any ship's waste disposal system. Shipboard mercury storage and handling areas should not be connected to deck drainage systems.

For shipboard only, all mercury-contaminated waste, including scrap amalgam, will be collected, and packaged with a **double boundary** of confinement using plastic bags, sealable drums, or polyethylene bottles and labeled.

For shore facilities, dispose packaged mercury waste in cooperation with the base environmental public works department.

Special disposal procedures are **not** required for items contaminated with trace amounts of mercury, such as used disposable amalgam capsules. **Reclose** amalgam capsules after use, or seal used capsules in a denture bag.

## BURNS

The major causes of burns are inattentiveness and rushing through a task. Two types of burns are possible in DTFs—thermal and chemical. Whether thermal or chemical, burns are injuries that can be avoided by exercising caution.

### Thermal

Thermal burns are caused by open flames and hot surfaces. Common dental items using open flames are Bunsen burners and torches. Dental items that may be

hot include compound and wax heaters, sterilizers, and items in the sterilizers, such as instruments. Constant awareness of the use, condition, and location of these items is essential to prevent thermal injury. Equipment should be located in an area convenient for use while minimizing the chance of accidental burns. Flames are difficult to see, so make a habit of keeping them away from flammable liquids, materials, and yourself. Always use heat-resistant gloves or the device supplied by the manufacturer to remove items from sterilizers. Always allow sterilized items to cool before using. Items should never be taken out of the sterilizer and placed directly on the instrument tray for use or placed directly into a patient's mouth.

### Chemical

Chemical burns result from contact with a caustic agent, whereas, damage from thermal burns cease when the heat source is removed. Chemical burns may continue below the skin long after removing the agent from the skin's surface. A caustic chemical burn must be neutralized. When handling caustic chemicals, you should know what the neutralizer is and where it is located. Often, the neutralizer cannot penetrate the skin with the same efficiency as the caustic agent. Immediate treatment by professional medical personnel is essential.

Chemical burns of the eyes and skin can result from careless use of many materials such as etchant acids, radiographic solutions, endodontic materials, and bleaching agents. Protective eyewear should always be worn when handling hazardous liquid chemicals for protection against splash hazards. Proper storage of chemicals is critical for safety.

## ADDITIONAL HAZARDS IN THE DENTAL ENVIRONMENT

Additional hazards or safety items are associated with the dental environment. This includes allergens and sensitizing agents, visible light, injury by projectiles, noise, and psychological effects.

### Allergens and Sensitizing Agents

Many patients or personnel may be allergic to one or more of the materials used in the DTF. Other individuals may develop allergies or sensitivities from the use or misuse of materials. Dust from poor housekeeping, grinding, or buffing and polishing can become hazards. Chemicals in medicaments or disinfectants, sterilizer solutions, formalin, solvents, acrylic resins, impression materials, radiographic solutions, waxes, cements, unset composites, and

sealants are just a few of the many chemical agents that could become hazards.

## Visible Light

The use of photo-initiated dental materials has increased dramatically. Many restorative resins, bases/liners, impression materials, and periodontal dressings are now visible light polymerized materials. Repeated exposure to the curing light from the visible light polymerization unit can cause damage to the retina. You should use protective filtering lenses, goggles, or shields when using visible light polymerization procedures. It is also recommended that you do not stare at the light source or reflected light during the polymerization period.

## Injury by Projectiles

Patients and staff members can be injured by projectiles or debris generated by cutting, scaling, polishing, or irrigating procedures. Aspiration of projectiles by the patient is also a possible hazard. Actions that prevent projectile injuries include using rubber dams and wearing protective eyeglasses or goggles.

## Noise

In the DTF, several devices have the potential to produce noise levels that may cause a hearing loss in exposed personnel. The potential for hearing loss is directly related to the intensity of the noise, the duration of the exposure, and the sensitivity of the individual. The proper use and maintenance of equipment and the proper use of hearing protection, when appropriate, are all important to prevent unnecessary exposure to hazardous noise and the potential for occupational hearing loss.

## Psychological Affects

Some aspects of the dental environment have psychological affects on staff and patients. Every effort should be made to maximize the positive psychological affects by optimal use of such interior design features as lighting, wall color, texture, and decoration, furnishings, and floor coverings.

## DENTAL EQUIPMENT

It's important for you to understand that as a dental assistant, you are **not** expected to assume the role of a Dental Equipment Technician (DET). The DET has a Navy Enlisted Classification Code of DT-8732 and is

trained to maintain and repair mechanical, electro-mechanical, and electronic dental equipment; and perform preventive maintenance and electrical safety testing on dental equipment.

To be an effective dental assistant, you must be familiar with the equipment in the DTR. You are expected to:

- Recognize the major components of each piece of equipment.
- Operate each piece of equipment.
- Perform routine user maintenance on equipment.

The **first rule** for operating and performing user maintenance on equipment is to carefully read the manufacturer's instructions. Copies of this literature should be in the LPO/LCPO's office, or contact the Dental Equipment Repair Division.

## TERMINOLOGY AND DEFINITIONS

- **Biomedical and Facilities Systems (BIOFACS)**—A centrally-managed automated preventive maintenance system for use by DETs.
- **Dental Equipment**—Consists of devices used in the dental diagnosis, therapy, and treatment of injury or disease. This equipment consists primarily of Federal Supply Classification (FSC) 6500 items. It also consists of similar commercial, nonstandard items used in dental treatment facilities to provide patient care.
- **Types of Maintenance Requirements (MRs)**—The three types of MRs are as follows:
  - Preventive maintenance (PM)**—Often called scheduled maintenance, serves to ensure inherent reliability, increase operational availability, and prevent excessive wear of moving parts.
  - Unscheduled maintenance (UM)**—Often referred to as corrective maintenance for the repair of equipment breakage or malfunctions.
  - No maintenance required (NMR)**—Applies to equipment that normally requires no scheduled maintenance.
- **Maintenance Levels**—The three maintenance levels are as follows:
  - Level I (performance testing)**—Organizational maintenance consists of

operator maintenance that is performed before, during, and after equipment usage. It is the basic maintenance required to keep equipment operating on a daily basis. Procedures usually consist of maintaining fluid levels, simple lubrication, daily inspections, cleaning, and operator calibration checks and adjustments.

—Level II (preventive maintenance)—Intermediate maintenance relates to scheduled periodic (planned) technical inspection, lubrications requiring disassembly, replacement of worn or deteriorated parts, interior cleaning, calibration verification or adjustment, and verification of Level I performance. Level II maintenance is to be performed by a DET or contracted service.

—Level III—Maintenance consists of maintenance requiring complete overhaul of the item of equipment and is considered depot-level maintenance or equipment manufacturer service center level maintenance. At command discretion, performance of Level III is permitted if parts, personnel with technical expertise, tools, and test equipment, and manhours are available. Level III maintenance will usually result in extension of service life and should be documented in the appropriate service history.

## **MAINTENANCE WORK ORDERS**

The Medical/Dental Maintenance Work Order (NAVMED 6700/4) shown in figure 11-1, or BIOFACS work orders are used to determine workload and assign priorities for the DETs. Dental technicians who have equipment that does not properly function will complete the top section of the NAVMED 6700/4. The form is then turned in to the dental repair department for action. Depending upon the DETs' workload, they may assign you a functioning piece of equipment on a loan basis until the equipment repairs are completed.

## **DENTAL DELIVERY SYSTEM**

The operation and maintenance of the dental delivery system (DDS) which consists of a chair, unit, and light (fig. 11-2) are critical to the performance of dentistry. You must know how to properly use, maintain, and make minor adjustments to a dental chair, unit, and light to avoid unnecessary delays. Because of the many different makes and models used in Navy dentistry, always read the manufacturer's

instructions on the operation and maintenance for the make and model of the equipment you are using. Procedures for chemical disinfection of the DDS are discussed in *Dental Technician, Volume I*, Chapter 10, "Sterilization and Disinfection."

## **DENTAL CHAIR**

As the dental assistant, it is your responsibility to seat the patient and make chair adjustments smoothly, and assure the patient is placed in the correct position for treatment and is comfortable.

### **Operation**

Begin each day by making a visual inspection and an operational check of the dental chair. The dental chair is electronically controlled and hydraulically powered. An electronic motor drives the hydraulic pumps enabling the back of the chair to tilt and the base of the chair to lift. The movements are controlled by switches located on the back of the chair. More recent models use foot controls for infection control purposes.

Most dental chairs have movable armrests that either slide back or raise up to provide easier patient entry and exit. Generally, some form of a release button locks and unlocks the armrest. A swivel/brake device allows the dental chair to rotate to approximately 45 degrees from either side of the center and then lock into position.

Dental chairs are equipped with either an articulating or a horseshoe-style headrest (fig. 11-3). The articulating headrest allows you to move the patient's head in approximately a 60° arc. It is adjusted by a release button located on the backside of the headrest. The horseshoe-style headrest is adjusted by pushing or pulling down on the headrest. The horseshoe headrest may also have an adjustable strap on the backside to make up and down movements of the horseshoe.

### **Securing the Dental Delivery System**

Procedures for securing the dental delivery system are as follows:

- Place chair in the lowest position.
- Raise the back to the upright position.
- Place the armrest in the locked position.
- Turn off the master switch.



### MEDICAL/DENTAL MAINTENANCE WORK ORDER

Date of request	For additional Information call: Ext: Name:				
Requesting Activity	PM no.	PA or minor property no.			
Location of equipment: Rm, Dept, etc.		Name of equipment to be repaired			
Manufacturer	Model no.	Serial no.	MIP no. (for ships)		
Description of work requested in your own words:					
<b>FOR SHOP USE ONLY</b>					
Date parts: Ordered      Received		Reqn or purchase order nos.	Work/Job order no.		
<b>PARTS USED</b>					
NSN or Mfg's part #	Nomenclature	Cost	Quantity		
Manhours:		Description of work performed/remarks:			
BMET/DERT	Date			HRS	
Total manhours					
Date job completed:					
Maint contract in effect					
Yes <input type="checkbox"/> No <input type="checkbox"/>					
Warranty in effect					
Yes <input type="checkbox"/> No <input type="checkbox"/>					
Work assigned to:		Note: This information is to be transferred to the NAVMED 6700/3 or the Automatic Data PM record.			
<b>RECEIVED IN SHOP</b>		<b>OUT OF SHOP</b>			
Signature:		Date:	Returned to Requesting activity.		
		Date:	Signature:		

NAVMED 6700/4 (Rev. 7-81) S/N 0105-LF-206-7020

DTB1f1101

**Figure 11-1.—Medical/Dental Maintenance Work Order, NAVMED 6700/4.**

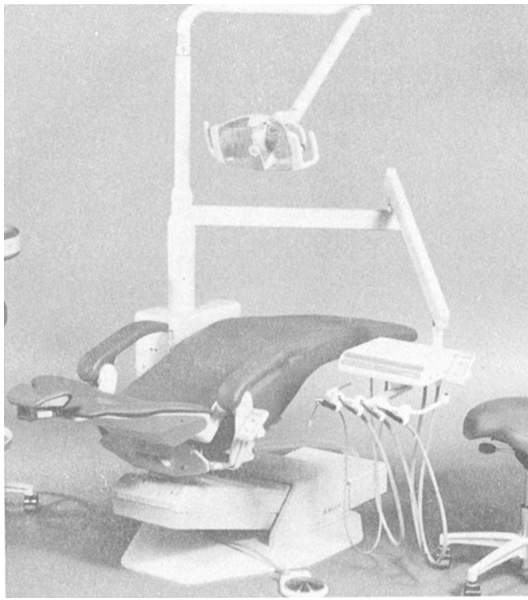


Figure 11-2.—Dental chair, unit, and light.

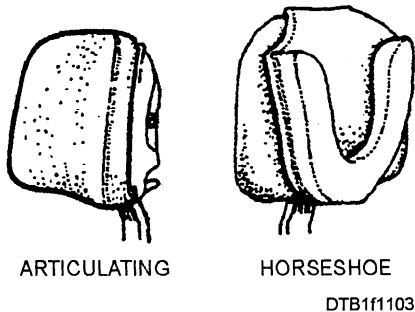


Figure 11-3.—Headrest styles.

### Level I Maintenance

Perform the following Level I maintenance on the dental delivery systems:

- Perform an operational check before seating your first patient of the day.
- Look for air, water, and oil leaks and broken or missing parts.
- Ensure the exterior surface is clean and the upholstery is in good condition, with no tears or other damage.
- Clean the chair daily with a soft cloth dampened with soapy water. Dry the chair thoroughly with a clean soft cloth.

### DENTAL UNIT

Two types of dental units used in Navy dentistry are the mobile and chair-mounted types. The

chair-mounted is the most common type in use. Most units provide the basic utilities for dental treatment including water, compressed air, electricity, and vacuum. It may also include handpiece controls, foot controls, a bracket tray, tubing flush system, 3-way syringes, cuspidor, and a suction apparatus. The unit should be designed so that it is compact and doesn't occupy space needed by the assistant. Hose-attached equipment, such as handpieces, syringes, and oral evacuation devices, should be conveniently positioned to both the provider and the assistant.

### Operation

As with the dental chair, begin each day by making a visual inspection and operational check of the unit. During the inspection, first look for obvious problem areas, such as frayed electrical wiring, missing screws, and water leaks. Then conduct an operational check for each system. For example, you can test the water, air, electrical, and vacuum systems by operating the 3-way syringe, fiber-optic handpiece, dental light, and saliva ejector.

### Water System

Many dental units operate with water that comes from the clinic's main water line. With the emphasis on infection control and the advances in dental equipment, the Navy is replacing older dental units and purchasing new units that have self-contained water systems. A malfunctioning water system affects the operation of the 3-way syringe, cuspidor, cup filler, and handpiece water spray. If any of these items fail to work, first make sure that the necessary valves and switches are turned on. If you can't solve the problem at this point, read the manufacturer's instructions before continuing. Water leaks are usually the result of loose connections or defective washers and valves. When necessary, have the DET replace any defective parts.

The new self-contained water systems are designed so you can optimize the quality of your dental unit water. The benefits from this system only occur when periodic system flushing and disinfection procedures are followed. Failure to follow the procedures for the type of self-contained water system you use may expose patients to water with higher than normal microbe counts. Most systems can use either tap, distilled, or sterile water to operate. Do not use saline solutions, mouthrinses, or any chemical solutions. These solutions may damage the water

system components and cause the failure of your dental unit. A 750ml bottle constructed of polyethylene plastic is used to hold the water for the system. The bottle cannot be heat sterilized, but can be sterilized using ethylene oxide. Before attempting to use a self-contained water system, read the manufacturer's instructions for operation and maintenance.

### Air System

A large central air compressor in your clinic provides compressed air. This enables most dental units to operate up to three dental handpieces and the 3-way syringe. Because of the noise level and for safety reasons, this system is located outside of the patient treatment area.

Most dental handpieces operate on air pressure within 20- to 80- pounds per square inch (psi) range, with a specific pressure recommended for each handpiece. Most units have a type of control system located on the bracket tray where air pressure can be adjusted. If you locate any air leaks, have a DET correct them as soon as possible.

### Electrical System

Probably the most complex system on a dental unit is the electrical system. When there is a problem with this system, report it to the DET. Among the items affected by a dental unit's electrical system are the water heaters and solenoids (electrically operated switches).

### Central Vacuum System

Generally, a central vacuum system provides suction to numerous dental units. The vacuum is connected to the unit with hoses and oral evacuation equipment, such as high-volume evacuator (HVE) and saliva ejector. A filtering component of the central vacuum for both the HVE and saliva ejector is the solids separator (fig 11-4). It contains a strainer which collects large pieces of debris that could clog suction hoses. At least once a week or if a decrease in vacuum is detected, remove and clean the strainer. This ensures proper suction from the central vacuum and maintains proper DTR infection control.

**HIGH-VOLUME EVACUATOR.**—The water spray from the handpieces and three-way syringes, along with debris from the patient's mouth, must be removed. The most efficient way to do this is with an

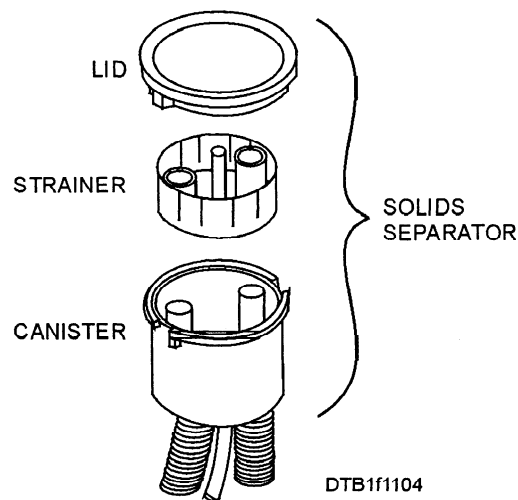


Figure 11-4.—Solids separator.

HVE (fig 11-5). The principle of this evacuator is low pressure and high volume. A tip is placed into the HVE handpiece and the suction turned off and on by a control valve or button on the handle. Some of the newer models of HVEs have a quick disconnect device and are now autoclavable. Follow the manufacturer's instructions for maintenance.

**SALIVA EJECTOR.**—During certain procedures, the provider may choose to keep the working site dry by using the saliva ejector. This type of suction is effective only when there is a limited amount of fluids, such as saliva, to remove from the patient's mouth. It can also be used to hold the tongue away from the working site and keep an area dry for placement of material that takes a long time to set. A disposable plastic saliva tip inserts into the rubber end of the saliva ejector assembly and is turned on/off by a control valve. Follow the manufacturer's instructions for maintenance.

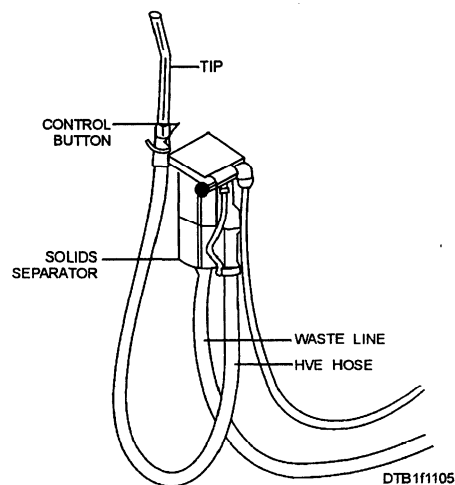


Figure 11-5.—High-volume evacuator (HVE).

## Control System

This system delivers the drive air and coolant to whichever handpiece is lifted from the dental unit. The control system is made up of two parts: handpiece controls and a foot control.

**HANDPIECE CONTROLS.**—Most handpiece controls are located on the bracket tray that can accommodate three handpieces (fig. 11-6). The water coolant flow and maximum drive pressure are individually adjustable for each handpiece.

Most units use the following international symbols:

- A blue dot identifies a water control.
- A yellow dot identifies an air control.
- A red dot identifies the ON or active position.

Every dental unit has a master ON-OFF toggle or switch. It turns on the air and water to the control system. When it is turned off, none of the items on the unit will function. This switch should be OFF whenever the unit is not in use to prevent flooding in the event of a leak while the system is unattended. The ON/OFF indicator provides a visual indication that the system is pressurized when the master switch is ON.

**HANDPIECE HOSES.**—The handpiece hose is attached to a coupling that joins the handpiece to the hose. Never over-tighten the coupling. Under-tightening

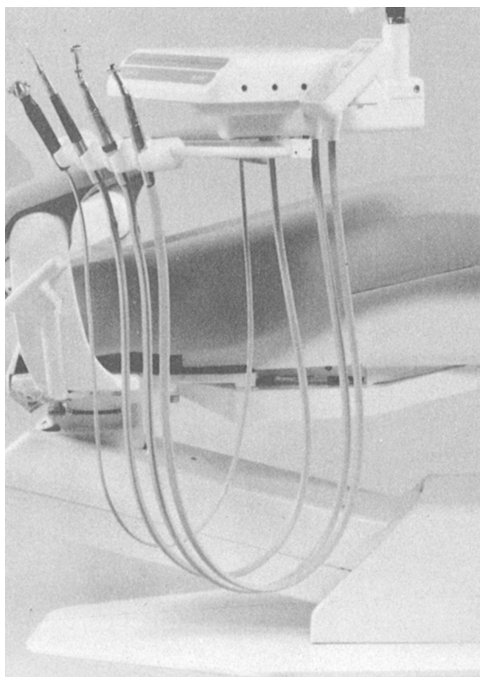


Figure 11-6.—Handpiece controls.

can cause air and waterleaks. Many providers use a “quick disconnect” that attaches to the coupling. By gently pulling on the handpiece, the operator is able to change handpieces very quickly. The quick disconnect is also available with a 360° swivel that allows the handpiece to be turned around without tangling up the hoses. Perform a daily operational check on the quick disconnect equipment. Inspect “O” rings and replace them if found frayed or missing.

**FOOT CONTROL.**—All handpieces are operated by the provider through the use of a foot control (rheostat) device. A valve inside the foot control regulates the handpiece speed and provides an air signal that activates the air and water coolant flow. The foot control is operated by light foot pressure applied to any part of the disk. Some foot controls may also be equipped with a wet/dry toggle switch and a chip blower. The wet/dry toggle switch can shut off the water coolant to the handpiece without moving the hands from the treatment area. The chip blower sends a jet of air through the handpiece when not in use to remove any debris accumulated in the treatment site.

### Other Controls

The other controls that could be on the bracket table and assembly, depending on the make and model, are as follows:

**WATER COOLANT ON/OFF TOGGLE**—Stops the flow of water coolant to all handpieces.

**AIR COOLANT FLOW CONTROL**—Adjusts the air coolant flow to all handpieces and can completely shut off the air coolant.

**DRIVE AIR PRESSURE CONTROL**—Adjusts the drive air pressure to the handpiece with an adjustment screw for each handpiece.

**SYRINGE FLOW CONTROL**—Adjusts the air and water flow from the three-way syringe.

**AUTOMATIC HANDPIECE HOLDER**—Shuts off air and water to the handpiece when it is in the holder.

**HANDPIECE TUBING FLUSH SYSTEM**—Some newer models of dental units have a handpiece tubing flush system that quickly and thoroughly flushes the handpieces to wash away contaminants accumulated in the handpiece and tubing. This system saves wear on the handpieces by sending water directly to the handpiece, and bypassing the control block and not requiring the handpiece turbine to operate. Flush the handpieces at the beginning of each day for 1

minute, after each patient, and at the end of the workday for 30 seconds following BUMEDINST 6600.10.

**THREE-WAY SYRINGES**—Each dental unit has at least one 3-way syringe that provides a stream of (1) air, (2) water, or (3) a combination spray of air and water. Many of the new syringes have a quick disconnect that allows the syringe tip to be changed for each patient and is autoclavable. The water temperature control, if equipped, on the dental unit, can be adjusted to keep the temperature of the water at approximately 130°F.

## DENTAL LIGHT

The dental light (fig. 11-7) illuminates the patient's mouth and treatment area. It may be on a ceiling track or mounted to the DDS. The light should be properly positioned 30-36 inches from the patient's face. Most dental lights mounted to the DDS consist of three major assemblies: the transformer and rigid arm assembly, flex arm assembly, and the light head assembly. The intensity switch located on the transformer housing is used to set the intensity of the light to low, medium, or high settings.

The dental light head rotates on three different axes. It can rotate as much as 180° horizontally, 125° vertically, and 45° diagonally from either side.

To perform a daily operational check on the dental light.

- Turn light on.
- Move light ensuring a free full range of motion.
- Light should not drift. If drifting is discovered, initiate a repair request

## Light Replacement

Often, at the most inconvenient time, the bulb in the dental light burns out. To avoid further delays, you need to know how to quickly and properly replace the bulb. Use the following steps to change a bulb:

- Turn the light switch to the off position and allow the bulb to cool.
- Release the fastening devices on the light shield and move the shield aside.
- Use a gauze pad or cloth to protect your fingers when removing the bulb. Very carefully pull the old bulb from the socket and discard it.
- Most units have a spare bulb compartment on the light assembly. Open the wrapper of the new bulb to expose the bulb pins, but do not remove the bulb from the wrapper.
- Use the wrapper to protect the bulb #while installing it. This is necessary because finger oils limit bulb life and can affect light performance.

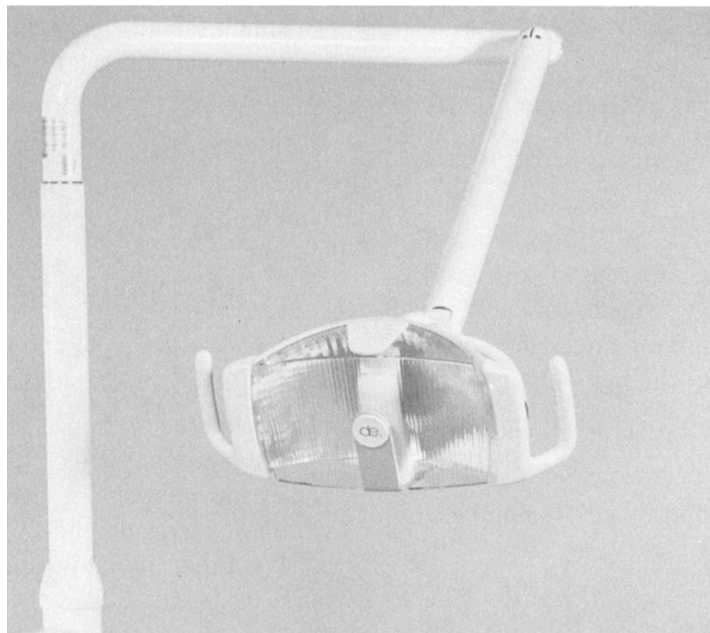


Figure 11-7.—Dental light.

- If you do touch the bulb by mistake, gently clean it with cotton soaked in ethyl alcohol.
- Carefully insert the new bulb into the socket and remove the wrapper.

### CAUTION

Never operate the dental light with the light shield removed. The shield is your protection against injury if the bulb shatters.

- Replace the light shield, and test the dental light to ensure it works properly.
- Notify the dental repair department to replace the spare light bulb you used, or if the light does not begin to function properly.

### Light Shield

The light shield is constructed of hard plastic and is used to protect the dental light bulb and the reflector. Because the dental light is close to the patient treatment area, it is frequently soiled by splatter and aerosols. Use the following steps to clean the light shield:

- Ensure the light has cooled before cleaning the light shield.
- Release the fastening devices on the dental light to remove the light shield.
- Immerse the shield in warm, soapy water, rinse in clear water, and then wipe dry with a lint-free cloth.
- When the shield is clean, replace it on the dental light and test for proper operation.

### Light Reflector

The light reflector is constructed of glass and is protected by the light shield. Use the following steps to clean the inside surface of the reflector when dust or spots reduce the efficiency of the light:

- Allow the light and reflector to cool before removing the light shield.
- Use a soft, lint-free cloth to gently remove any accumulated dust particles.
- Unplug the DDS or dental light. Use a dampened cloth with water or a diluted solution of mild dishwashing soap for a more thorough

cleaning. Ensure the cloth is not so wet that it drips into the electrical parts of the light.

- Wipe the inside surface of the reflector in one direction only. Ensure no residue remains on the reflector.
- Never use abrasives or chlorine on the surface of the reflector. Doing so can damage or discolor the surface of the reflector, causing poor lighting.
- Do not rub heavily or clean the reflector when it is hot. Never soak the reflector in cleaning solutions.
- After cleaning is completed, replace the light shield and test for proper operation.

## DENTAL HANDPIECES

A dental handpiece is a precision-built mechanical device designed for use with rotary instruments, such as burs, stones, wheels, and discs, used in dental treatment. Handpieces may be air driven, electric, or compressed gas (for surgical handpieces). Surgical handpieces are discussed in *Dental Technician, Volume 2*, Chapter 5, "Oral Surgery Assistance."

Handpieces can be classified according to the revolutions per minute (rpm) or speed at which they operate. One type is the low- or slow-speed, and the other is referred to as the high-speed contra-angle.

Both the low- and high-speed handpieces use an air system to operate several parts of the handpiece. The main function of the air is to rotate the air turbine or vane drive. Basically, this means the air system is the main power source for these handpieces.

Fiber optic accessories attached to dental handpieces allow the provider to operate handpieces with a light source and is discussed in this section.

## CONTRA-ANGLE HANDPIECES

This type of handpiece is used in cavity preparations to remove the bulk of enamel, dentin, and old metal restorations. It is also used to prepare retention grooves and bevels with a cavity preparation and to develop the cavity outline. The high-speed contra-angle handpieces (fig. 11-8) turn at a higher rate of speed than the slow-speed handpieces. Its speed ranges from 380,000 to 400,000 rpm depending on the model. High-speed handpieces are operated by air pressure. The term *contra-angle* describes the angle at

the head of the handpiece. The contra-angle allows for easy access to treatment sites. Straight designed high-speed handpieces are available, but the contra-angle is the most commonly used in restorative procedures. Before you use one, consult the appropriate manufacturer's instructions.

The high-speed handpieces are designed to use smooth shank burs that are 1/2-inch in length. All models work on the same basic principle: Burs are inserted into a plastic or metal friction chuck and held tight in the handpiece by either manual tightening or a power lever lock. The bur is rotated when air is forced through the airports into the head of the handpiece and to the air turbine.

The high-speed handpiece uses a water system to keep the handpiece cool. The water system also produces a fine spray mist, which aids in flushing debris from the treatment site. **Constant preventive maintenance is essential in caring for handpieces.** If they are **not** properly cleaned and lubricated, abrasives, such as finely ground tooth, metal, and other particles, will cause excessive wear and undue vibration. The proper lubrication of handpieces is of such importance that it **cannot** be overstressed. Read and follow the manufacturer's instructions to make sure that you understand the **lubrication, cleaning,**

and **sterilization** requirements. Perform the necessary maintenance as recommended. It takes only a few seconds to ruin a handpiece that has been improperly or insufficiently lubricated, cleaned, or sterilized. Always ensure your handpieces meet the required infection control standards as outlined in BUMEDINST 6600.10, *Dental Infection Control Program*.

## LOW- OR SLOW-SPEED HANDPIECES

This type of handpiece is used for removing caries, refining a cavity preparation, and performing a prophylaxis.

The low-speed handpiece consists of a motor or power driven unit (fig. 11-9) and various attachments (fig. 11-10). The speed of the motor ranges from 0 to 5,000, or 80,000 rpm depending on the model.

The head of the handpiece attachment contains a chuck into which a dental bur or other rotary instrument is fitted. Most heads contain a latch-type chuck. Some heads contain a friction-grip chuck. On the slow-speed motor is a speed control ring. By turning this ring, you can control the speed with which a bur rotates and its direction of rotation.

Many units and models have some method of quickly connecting and disconnecting the motor and attachments. Some models have a quick ring disconnect, while others have a button to depress or an indicator to press. As with the high-speed handpiece, read and follow the manufacturer's instructions for operation, lubrication, cleaning, and sterilization requirements for the slow-speed motor and attachments.

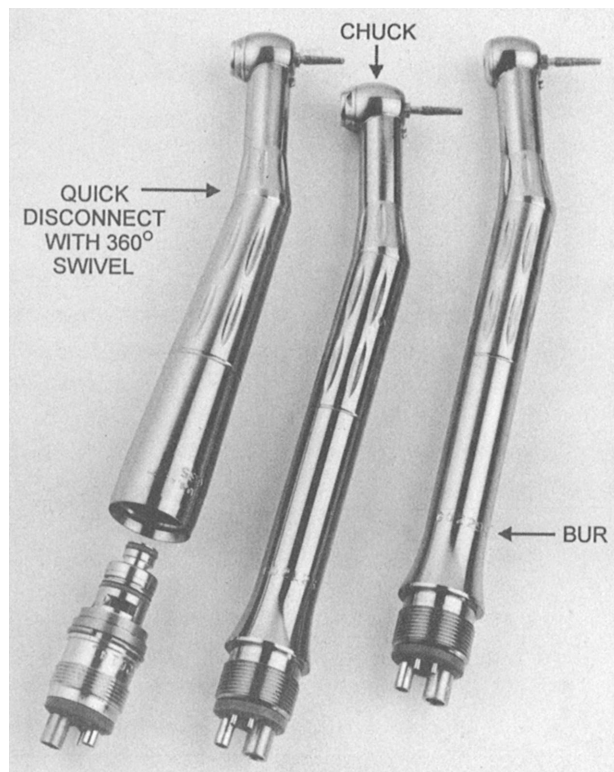


Figure 11-8.—High-speed contra-angle handpiece.

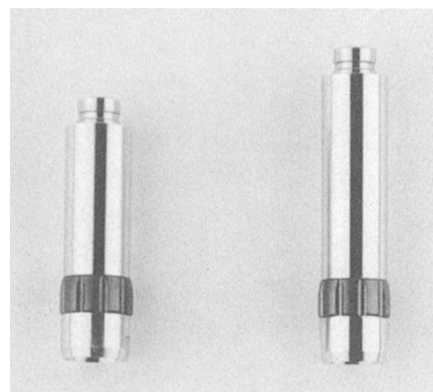
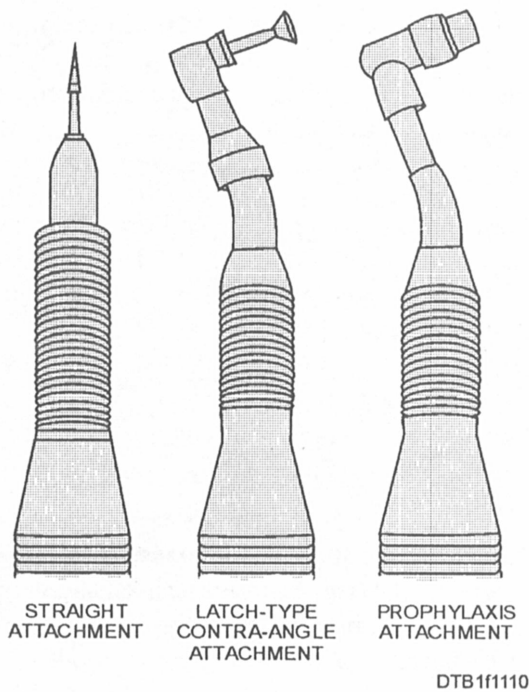


Figure 11-9.—Slow-speed motor.



**Figure 11-10.**—Selection of attachments for the slow-speed handpiece, including (from left) straight, latch-type contra-angle, and prophylaxis attachment.

## FIBER OPTIC ACCESSORIES

Fiber optic accessories provide the operator a source of artificial illumination through the dental handpiece. The clinical applications of a fiber optic handpiece are almost limitless. It is useful in general inspection and transillumination of the oral cavity and tooth structure to help identify and diagnose inter-proximal caries, stains, decay, calculus, crazing and hair line cracks in natural and artificial teeth, location of excess cement, and smoothness of crown preparations.

Most fiber optic systems are activated by touch or an air-electric switch. Many systems also have an intensity control that permits adjustment of the light intensity to suit individual preferences and needs.

Fiber optic technology involves the transmission of light through long, thin fibers of glass or transparent material. The light travels, nonelectrically, through the fiber by reflecting from wall to wall without transmitting or generating heat. This makes fiber optics completely safe for use in the oral cavity.

Each individual fiber is approximately 25 microns in diameter, or about 1/3 the size of human hair. A cluster of fibers is called a fiber optic bundle. The bundles are enclosed inside the handpiece and

positioned to direct the light along the same line as the dental bur.

Level I maintenance on the fiber optic system is to clean the fiber optic surfaces on both ends of the handpiece after each patient. To do this, wet a cotton swab with isopropyl alcohol and clean both ends before the sterilization cycle. This prevents residual debris and handpiece lubricant from baking onto the fiber optic surfaces, which results in reduced light output. Read the manufacturer's instructions for additional care, maintenance, and bulb replacement requirements.

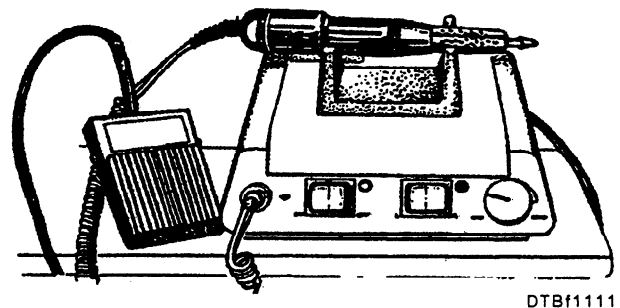
## ELECTRIC HANDPIECE

This type of handpiece attaches directly to a small electric motor and is normally used in the prosthetic lab. The electric handpiece is portable, lightweight, and has variable speeds of 2,500 to 25,000 rpm (fig. 11-11). Units are initially activated by an on/off switch and controlled by a foot switch. Another switch controls the left or right torque action similar to the forward and reverse of the low-speed handpiece. The electric handpiece uses long, smooth-shanked rotary instruments.

Electric handpieces require minimal maintenance and adjustments. Consult the manufacturer's instructions for specific requirements and guidelines.

## IDENTIFYING ROTARY INSTRUMENTS

Rotary instruments are used in conjunction with dental handpieces. The rotary instrument group includes a great number of small, separate items. These instruments are made from many materials and combinations of materials ranging from diamonds to very finely detailed steel. Rotary instruments have many uses, such as preparing cavities, finishing restorations, trimming dentures, polishing teeth, and removing bone during oral surgery. Rotary instruments are a vital part of most dental treatment



**Figure 11-11.**—Electric handpiece.



procedures. Your role with this group ranges from keeping an adequate number of rotary instruments in the treatment room to changing them in the handpiece.

### Basic Rotary Instruments

Rotary instruments, such as burs, have three basic parts: head, neck, and shank (fig. 11-12). The head of the bur is the working or cutting portion, which is made in many sizes and shapes. The neck, which is the narrow portion of the bur connects the shank and the head. The part of the bur that fits into the handpiece is the shank. The length of the shank depends on the specific use of the bur, whereas the shape of the shank is designed to fit into a specific handpiece.

We have already discussed the several types of handpieces used in dentistry. Each rotary instrument is used in a particular handpiece. To indicate in which handpiece the rotary instruments function, they have been classed as friction grip, straight handpiece, or latch contra-angle handpiece types (fig. 11-13). The friction grip (FG) instruments are abbreviated as FG and are used in high-speed handpieces and friction grip low-speed contra-angles. These burs have small, smooth shanks that are held in the handpiece by friction against a metal or plastic chuck, or by a wrench-tightened metal chuck. Friction grip burs are available in short shank and miniature (pediatric), as well as the commonly used standard length.

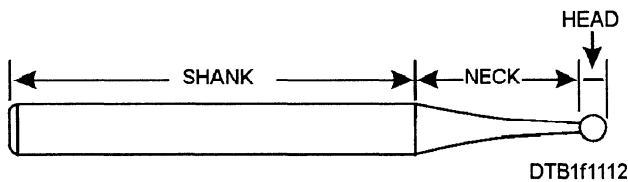


Figure 11-12.—Bur parts and basic shank designs.

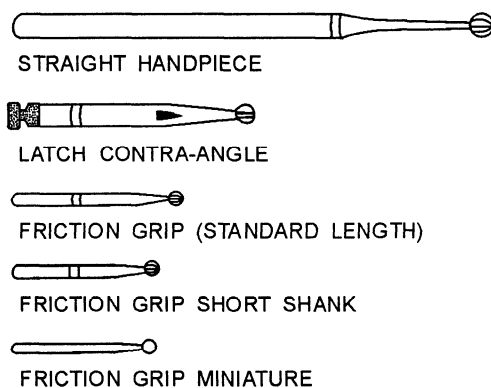


Figure 11-13.—Classification of rotary instruments

The straight handpiece rotary instruments are abbreviated as (SHP). They are used in electric straight handpieces and in slow-speed, air driven straight handpieces. The shank on the straight handpiece instruments is larger in diameter than the FG shank and at least twice as long.

The latch contra-angle handpiece instrument is identified as angled handpiece (AHP) or latch-angle (LA). This instrument is used in conventional latch contra-angle handpieces. Common AHP rotary instruments have a notched shanked with the same diameter as the SHP instruments but are about half the length. However, some AHP instruments are made with short or long shanks.

Dental burs are available in many shapes and sizes. The basic shapes of bur heads are the round, inverted, pear-shaped, end and side cutting, straight/tapered plain fissure, and tapered/straight crosscut fissure as shown in figure 11-14.

Burs are made of either steel or carbide. Steel burs are used in the slow-speed handpiece and dull after only one use when cutting enamel of teeth and should be discarded after use or when directed by the dentist. Steel burs being used on dentin under slow-speed often generate heat in the tissue of the tooth, causing discomfort to the patient. The dentist will use the very lowest speed to reduce the chance of heat and discomfort.

High-speed handpieces use a carbide bur. Because of its hardness, the carbide bur can be used many times to cut hard enamel tooth structure without becoming dull. However, carbide burs are brittle and have a tendency to fracture under pressure. The carbide bur operates most efficiently at high speeds with light pressure.

### TYPES, USE, AND MAINTENANCE OF MISCELLANEOUS EQUIPMENT

Several pieces of equipment are commonly used in many dental specialties. These items include provider and assistant mobile chairs, amalgamators, and visible light curing units.

### PROVIDER AND ASSISTANT MOBILE CHAIRS

Provider and assistant mobile chairs play an important role in the practice of dentistry because of techniques that require both the provider and assistant to work from seated positions. The doctor's or



A



B



C



D



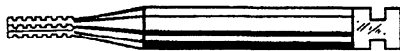
E



F



G



H

- A. ROUND (NOS. 1/4, 1/2, 2, 4, 6, 8)
- B. INVERTED CONE (NOS. 33 1/2, 34, 35, 37, 39)
- C. PEAR SHAPED (NO. 330)
- D. END AND SIDE CUTTING (NO. 901)
- E. STRAIGHT PLAIN FISSURE (NOS. 56, 57)
- F. TAPERED PLAIN FISSURE (NOS. 169, 170)
- G. TAPERED CROSSCUT FISSURE (NOS. 699, 700, 701, 702, 703)
- H. STRAIGHT CROSSCUT FISSURE (NOS. 557, 558, 559)

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Figure 11-14.—Basic bur head shapes and sizes.

provider's chair is designed with an adjustable backrest (fig. 11-15). The assistant's chair on the other hand, has an adjustable armrest that wraps around to the front of the chair (fig. 11-16). Chairs for both the provider and the assistant should be well-padded and comfortable. They both must have adjustable seat height, as well as a broad base to give stability. Normally, chairs with at least four to five casters are preferred. The chair should have a foot support ring so that the users can keep their feet parallel to the floor, thereby maintaining comfort and proper posture.

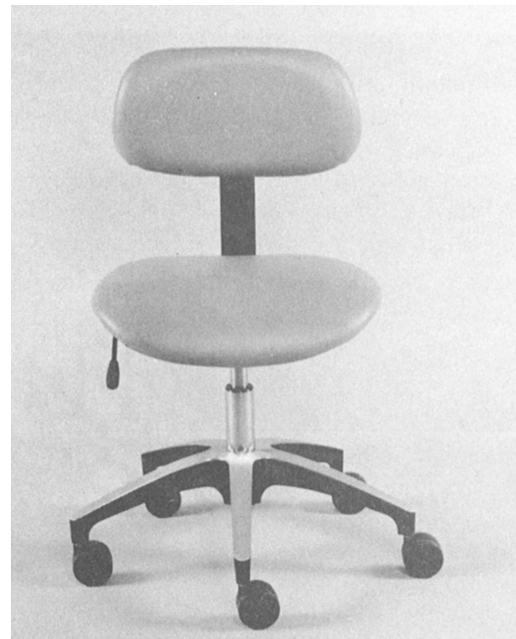


Figure 11-15.—Provider's mobile chair.



Figure 11-16.—Assistant's mobile chair.

Level I maintenance on mobile chairs consists of making adjustments, lubricating the caster bearings, and cleaning. The adjustments involve seat height and backrest or armrest positions. Lubricate the caster bearings with light-weight machine oil monthly. **Never** lubricate the single shaft on these chairs,

because doing so would keep the locking mechanism from holding its adjusted position. Be sure to routinely clean the chair seat and backrest or armrest since these areas often become soiled.

## MOBILE DENTAL CABINETS/CARTS

Your DTR may be equipped with wall-mounted cabinets, mobile cabinets/carts, or a combination of both. They provide the working surface when assisting with dental procedures. Because of infection control, and possible contamination, only disposable or sterilizable items should be placed on the working surfaces. All other items, such as floss dispensers, sharps containers, and miscellaneous equipment and supplies should be stored near by, but out of the field of operation.

Mobile dental cabinets and carts are used to store dental instruments and materials with the top of the cabinet or cart serving as a working surface. Figure 11-17 illustrates a typical mobile cabinet, while figure 11-18 illustrates a mobile dental cart.

The mobile dental cabinet has castors that are on the bottom of the unit. It usually has four drawers and a top that can slide from either front to back or side to side. A recessed area under the movable top provides deep space to store larger items. The drawers provide space for any instruments, supplies, and materials such as topical and local anesthetic, rubber dam equipment, bases, and cements.

The mobile dental cart provides a working surface and can have various attachments for handpieces, the HVE system, and a saliva ejector if equipped.



Figure 11-17.—Mobile dental cabinet.

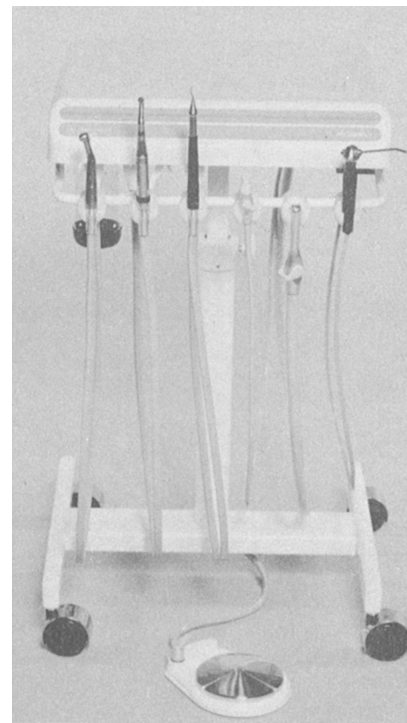


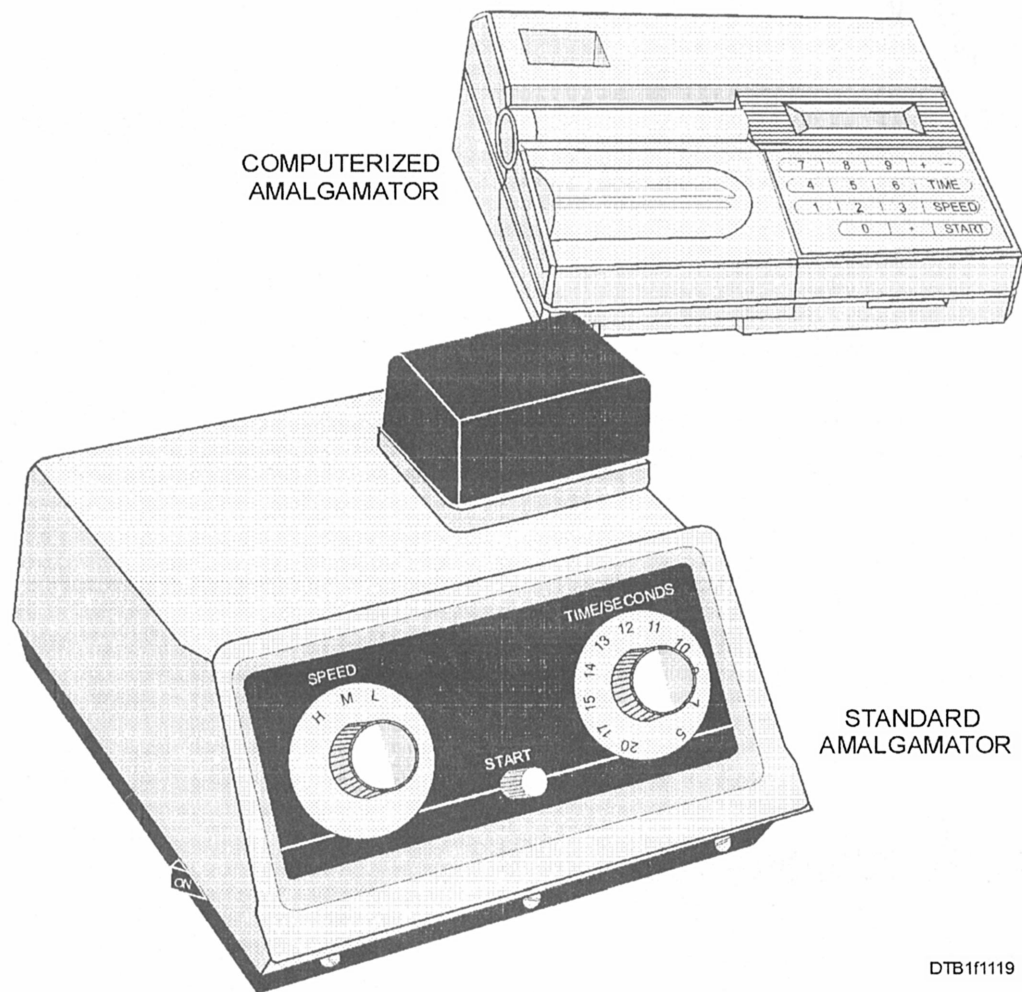
Figure 11-18.—Mobile dental cart.

Follow the infection control guidelines for disinfection of cabinets and carts.

## AMALGAMATORS

An amalgamator is a device used to triturate or mix mercury and amalgam alloy. It has a small electric motor that rotates the forked prongs holding the amalgam capsule in place. Ensure the cover is closed over the forked prongs before the amalgamator is activated to prevent mercury vapors from escaping. The forked prongs move in a figure “8” to triturate the amalgam alloy. Most amalgamators have a variable speed control and timer dials (fig. 11-19). Some newer models use a micro-processor computerized amalgamator that uses magnetic cards to set mixing times. By using various capsules and settings, other materials such as some dental cements can be mixed.

It’s important to keep the amalgamator clean. The newer models in use today have an enclosed area in the prong area so the capsules cannot drop down inside the unit. The older models do not have an enclosed area and capsules can fall down inside the unit. If this occurs, first unplug the unit and then you can attempt to retrieve the capsules with a pair of hemostats or cotton forceps. If you are unable to retrieve them, fill out a NAVMED 6700/4 and have a DET remove them. Never turn the amalgamator upside down and attempt to shake them out. This could cause excess



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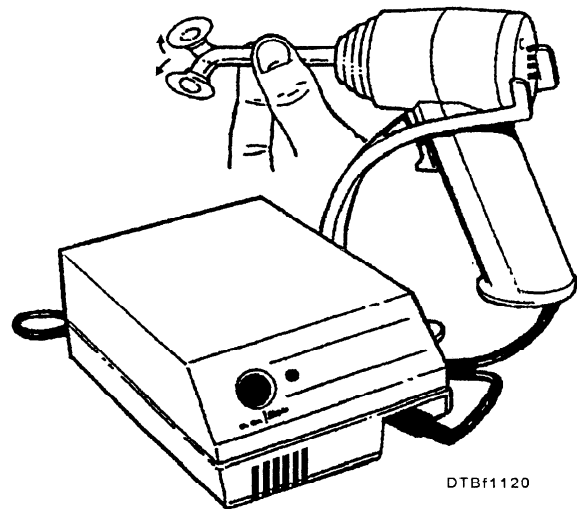
Figure 11-19.—Amalgamators.

mercury from broken capsules from being spilled. Refer to the manufacturer’s instructions for operation and maintenance.

**VISIBLE LIGHT CURING UNIT**

Many dental materials are now cured or set by a visible light in the high intensity (blue) range. The visible light curing (VLC) technique has varied applications in dental materials, including pit and fissure sealants, resins, impression materials, and surgical dressings, to name only a few. Most hand-held VLC units (fig. 11-20) contain a quartz halogen lamp that produces a high-intensity light to induce curing (hardening). This allows the provider an unlimited amount of working time with the material. Some models have light tips that rotate to permit easy positioning. The high intensity light radiation emitted from the unit is capable of retinal injury from chronic exposure. The light should never be directed toward the eyes. Staff and patients should use protective glasses that match the unit’s radiation output.

These units require minimal maintenance and adjustments. Clean the unit after each patient treatment following infection control guidelines. Read the manufacturer’s instructions for specific requirements.



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Figure 11-20.—Visible light curing unit.

# SHIPBOARD, FLEET MARINE FORCE, AND NAVAL MOBILE CONSTRUCTION

## BATTALION DENTISTRY

Dental Technicians who serve on board dental departments of ships, Fleet Marine Force, or Naval Mobile Construction Battalions are assigned to such duties that are indicated by their special qualifications and by current requirements for rendering dental care. These special qualifications are discussed in this volume, chapter 1, "General Administration and Orientation," and in MANMED, chapter 6.

## SHIPBOARD DENTISTRY



The mission of a dental department on board Navy ships is to provide care to active duty personnel to prevent or remedy diseases, disabilities, and injuries to teeth, jaws, and related structures. The dental officer (department head) consults with and advises the commanding officer in all matters affecting the dental health of the crew. To accomplish this mission, dental personnel must keep themselves informed of planned operations and anticipate any possible demands placed upon them. The Navy must maintain the highest degree of dental health and readiness for fleet personnel. An aggressive Dental Liaison Program, through the combined efforts of the Dental Department, Naval Dental Centers, and independent duty Hospital Corpsmen, is a necessity.

The actual performance of dentistry and dental assisting on board ships is similar to that of shore-based dental treatment facilities. The same equipment, materials, supplies, and techniques discussed in this volume and *Dental Technician, Volume 2*, NAVEDTRA 12573, will provide guidance for you in your duties.

## FLEET AND FORCE DENTAL OFFICERS

The fleet and force dental officers ensure that the fleet is dental ready. Each individual aboard ship is considered to be in the state of dental readiness if the following requirements are met:

- No dental treatment or reevaluation will be needed within the next 12 months (Class 1)
- No oral condition that, if not treated, would have the potential to become an emergency within the next 12 months (Class 2)

An individual who has an oral condition that may result in an emergency condition within the next 12 months (Class 3), or a person who needs a dental exam or has oral conditions that are unknown (Class 4), is considered likely to compromise combat effectiveness or deployability by experiencing a dental emergency. (See *Dental Technician, Volume 2*, chapter 2, for further details on classification of dental treatment.)

### Fleet Dental Officer

Two senior dental officers are appointed as the Fleet Dental Officers. The fleet is broken down into the Atlantic and Pacific regions. The title held for each Fleet Dental Officer is CINCLANTFLT and CINCPACFLT Dental Officer (Commander-in-Chief Atlantic or Pacific Fleet). They have the ultimate authority, responsibility, and accountability for dental care provided to each fleet.

### Force Dental Officer

Six senior dental officers are appointed as force dental officers. The force dental officer is the advisor to the type commander on all force dental matters. Each force dental officer:

- Keeps informed of all matters pertaining to dental services, dental personnel, and dental material condition of the force by means of inspections, assist visits, and the review of dental service and inspection reports.

The force dental officer ensures all ships or submarines assigned to a specific type commander are dental ready. This state of dental readiness is achieved by ships with dental departments and the use of shore-based dental clinic facilities. The ships or submarines that are in port use the Fleet Liaison Program to schedule appointments.

The force is broken down into the Atlantic and Pacific regions. Within each force is the type commander to whom each Force Dental Officer reports. An example of this is the SURFLANTFLT Force Dental Officer who would report directly to the Atlantic Fleet Type Commander. The six force dental officers are as follows:

- SURFLANT/SURFPAC (Atlantic Fleet/ Pacific Fleet)—Responsible for all ships that are not fixed winged or submarine connected.
- AIRLANTIAIRPAC (Air Atlantic/Air Pacific)—Responsible for all ships that have fixed wing capabilities (i.e., aircraft carriers).
- SUBLANT/SUBPAC (Submarine Atlantic/ Submarine Pacific)— Responsible for all submarines and auxiliary support ships (submarine tenders).

## **DENTAL DEPARTMENT HEAD**

The head of the dental department of a ship is designated the “dental officer.” He or she is usually the senior dental officer on board. The type or class of ship will determine how many other dentists are assigned to the department. They could be general dentists or specialty providers (oral surgeon, prosthodontist, and so forth). The primary responsibility of the dental department head is to maintain the dental health of all personnel assigned to the ship and personnel attached to squadrons, ships in the battle group, staffs, and any other units dependent upon the dental department for dental care.

If a ship has more than one dentist, the department head may appoint a dentist on board as a division officer to assist him or her with administrative duties and the supervision of the enlisted personnel.

## **ENLISTED DENTAL PERSONNEL**

Enlisted dental personnel assigned to the dental department of a ship serve as technical assistants to the dental officer. The type or class of ship that you serve on will determine how many and what type of Navy

Enlisted Classification Codes (NECs) enlisted dental personnel will have to support the dental department. These classifications are discussed in this volume, chapter 1, “General Administration and Orientation.”

## **Leading Chief or Senior Chief Petty Officer**

Depending on the structure of the manning for a specific class ship, your dental department may have a leading chief petty officer (LCPO) or senior chief petty officer (SCPO) assigned. His or her responsibilities are for the smooth and efficient operation of the dental department and the supervision of enlisted personnel.

## **Leading Petty Officer**

In the absence of an LCPO billet, many of the smaller class ships will have a Dental Technician Second Class or First Class Petty Officer in charge of the dental department. Most leading petty officers (LPOs) carry the NEC DT-8703, Dental Technician, Administration. The responsibilities are similar to an LCPO.

## **Dental Assistants**

Dental assistants are junior Dental Technicians (E-1 through E-4) who perform a variety of shipboard and professional duties. They have graduated from Dental Technician “A” school and are classified as a DT-0000. Dental assistants’ duties may include: preventive maintenance, the ship’s 3-M program, assignment to a battle dressing station (BDS), and assisting the medical department in the treatment of casualties. In addition, the dental assistants assist the dental officers in dental procedures, performing oral prophylaxis, radiology, and supply and dental administration. Next we will discuss the different classes of ships that have dental departments.

## **SHIPS WITH DENTAL DEPARTMENTS**

Table 12-1 is a list of the different types of ships that have dental departments. Some ships have one dental officer and two to three Dental Technicians assigned, while larger ships may have two to four dental officers with 4 to 13 Dental Technicians assigned.

The above manning numbers represent the ship’s basic allowance (BA) for Dental Technicians. Please note that the Hospital ship has only 1 Dental Technician assigned as permanent ship’s company (1

**Table 12-1.—Different types of ships**

SHIP TYPE	Navy Enlisted Classification						TOTAL
	8703	0000	8752	8753	8783	8732	DT'S
Carrier Vessel Nuclear (CVN)	1	9	1	1	1		13
Carrier Vessel (CV)	1	9	1	1	1		13
Landing Platform Helicopter (LPH)	1	2					3
Landing Platform Dock (LPD)	1	2					3
Landing Ship Dock (LSD)	1	2					3
Landing Helicopter Dock (LHD)	1	2	1				4
Landing Helicopter Assault (LHA)	1	2					3
Ammo, Oil Auxiliary (AOE)	1	2					3
Submarine Tender (AS)	1	5	1	1			8
Hospital Ship (USNS)	1						1
Mobilization Manning		5	1	1	3	1	11
Amphibious Command Ship (LCC)	1	2					3
Miscellaneous Command Ship (AGF)	1	2					3
Mine Countermeasure Sweeper (MCS)	1	2					3

DT-8703). The other Dental Technicians, when assigned to a United States Naval Ship (USNS), represent mobilization manning. Mobilization personnel are assigned from shore-based Naval Dental Clinics and report to the (USNS) on temporary additional duty (TAD).

The permanent assignment of a dental hygienist DT-8708 to the fleet will occur when manning levels are established for designated ships having billets authorized.

### **DUTIES UPON REPORTING TO A SHIP**

You have just received your transfer orders to a ship and are now on board your new home. Your sponsor will take you down to the dental department. The first thing you will notice is the cleanliness and well-preserved (painted) dental spaces. Both dental and medical departments always have the most immaculate spaces on board ships.

## REQUIRED READING

You will be required to accomplish many requirements when checking aboard. The following is a list of reading requirements that should be familiar to all Dental Technicians.

- *Shipboard Dental Procedures Manual* (CINCLANTFLT OR CINCPACFLTINST 6600.2)
- *Manual of the Medical Department* (MANMED), Chapter 6
- *Dental Departments Organization and Instruction Manual*

## ASSIGNMENT OF DENTAL PERSONNEL

Your LCPO or LPO will give you assignments to perform. Once you have completed all the check-in procedures and required ship's courses and classes, you may be assigned to work in the dental department as a chairside assistant, preventive dentistry technician, dental administration, X-ray technician, or the supply representative.

### Collateral Duties

Collateral duties or assignments help both the dental department and ship accomplish their missions. Collateral duties vary from ship to ship. Your involvement in these collateral duties has a direct impact with the morale and welfare between the dental, medical, and other departments on board the ship. Your participation builds true "team spirit" to accomplish the ship's mission.

During your tour aboard the ship, you may be called upon to work as a food service attendant in the galley. Personnel in paygrades E1-E3 receive an inter-department transfer to the galley for a period of up to 90 days. After completion of the food service attendant duties, personnel are sent back to their respective departments.

If your ship receives an overhaul and is in a ship yard undergoing repair or renovation, the dental department might not be operational because of construction in those spaces. You may be called upon to participate in the ship's "Tiger Team." The Tiger Team consists of different teams that are assigned projects to accomplish throughout the ship.

The time you spend in the galley or working in other areas of the ship is an outstanding opportunity to meet the crew and start building "team spirit."

### Assignment of Dental Personnel to Watches

Dental department personnel will be assigned to watches using the ship's policy. While in port or underway in a group, your ship may be assigned the "Dental Guard Ship," which is responsible for any dental emergencies that might occur.

### Watch, Quarter, and Station Bill

It is the responsibility of the dental officer (dental department head) to correctly assign dental department personnel to the Watch, Quarter, and Station Bill as outlined in the Ship's Organization Manual and Emergency and Battle Bills.

The medical officer (medical department head) assigns duties and responsibilities to dental personnel during general quarters and mass casualty situations. Dental department personnel are under the supervision of the medical officer when providing medical care at battle dressing stations.

## MEDICAL WASTE

A dental department can generate and accumulate large amounts of medical waste while at sea. The disposal of plastic materials and medical waste at sea by U.S. Navy ships has raised public concern over potential adverse environmental or human health effects. Dental departments will cooperate fully with other shipboard departments (medical, supply, safety, etc.) involved in waste disposal to establish and enforce appropriate command policy. The following references provide guidelines for waste disposal:

- OPNAV P-45-113-93, Afloat Medical Waste Management Guide/Management of Infectious Waste
- OPNAVINST 5090.1, Environmental and Material Resources Protection Manual
- BUMEDINST 6280.1, Management of Infectious Waste

Most ships have designated areas to store medical waste while at sea. Transfer of medical waste occurs when in port to designated waste treatment facilities for disposal.



## SECURING FOR SEA

Performing dental procedures at sea is one unique aspect of shipboard dentistry. The securing procedures greatly differ from shore-based dental treatment facilities (DTFs) compared to dental departments at sea. Within the dental department on a ship are hundreds of projectiles that can become mobile if the ship starts to roll or pitch. This can cause bodily injury, thousands of dollars of damage, and the possibility of broken dental delivery systems or X-ray equipment, which could shut down the dental department.

The type of ship determines how much it will roll or pitch. Larger ships, such as an aircraft carrier (nuclear) (CVN) or (CV), generally will not be affected unless very high seas are present. All other ships can be affected with any type of degree of roll or pitch.

Various materials are used to secure pieces of equipment. Rope, bungee cords, and locking bars are just a few examples used to secure equipment. A partial list, which may not include all items in your department, but need to be secured, is discussed next.

When securing for high seas, the following items should be secured:

- Desks, desk drawers, file cabinets, computer equipment, printers, and the like.
- The dental delivery system that includes the dental chair, light, and bracket table. Ensure the dental chair is locked into position and the dental light and bracket table are tied down and not mobile.
- X-ray and processing equipment. Remove any fixer, developer, and water to avoid contamination or spillage.
- Mobile dental cabinets.
- Prosthodontics and surgical equipment.
- Provider's and assistant's chairs.
- Oxygen and compressed air tanks.

## SUPPLY AND EQUIPMENT

Without the proper amount of dental supplies and equipment on a ship, the dental department's operational readiness to treat patients could become compromised. Proper planning, inventory, and maintenance are essential for the operation of the dental department.

## STOCK RECORD CARDS

Dental departments must maintain Stock Record Cards (SRCs) Afloat (NAVSUP Form 1114). Your supply petty officer will prepare and maintain these SRCs on all dental supplies and equipment to reflect an accurate account of the current inventory, location of the item(s), and other management data. The supply petty officer under normal circumstances will issue your supplies and equipment. If you do take supplies or equipment from the dental store room or supply locker, ensure that you notify the supply petty officer so he or she can record the materials you took on the stock record card. Supply procedures are found in the CINCLANTFLT OR CINCPACFLTINST 6600.2 and in NAVSUP P-485. An appropriate automated supply data system that produces the necessary information such as posting receipts, issues, and orders may substitute for the stock record card.

## DENTAL STOREROOM/SUPPLY LOCKERS

The Dental Officer (dental department head) takes charge of and is responsible for the dental storeroom and supply lockers, keeping custody of the key(s) or assigning custody of those key(s) to a designated representative such as a supply petty officer.

Storerooms and lockers should always be clean and organized. Proper temperatures should be monitored to avoid deterioration of dental products. Rotation of the stock and using products before the expiration date has expired are critical to patient care.

## AUTHORIZED DENTAL ALLOWANCE LIST (ADAL)

The Authorized Dental Allowance List (ADAL) is a document published by the Medical Logistics Command, which consists of a specific list of dental material requirements for each type and class of ship or unit assigned. The ADAL (formerly titled Initial Outfitting List) indicates the authorized inventory of equipment and supplies standardized throughout the fleet and represents the minimum quantities of consumable items to be maintained on board at all times. Each dental department must maintain at least:

- The authorized allowance of dental equipment.
- The minimum quantity of medical and dental supplies required on board.

- A level of spare parts determined by routine replacement as documented on the Medical/Dental Equipment Maintenance Record (NAVMED 6700/3).
- Proper stock objectives. Normally stock objectives for extended deployments should contain all of the materials specified in the ADAL plus an additional 90 days worth of supplies. The dental department head, with approval of the force dental officer, determines supply augmentations necessary to support embarked USMC dental officers on extended deployments. Departments may need non-ADAL items to meet anticipated requirements during a specific cruise.

## **PREVENTIVE MAINTENANCE**

A major cause of equipment failure is the quality of care and how the equipment is used. Proper preventive maintenance by operators will prolong the economic life of the equipment, avoid costly repairs, and provide safe, dependable equipment. Operators (Dental Technicians) are responsible for performing preventive maintenance before, during, and after operation of the equipment. Review and retain instruction pamphlets accompanying each piece of equipment. You should also become thoroughly familiar with the equipment before you operate it. You should always inspect the equipment for cleanliness, missing or broken knobs, frayed electrical cords, and so forth. If you should have a minor problem with a piece of equipment, check with your LCPO or LPO before attempting to correct it. Major repair problems will be reported to the fleet dental equipment repair technician.

## **FLEET DENTAL EQUIPMENT REPAIR TECHNICIANS**

Fleet dental equipment repair technicians are responsible for performing and documenting all preventive maintenance and repairs of dental equipment that require a repair technician on the NAVMED 6700/3. This form has been discussed in *Dental Technician*, Chapter 11, "Dental Safety and Equipment." Please note that this does not relieve you of your responsibility of performing daily and scheduled maintenance of equipment that is documented and reported through the ship's 3-M Systems. The use of equipment Maintenance

Requirements Cards (MRCs) on all dental equipment is used throughout the fleet under the 3-M Systems.

## **SHIPS' 3-M SYSTEMS**

The Navy's 3-M Systems stands for maintenance, material, and management. The 3-M Systems are the nucleus for managing maintenance aboard all ships and applicable shore station equipment. This system provides all maintenance and material managers throughout the Navy with a means to plan, acquire, organize, direct, control, and evaluate the manpower and material resources expended or planned for expenditure in support of maintenance. OPNAVINST 4790.4 provides guidance for the program. As a basic dental assistant, you will be responsible for a part of the 3-M Systems that covers the 3-M PMS (Planned Maintenance System). The PMS program was developed to provide the organizational level with the tools to plan, schedule, and control planned maintenance effectively. The maintenance procedures developed for planned maintenance are the minimum standards required to maintain equipment within specifications.

## **DEPARTMENT HEAD**

The dental officer (department head) is responsible for the effective operation of the 3-M Systems within the dental department. The Dental Officer reports to the 3-M Systems coordinator who in turn reports to the 3-M Systems manager (ships' XO). The commanding officer has overall responsibility for ensuring ship maintenance is accomplished following 3-M Systems procedures and that the 3-M Systems functions effectively within the command.

## **Division Officer**

If the dental department is large enough, a division officer will be responsible to the department head and will be trained in the 3-M Systems. The division officer assists in managing the maintenance required for the equipment within the dental division of responsibility (this includes all dental equipment and ships equipment such as fan rooms, water tight doors, valves, and hatches within the dental spaces of the ship).

## **Group Supervisor**

Ship's divisions such as dental and medical may have chief petty officers who are responsible for two or

more work centers. These chief petty officers shall be referred to as “group supervisors.” Group supervisors are responsible for the proper performance of the 3-M Systems functions within their respective work centers.

### **Work Center Supervisor**

The senior enlisted person will be designated as the work center supervisor, responsible for the effective operation of the 3-M Systems within the work center. The work center supervisor will assign the maintenance personnel various PMS tasks.

### **Maintenance Personnel**

Junior Dental Technicians are the maintenance personnel in the dental center and report to the work center supervisor. Their 3-M Systems duties include, but are not limited to, the following:

- Perform assigned scheduled maintenance requirements using MRCs (Maintenance Requirement Cards), TGLs (Tag Guide Lists), and EGLs (Equipment Guide Lists) as indicated by the division’s weekly schedule.

When performing PMS, maintenance personnel will **notify** the work center supervisor **when**:

- Anything on an MRC is not fully understood, appears to be incorrect, or cannot be accomplished as written on the MRC.
- Tools, materials, etc., prescribed by the MRC are not available.
- Any doubt exists about capability, training, or experience to properly perform the MR (maintenance required).
- Factors exist that would make performance of the MR unwise or dangerous.
- Equipment deficiencies or casualties (casualties meaning down equipment not medical casualties) are discovered.

Maintenance personnel will inform the work center supervisor when planned maintenance requirements have been completed and sign the accountability log. The work center supervisor must be informed of any problems encountered under current schedules and/or MRCs.

### **WORK CENTER PMS MANUAL**

The Work Center PMS Manual reflects the portion of the PMS Master File (maintained by 3-M Systems

coordinator) that contains only the planned maintenance requirements applicable to a particular work center. It will be retained in the working area near the Weekly PMS Schedule. Maintenance personnel will be familiar with the following information contained in the Work Center PMS Manual:

- List of Effective Pages (LOEP)
- Maintenance Index Page (MIP)
- Maintenance Requirement Cards (MRCs)

### **LIST OF EFFECTIVE PAGES (LOEP)**

The LOEP, as shown in figure 12-1, provides a listing of the Maintenance Index Pages (MIPs) and system equipment not requiring PMS that is assigned to each work center. Note that the dental and medical departments fall under one work center as illustrated in figure 12-1.

### **MAINTENANCE INDEX PAGES**

Maintenance Index Pages (MIPs) are prepared and issued for each installed system/equipment for which PMS support has been established. MIPs are basic PMS reference documents. Each is an index of a complete set of Maintenance Requirement Cards (MRCs) applicable to a ship’s system, subsystem, or equipment. Figure 12-2 illustrates an MIP for a Dental Delivery System (DDS). Note that this DDS has 4 different MRCs (identified by the box containing SYSCOM MRC Control No.).

### **MAINTENANCE REQUIREMENT CARDS**

Maintenance Requirement Cards (MRCs) provide detailed procedures for performing maintenance requirements and describes who, what, how, and with what resources a specific requirement will be accomplished. Personnel performing the maintenance should always follow any safety precautions noted on the MRC’s and should become familiar with any chemicals used during the PMS including the correct use of any personal protective equipment required during the handling of chemicals or during the maintenance procedures. Figure 12-3 illustrates one of the four MRCs for the DDS. The OPNAVINST 4790.4 provides guidance and requirements for all of the blocks and codes listed on the MRC.

### **SPECIAL QUALIFICATIONS**

All Dental Technicians serving in CONUS and overseas sea duty on board commissioned vessels or in

List of Effective Pages (PMS-5)

Unit: LHD 0003 UIC: V21700 Work Center: MD01 USS KEARSARGE

Add Chg	MIP	Nomenclature	RICs
	1671/001-68	WATERTIGHT DOORS/AIRTIGHT, HATCHES, AND	
	1671/008-68	WATERTIGHT DOORS/HATCHES	
	5832/002-48	LIFE SAVING EQUIPMENT	
	5832/005-38	LIFESAVING EQUIPMENT	
	6300/001-78	PRESERVATION AND COVERINGS	
	6521/319-71	SURGICAL ASPIRATOR,	
	6521/518-37	MEDICAL GAS PRESSURE REGULATOR	
	6521/555-85	MEDICAL/DENTAL EQUIP. ELECTRICAL SAFETY PMS	
	6521/582-77	MEDICAL OXYGEN CYLINDERS	
	6521/586-97	X-RAY PROCESSOR A/T 2000	
	6521/802-38	ELECTROSURGICAL APPARATUS	
	6521/R12-B5	LIGHT, SURGICAL	
	6531/309-37	AMALGAMATOR	
	6531/311-93	TRIMMER DENTAL MODEL	
	6531/323-18	MIXER VACUUM DENTAL	
	6531/325-67	X-RAY UNIT DENTAL INTRA ORAL	
	6531/330-37	GRIND/POLISH MACHINE, DENTAL	
	6531/345-37	DELIVERY SYSTEM DENTAL	
	6531/346-22	GRINDER/POLISHER DENTAL, 3165-A, B & C	
	6531/347-22	SOLDERING UNIT DENTAL,	
	6531/348-77	CASTING UNIT DENTAL	
	6531/349-84	SANDBLASTER DENTAL, WHIRLWIND, JELENKO	
	6531/350-37	X-RAY FILM DUPLICATOR DENTAL	
	6531/355-17	COMPRESSOR AIR PYRAMID 2000	
	6531/613-68	X-RAY FILM PROCESSOR DENTAL	
	6531/615-37	FURNACE, PORCELAIN DENTAL	
	6531/619-17	FURNACE BURNOUT DENTAL ACCU-THERM II 1000 AND	
	6531/622-37	PUMP CENTRAL VACUUM	
	6531/625-37	COLLECTOR DUST DENTAL	
	6531/626-37	ENGINE DENTAL LAB	
	6531/R02-A7	CURING UNIT DENTAL	
	6600/002-28	SAFETY PETTY OFFICER (SPO)	
	6641/003-B7	DCPO-MISCELLANEOUS ITEMS	
	6641/004-28	DAMAGE CONTROL PETTY OFFICER (DCPO)	
	6641/005-58	DCPO - CLIMATE CONTROL ITEMS	
	6641/018-28	SHIPBOARD CBR-D DEFENSE EQUIPMENT	
--- NMR - No Maintenance Required, Do Not Schedule			
	NMR-6521/801-84	TAPLE OPERATING, 600G, SMITH AND NEPHEW, INC.	
	NMR-6531/001-34	FORMER VACUUM DENTAL	
	NMR-6531/003-34	CHAIR DENTAL 1005	
	NMR-6531/004-34	LIGHT DENTAL OPERATORY	
	NMR-6531/008-54	ARTICULATOR DENTAL	
	NMR-6531/009-54	BALANCE ELECTRONIC	
	NMR-6531/010-54	BATH WATER LABORATORY	
	NMR-6531/014-54	CHAIR DENTAL RELIANCE 6100H	
	NMR-6531/031-54	LIGHT DENTAL CURING VCL 401	
	NMR-6531/043-54	CHAIR DENTAL S-601/4	
	NMR-6531/053-54	PULP TESTER DENTAL 2006	

List of Effective Pages (PMS-5)

Unit: LHD 0003 UIC: V21700 Work Center: MD01 USS KEARSARGE

Add Chg	MIP	Nomenclature	RICs
	NMR-6531/062-54	PNEUMATIC FLASK PRESS DENTAL COE-BUILT	
	NMR-6531/065-54	LIGHT DENTAL EXAM/SURGY ALL	
	NMR-6531/067-54	LIGHT SOURCE FIBEROPTIC QUARTZ	
	NMR-6531/068-C4	LIGHT SOURCE FIBEROPTIC IN-SIGHT II	
	NMR-6531/069-54	LIGHT DENTAL OPERATING	
	NMR-6531/071-54	PNEUMATIC FLASK PRESS DENTAL 832	
	NMR-6531/073-54	TESTER PULP DENTAL 2006	
	NMR-6531/077-54	STERILIZER GLASS BEAD DENTAL	
	NMR-6531/093-54	VIBRATOR DENTAL LAB 876A	
	NMR-6531/096-54	ULTRASONIC INSTRUMENT CLEANER Q140,Q650	
	NMR-6531/097-74	COLLECTOR DUST DENTAL TURBO-VAC	
--- MRS - The need for Maintenance Requirements is Substantiated			
	MRS-6521/800-84	TRAINING MANIKIN CPR, CHRIS CLEAN	
	MRS-6521/801-84	MONITOR VITAL SIGNS, PASSPORT	
	MRS-6521/802-84	CHAIR OPHTHALMIC/ENT, 1202, MARCO OPHTHALMIC, I	
	MRS-6531/020-54	HANDPIECE SURGICAL DENTAL	

End of Report

DT1f1201

Figure 12-1.—List of Effective Pages (LOEP) for the dental and medical work centers on board *USS Keasarge*.

SHIP SYSTEM, SYSTEM, SUBSYSTEM, OR EQUIPMENT		REFERENCE PUBLICATIONS				DATE	
Delivery System Dental Dentech Series CM 115 and CM 415 6531		Dentech Corporation Installation and Operator's Manual				March 1997	
CONFIGURATION							
Dentech Corporation Automatic Chair Mounted Unit CM 115 and CM 415							
JOB	SYSCOM MIP CONTROL NO	MAINTENANCE REQUIREMENT DESCRIPTION	PERIODICITY CODE	RATES	MAN HOURS	RELATED MAINTENANCE	
	13 KS78 N	1. Clean and inspect solids collector.	W-1	DTSN	0.1	None	
	63 KS77 N	1. Clean and inspect air and water filter/ regulator assemblies.	S-1	DN	0.2	None	
<b>INACTIVE EQUIPMENT MAINTENANCE</b>							
	63 KS79 N	The following requirements will be scheduled when equipment is inactivated for periods of prolonged idleness.  <b>Lay-Up Maintenance</b>  1. Install protective covering. <b>NOTE:</b> Accomplish if industrial work is to be performed in vicinity of equipment.  <b>Periodic Maintenance</b>  None  <b>Start-Up Maintenance</b>	LU-1	DN	0.2	None	
	63 KS80 N	1. Remove protective covering. 2. Inspect system for leaks. <b>NOTE:</b> Omit requirement if equipment was not covered during lay-up.  <b>Operational Test</b>  None	SU 1	DN	0.2	None	
<b>DISTRIBUTION STATEMENT D</b> Distribution authorized to DOD components and DOD contractors only; critical technology; March 1997. Other requests for this document shall be referred to Naval Sea Systems Command (SEA 04TD). Destroy by any method that will prevent disclosure of contents or reconstruction of the document.							
MAINTENANCE INDEX PAGE (MIP) OPNAV 4790/66 (REV. 2-82)		PAGE 1 OF 1		SYSCOM MIP CONTROL NUMBER		6831/345-37	

DT11202

Figure 12-2.—Maintenance Index Page (MIP), Dental Delivery System, SYSCOM MIP Control Number 6531/345-37.

PROCEDURE (Contd)  
DISPOSAL METHODS FOR HAZARDOUS MATERIAL/WASTE IDENTIFIED IN THE TOOLS, PARTS, MATERIAL, AND TEST EQUIPMENT BLOCK

Method 3: Discharge overboard outside of 12 nm of U.S. shore. Instructions on discharge in foreign water should be requested from Shipboard Hazardous Waste Coordinator. If material is an acid or alkali, follow neutralization instructions in Naval Ships' Technical Manual (NSTM) S9036-T8-010/CH-993, Pollution Control. Store packaging and containers for reuse or dispose as solid waste, in accordance with NSM, Chapter 593.

MAINTENANCE REQUIREMENT CARD (MRC)  
OPNAV 4750 (REV 2-82)

DT 111203

HAZARDOUS MATERIALS CONTROL STATEMENT (H)  
The Hazardous Material Users Guide (HMUG), OPNAV P-45-110-1, provides additional control measures, precautions, personal protective equipment (PPE), and spill controls for the hazardous materials (g) identified in the Tools, Parts, Materials, Test Equipment Block. Maintenance personnel shall determine if additional PPE is necessary to accomplish the MRC and take appropriate action to obtain and wear such PPE to ensure the safety of maintenance personnel. Report any deficiencies via PMG feedback report.

PROCEDURE (Contd)

d. Press air/water syringe air button; release air pressure through syringe. Release air button.  
e. Press air/water syringe water button, drain water into cupholder. Release water button.  
f. Unscrew and remove air sediment bowl with O-ring.  
g. Remove rubber washer and disassemble filter assembly.  
h. Wash residue from sediment bowl, filter and air filter assembly in solution of warm fresh water and detergent in sink.  
i. Rinse sediment bowl, filter and filter assembly in clean, hot, fresh water.  
j. Wipe sediment bowl, filter and filter assembly dry using clean lint-free cloth.  
k. Inspect filter for damage.  
l. Reassemble filter assembly and rubber washer.  
m. Reinstall filter assembly.  
n. Reinstall sediment bowl and O-ring.  
o. Place dry rag under water sediment bowl.  
p. Unscrew and remove water sediment bowl with O-ring.  
q. Remove rubber washer and disassemble filter assembly.  
r. Wash residue from sediment bowl, filter and filter assembly in solution of warm fresh water and detergent in sink.  
s. Rinse sediment bowl, filter and filter assembly in clean, hot, fresh water.  
t. Wipe sediment bowl, filter and filter assembly dry using clean lint-free cloth.  
u. Inspect filter for damage.  
v. Reassemble filter assembly and rubber washer.  
w. Reinstall filter assembly.  
x. Reinstall sediment bowl and O-ring.  
y. Turn on air valve; inspect for leaks.  
z. Turn on water valve; inspect for leaks.  
aa. Remove rag under sediment bowl.  
ab. Reinstall service box cover.  
ac. Remove tag and plug in vacuum pump power cord, if applicable.  
ad. Remove tag and plug in delivery system power cord, if applicable. If delivery system is hardwired, set MAINS POWER switch to on position.  
ae. Return equipment to readiness condition.

MAINTENANCE REQUIREMENT CARD (MRC)  
OPNAV 4750 (REV 2-82)

SHIP SYSTEM Service Spaces 6531	SUBSYSTEM Equipment, Dental Spaces 6531	MFC CODE 6531 S-1	63	XS77	N
SYSTEM Dental Spaces 653	EQUIPMENT Delivery System Dental Dentech Series CM 115 and CM 415 6531	RATES DN MM 0.2			
MAINTENANCE REQUIREMENT DESCRIPTION 1. Clean and inspect air and water filter/regulator assemblies	TOTAL/MH ELAPSED TIME 0.2 0.2				
SAFETY PRECAUTIONS 1. Forces afloat comply with Navy Safety Precautions for Forces Afloat, OPNAVINST 5100 series; Shore Activities comply with Safety Precautions for Shore Activities, OPNAVINST 5100.23 series. 2. Ensure all tag out procedures are in accordance with current ship/shore instructions.					
TOOLS PARTS MATERIALS TEST EQUIPMENT 1. (00385) Berarant, general purpose, P-D-1747 2. (01102) Rag, wiping 3. (02376) Water, fresh, No NSN -- W/C provide Hazardous Material User's Guide (HMUG) Group 7, Disposal Method 3					
NOTE: Numbers in brackets can be referenced to Standard PMG Materials Identification Guide (SPMIG) for stock number identification.					
PROCEDURE WARNING: Ensure all tag out procedures are in accordance with current ship/shore instructions. Preliminary a. Unplug and tag delivery system power cord, if applicable. If delivery system is hardwired, set MAINS POWER switch to OFF position and tag. b. Unplug vacuum pump power cord, if applicable. c. Set master toggle switch to on. 1. Clean and Inspect Air and Water Filter/Regulator Assemblies. a. Remove utility center service box cover. b. Shut dehydrated air manual shut-off valve. c. Shut water manual shut-off valve.					
DISTRIBUTION STATEMENT Distribution authorized to DOD components and DOD contractors only; critical technology; June 1993. Other requests for this document shall be referred to Naval Sea Systems Command (SEA 04TP). Destroy by any method that will prevent disclosure of contents or reconstruction of the document.					
LOCATION DATE DUE 1993					
MAINTENANCE REQUIREMENT CARD (MRC) OPNAV 4750 (REV 2-82)					

Figure 12-3.—MRC for Dental Delivery System, SYSCOM MRC Control No. 63 KS77 N.



ENLISTED SURFACE WARFARE SPECIALIST



ENLISTED AIR WARFARE SPECIALIST

DT1f1204

**Figure 12-4.—Enlisted Surface Warfare Specialist Insignia and Enlisted Air Warfare Specialist Insignia.**

squadron duty have an opportunity to qualify as an Enlisted Surface Warfare Specialist (ESWS) and/or Enlisted Air Warfare Specialist (EAWS) (fig. 12-4). This will depend on what type of platform to which they are permanently assigned. Contact the command master chief who serves as the ESWS/EAWS coordinator for Personnel Qualification Standards (PQS) for your ship or unit.

## FLEET MARINE FORCE



DT1i1202

The Fleet Marine Force (FMF) is a balanced force of combined ground and air arms primarily organized, equipped, and trained for offensive amphibious or expeditionary employment Marine Forces Atlantic (MARFORLANT) and Marine Forces Pacific

(MARFORPAC) are an integral part of the U.S. Atlantic and Pacific Fleets. These forces are subject to the operational control of fleet commanders, while the Commandant of the Marine Corps (CMC) retains administrative and training control.

## MISSION

The mission of the FMF dental organization is to ensure the combat effectiveness of the FMF by providing a comprehensive program of dental support. During contingency or mass casualty situations, FMF dental personnel augment the medical effort under the direction of the cognizant medical authority.

## ORGANIZATION RELATIONSHIPS

The Marine Corps has dental officers and Dental Technicians assigned to the following levels of organization. The same dental officer may frequently be assigned to more than one level.

- CMC Headquarters, U.S. Marine Corps (Health Services Directorate)
- Fleet Marine Force (Atlantic-MARFORLANT and Pacific-MARFORPAC)
- Marine Expeditionary Force (MEF)
- Marine Division (MARDIV)
- Marine Air Wing (MAW)
- Force Service Support Group (FSSG)
- Dental Battalion (DENBN)
- Headquarters & Service Company (H&S CO)
- Dental Company (DENCO)

## DENTAL OFFICER ON STAFF OF HEALTH SERVICES, HEADQUARTERS U.S. MARINE CORPS

The Director of Dental Programs (DDP) also has the title of Dental Officer, U.S. Marine Corps, and is the staff dental officer to the Commandant of the Marine Corps. Assigned to the Health Services Directorate, the DDP reports to the Director of Health Services. The DDP provides assistance and advice to the Director of Health Services on both professional and personnel matters relating to dental support throughout the Marine Corps. The DDP is supported by an administrative assistant who is a Master Chief Dental Technician.

## DENTAL OFFICER ON STAFF OF COMMANDING GENERAL, FMF

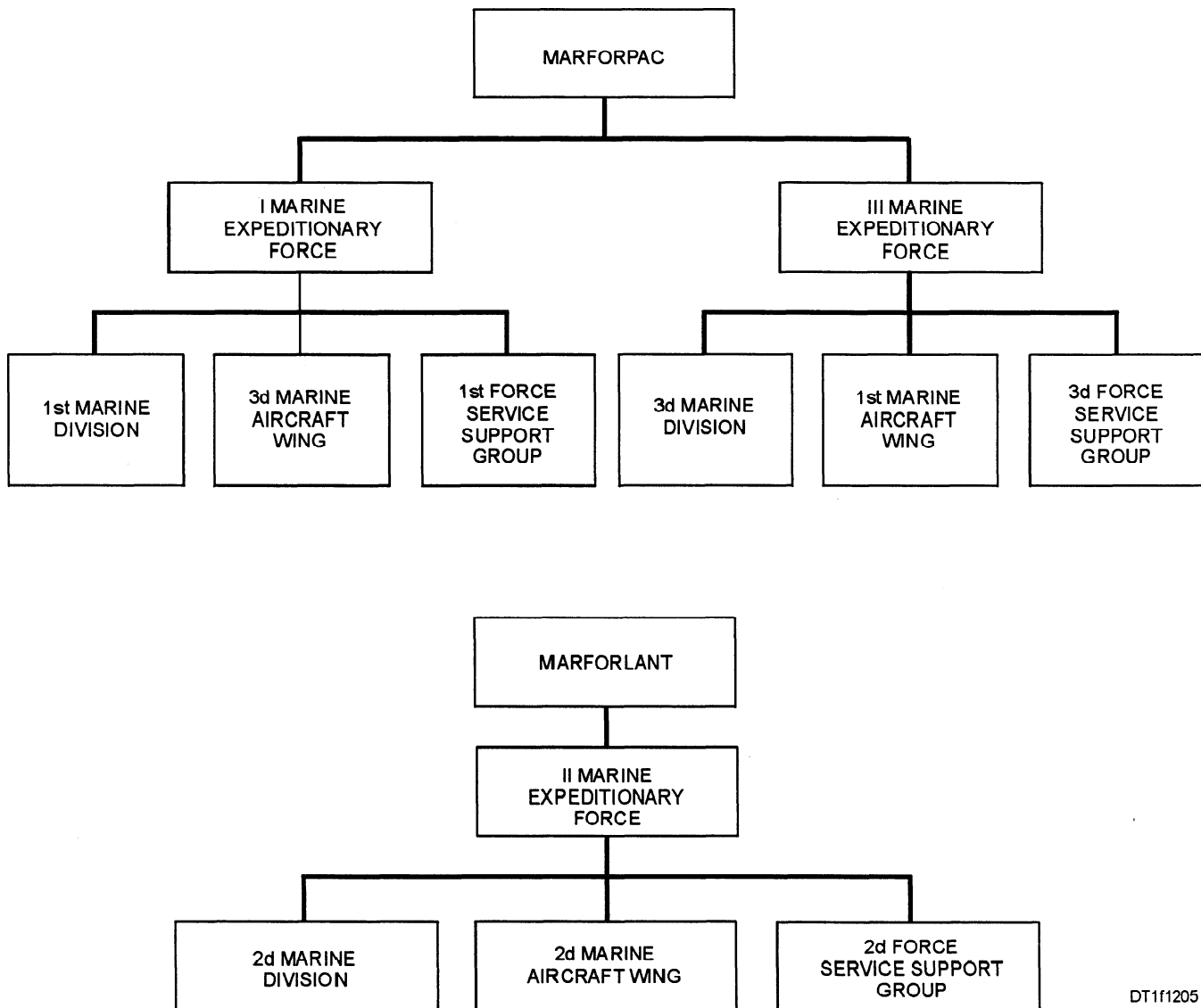
Commanding generals, FMF, Pacific and FMF Atlantic have a force dental branch or section as a special staff. The force dental branches (MARFORLANT and MARFORPAC) consist of the force dental officer (Captain, Dental Corps), the force dental administrative officer (Lieutenant Commander, Medical Service Corps), and an enlisted administrative assistant (Chief Dental Technician). The force dental branch assists the commanding general in professional, technical, administrative, and personnel matters pertinent to dental support to the FMF. Figure 12-5 illustrates the organization of the FMF for the Pacific and Atlantic. Note that MARFORPAC has two

different Marine Expeditionary Forces (MEFs), while MARFORLANT has one MEF.

## MARINE EXPEDITIONARY FORCE

A Marine Expeditionary Force (MEF) is the largest of all the organized Marine forces with over 30,000 Marine and Navy personnel. It is capable of a wide range of expeditionary operations and, with its 60 days of support, can sustain operations ashore. Each MEF is further broken down into 3 different subordinate elements:

- Marine Division (MARDIV)
- Marine Air Wing (MAW)
- Force Service Support Group (FSSG)



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Figure 12-5.—FMF organization Pacific and Atlantic.



## DENTAL BATTALION (DENBN)

A total of four dental battalions (three active duty battalions and one reserve battalion) support the FMF. Each DENBN is composed of 74 dental officers, 2 medical service corps officers, 153 Dental Technicians, and 9 enlisted Marines (Marines call this a Table of Organization or T/O). The four dental battalion names and locations are as follows:

- 1st Dental Battalion-Camp Pendelton, CA
- 2nd Dental Battalion-Camp Lejeune, NC
- 3rd Dental Battalion-Okinawa, JA
- 4th Dental Battalion (reserve battalion)—Marietta, GA

The DENBN is designed to attain maximum use of personnel, while providing the most effective dental healthcare to FMF operations. The organization of each DENBN allows for task organized detachments of individual dental companies or composite detachments made up of elements of more than one dental company, including the Headquarter & Service company (H&S) elements, to support various Marine Air-Ground Task Forces (MAGTFs). Figure 12-6 illustrates the organization of an FMF DENBN.

### CONSOLIDATED DENTAL BATTALION/ NAVAL DENTAL CENTER

To reduce infrastructure and enhance access to patient care, the consolidation of the co-located DENBN and Naval Dental Center (NDC) under one

commanding officer, one executive officer, and one command master chief was accomplished at the three dental battalions at Okinawa, Camp Pendelton, and Camp Lejeune in July 1994. Each commanding officer is also responsible for each branch dental clinic under his or her region. A nickname for this title is “Blue/Green,” meaning the commanding officer is responsible for both the shore-based (“Blue”) Dental Treatment Facilities (DTFs) and the FMF Battalion (“Green”). Figure 12-7 illustrates the organization of a Consolidated Dental Battalion/Naval Dental Center.

### HEADQUARTERS & SERVICE COMPANY (H&S CO)

The H&S Company is responsible to the commanding officer of the DENBN for coordination of administrative and logistical support for all elements of the DENBN.

### DENTAL COMPANIES (DENCO)

Each DENBN consists of three dental companies (DENCO), which provide clinical support, and a headquarters and service company (H&S CO), which provides administrative and logistical support.

The DENCOS are designed to provide dental support to a major subordinate element of the MEF. One company is in support of the MARDIV, one in support of the MAW, and the other in support of the FSSG. Table 12-2 illustrates each of the four DENBNs and the DENCOS assigned to them.

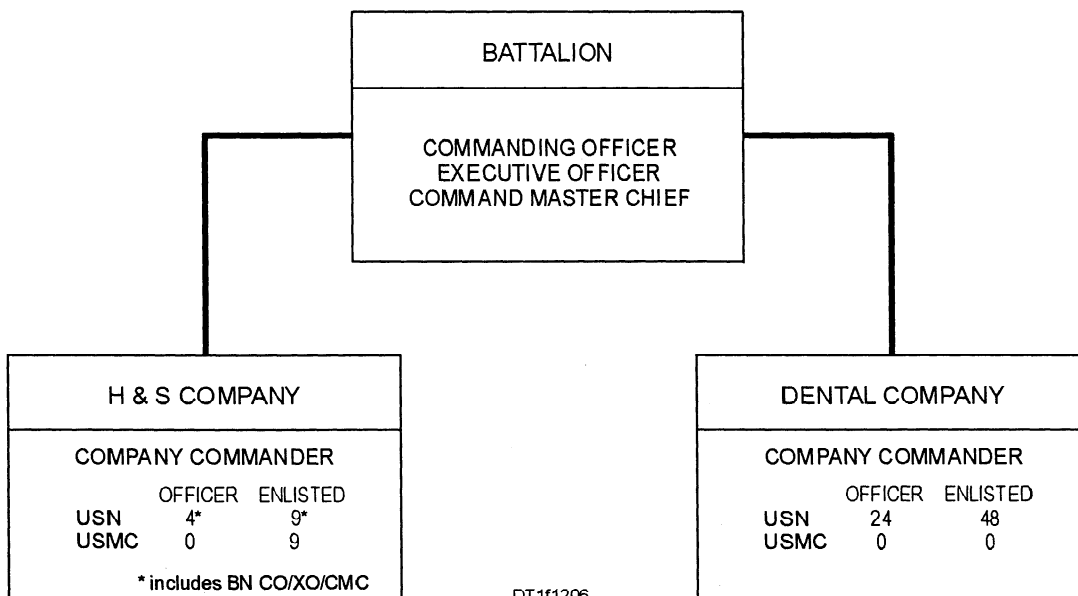


Figure 12-6.—FMF Dental Battalion (DENBN).

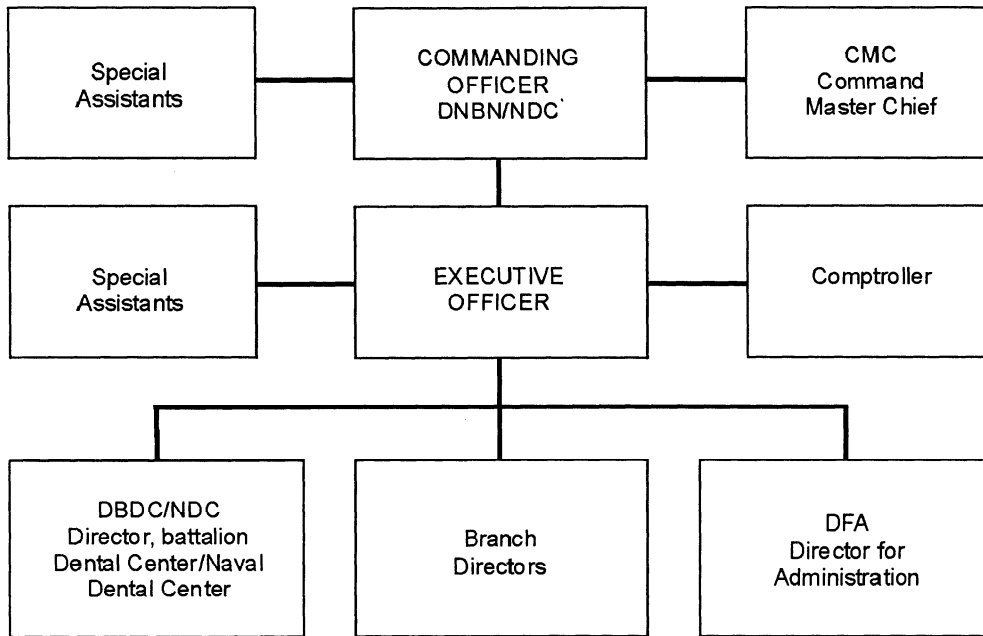


Figure 12-7.—Consolidated Dental Battalion/Naval Dental Center.

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## DENTAL SUPPLIES AND EQUIPMENT

Dental field equipment and supplies are items needed by the DENBN to carry out its mission of dental support in the field. These materials are on the authorized dental allowance lists (ADALs). The ADALs consist of a dental operatory set (ADAL 662) and a dental clinic set (ADAL 664).

The basic outfit for a dental officer (dental equipment set, operating field) is an assembly of dental equipment and supplies functionally packed in sets, kits, and outfits for convenience of handling.

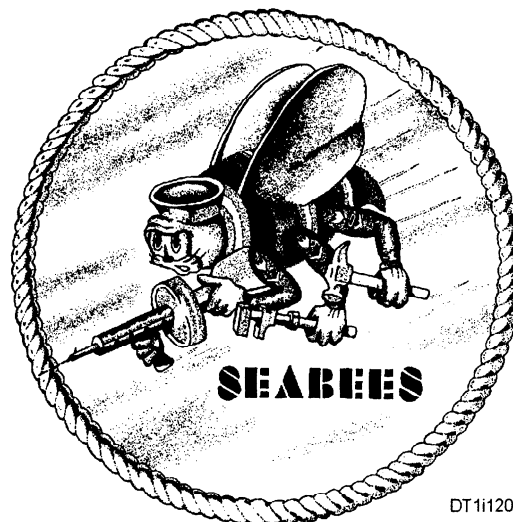
When the DENBN goes into field operations, it must have certain nontechnical items of equipment to function properly. This equipment is listed in the table of equipment (T/E) (Marine Corps allowance list) and includes such items as tents, desk sets, and so forth.

## SPECIAL QUALIFICATIONS

All Dental Technicians who serve with the FMF attend a class “C” school for the Navy Enlisted Classification Code (NEC) 8707 for Field Service Dental Technician. This has been discussed in chapter 1, “General Administration and Orientation.”

All Navy personnel who serve with the FMF are eligible to earn the Navy Fleet Marine Force Ribbon.

## NAVAL MOBILE CONSTRUCTION BATTALIONS



DT 111203

The Navy organized the Construction Battalions, or “CBs,” during the first days of WWII, 1942, and the name “Seabees” was quickly adopted to identify the personnel of the new organization. Seabees are at work all over the world designing, building, and replacing buildings, air fields, and camps in support of the Navy and Marine Corps mission requirements. This is accomplished with fully trained, combat ready, rapidly deployable, interoperable, and self-sustaining Seabee units or battalions. Dental personnel are assigned to various battalions to provide world-wide dental and medical support to 11,000 active and 17,000 reserve Seabees.

Table 12-2.—DENBNs AND DENCOS

1st DENBN	2nd DENBN	3rd DENBN	4th DENBN
2nd Denco	1st Denco	3rd Denco	4th Denco
12th Denco	13th Denco	11th Denco	14th Denco

## ORGANIZATION

Dental support to the Naval Mobile Construction Battalions (NMCBs) is provided at the battalion level by dental personnel assigned to the NMCBs. These officers are clinically and administratively assisted by Navy enlisted Dental Technicians.

There are a total of eight NMCBs homeported in NMCB, Gulfport, Miss., and NMCB, Port Hueneme, California. The organization of the NMCBs is shown below in Table 12-3.

## MISSION

The mission of the NMCB dental organization is to ensure the combat effectiveness of the NMCB by providing a comprehensive program of dental support. During contingency, disaster control, or mass casualty situations, NMCB dental personnel augment with the medical effort under the direction of the cognizant authority.

The deployment schedules of the NMCBs are on a 7-month rotation basis. With four battalions on each coast, they rotate the deployment schedule with two battalions out and two battalions in. Each coast sends one battalion to Guam or Rota Spain, and one battalion

to Puerto Rico or Okinawa, Japan. The two battalions on each coast that are not deployed work out of the branch dental clinic treating battalion and base personnel.

The NMCBs can also be called upon for special missions. During the Gulf War, more than 5000 Seabees (4,000 active and 1,000 reservists) served in the Middle East. In Saudi Arabia, Seabees built 10 camps for more than 42,000 personnel, 14 galleys capable of feeding 7,500 people, and 6 million square feet of aircraft parking apron. Dental personnel assigned to the NMCBs were there providing dental support.

## PERSONNEL

Each battalion has a total of three dental personnel assigned. One general dentist (dental department head) and two Dental Technicians. The dental department head reports directly to the commanding officer of the battalion. The enlisted personnel consists of one DT2 or DT1 who acts as the LPO and one DT3 or DN who is the chairside assistant to the dental officer.

## AUTHORIZED DENTAL SUPPLIES AND EQUIPMENT

The authorized dental allowance list (ADAL) for Naval Mobile Construction Battalions is the same as the FMF mentioned earlier in this chapter (dental field equipment).

## SPECIAL QUALIFICATIONS

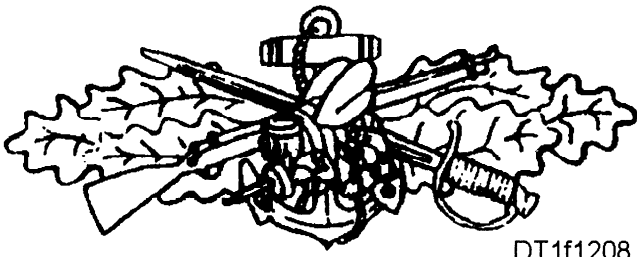
All Dental Technicians who serve with an NMCB attend the same Field Service Dental Technician School as do the FMF Dental Technicians.

Enlisted personnel permanently assigned to an NMCB have an opportunity to qualify as a Seabee Combat Warfare Specialist (SCW). The insignia is shown in figure 12-8. Contact the command master chief who serves as SCW coordinator for Personnel Qualification Standards (PQS) for your battalion.

Serving a tour on a ship, FMF, or with NMCBs are the building blocks for a successful naval career. Take

Table 12-3.—Organization of the NMCBs

NMCB #	HOMEPORT	DEPLOY TO
NMCB 1	Gulfport	Guam, Rota Spain
NMCB 3	Port Hueneme	Guam, Rota Spain
NMCB 4	Port Hueneme	Puerto Rico, Okinawa JA
NMCB 5	Port Hueneme	Puerto Rico, Okinawa JA
NMCB 7	Gulfport	Puerto Rico, Okinawa JA
NMCB 40	Port Hueneme	Guam, Rota Spain
NMCB 74	Gulfport	Puerto Rico, Okinawa JA
NMCB 133	Gulfport	Guam, Rota Spain



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Figure 12-8.—Seabee Combat Warfare Specialist Insignia.

advantage of earning a warfare device or the FMF ribbon when assigned to one of these units. A warfare device and FMF ribbon signifies that Sailors are competent in their rate and have acquired additional general knowledge that enhances their understanding of warfighting, mission effectiveness, and command survivability. Sailors who wear warfare devices or the FMF ribbon stand out as significant contributors to the Navy.

# CASUALTY CARE AND CBR WARFARE

As a dental assistant, your training in basic life support and emergency medical treatment makes you a vital resource in mass casualty situations. In such situations, you will be expected to assume the role of a medical aid person, to provide basic life support and emergency medical treatment, to sustain life, and to prevent further injuries. You can be called to these duties during either peace or wartime situations. This chapter explains your roles in (1) mass casualty situations and (2) chemical, biological, and radiological (CBR) casualty situations.

To meet these needs, we will explain procedures for providing emergency medical (first aid) treatment in a mass casualty and CBR situation.

### GENERAL MASS CASUALTY GUIDELINES

The general guidelines for dealing with mass casualty situations are as follows:

- Assess the site.
- Assess the condition of casualties.
- Perform basic life support.
- Treat the obvious conditions.
  1. Control external hemorrhage.
  2. Treat for shock.
  3. Immobilize fractures.
  4. Dress wounds.
- Perform a secondary examination.
- Prepare casualties for transport.
- Transport casualties to a safe area.

In the following sections, the guidelines are explained.

### ASSESSMENT

You must make a quick and accurate assessment of the site and of the immediate condition of the casualties.

### Site Assessment

Before you attempt to rescue or to administer emergency treatment, it is essential that you assess the conditions at the casualty site to ensure that it is safe for both you and the casualty.

Consider all aspects of the casualty site and the environment to determine the probability of success if a rescue is attempted. This assessment should include:

- Accessibility of the casualty site. Can the site be reached with available equipment? Once reached, can emergency treatment be rendered on site? Can the casualty be removed from the site if immobile?
- Safety of the casualty site. Is the site stable? Can you move safely at the site? Is the site exposed to hostile fire? In case of an unforeseen emergency, can you and the casualty be rescued from the site?
- Environmental conditions at the site. Is there adequate, breathable air at the site to sustain both the rescuer and the casualty? Are there poisonous or dangerous substances in the area? Will weather conditions hamper an attempted rescue?

### Casualty Assessment

During the initial or preliminary casualty assessment, you will perform a primary examination of the casualty to determine if injuries are life-threatening.

Basic rules for casualty assessment are as follows:

1. Keep the casualty lying down, with the head level with the body, until you have found out what kind of injury the person has and how serious it is. The following problems require that you place a casualty in different positions:

a. Vomiting, bleeding about the mouth, or semiconscious. If the casualty is in danger of sucking in blood, vomited matter, or water, place the patient on the side, or back, with the head turned to one side, lower than the feet.

b. Shortness of breath. If the casualty has a chest injury or has breathing difficulties, place the patient in a sitting or semi-sitting position.

c. Shock. If the casualty is in shock, place the patient on the back, with the head slightly lower than the feet. If the injuries permit, the casualty's feet should be raised and supported 6 to 12 inches above the head.

2. Move the casualty only when absolutely necessary. You may have to remove some clothing to determine the extent of the injuries. Remove enough clothing to get a clear idea of the extent of the injury. If you remove clothing incorrectly, you may do great harm, especially in fracture injuries. You may have to rip or cut clothing along the seams. When clothing is removed, ensure that the casualty does not become chilled. Shoes may have to be cut off to avoid causing pain or increasing an injury.

3. Reassure the casualty and keep the patient as comfortable as possible.

4. Do not touch open wounds or burns with the fingers or other objects except when sterile compresses or bandages are not available and it is absolutely necessary to stop severe bleeding.

5. Do not try to give an unconscious person any solid food or liquid substance by mouth.

6. If a bone is broken, or if you suspect that one is broken, do not move the casualty until you have immobilized the injured part. When transporting a casualty, always make sure that the litter is carried feet forward no matter what the injuries are. This enables the rear litter bearer to observe the casualty for any respiratory obstruction or stoppage of breathing.

7. Keep the casualty comfortable and warm enough to maintain normal body temperature.

If the casualty is conscious and coherent, the primary assessment can be expedited by asking about the nature of the injuries and the conditions involved. You must rely on an unconscious casualty's signs (e.g., profuse hemorrhage, cyanotic skin, choking, etc.) and on surroundings.

## Triage

*Triage* is the sorting of and allocation of treatment to patients, especially battle and disaster victims, based on a system of priorities designed to maximize the number of survivors.

Triage is normally the responsibility of the medical officer, dental officer, or Hospital Corpsman. But if they are not available, you will have to triage the casualties. Sorting decisions may be made at every stage in the movement of the wounded. Your goal in making these decisions is to do the most good for the largest number of casualties, given limited time, supplies, and personnel.

Casualties are grouped according to the seriousness of their injuries. The groups are as follows:

Group 1	Those whose injuries are so slight they can be managed by self-help or buddy care. These casualties can be returned promptly to their units for full duty.
Group 2	Those whose wounds require medical care but are so slight that they can be managed at the battalion aid station. These casualties can be returned to duty after a brief period.
Group 3	Those whose injuries demand surgical attention immediately, after resuscitation, or as soon as practical.
Group 4	Those hopelessly wounded or dead on arrival.

The treatment order of the groups depends on whether it is a combat or noncombat situation.

- **Combat.** This occurs when you are up against hostile, life-threatening situations (e.g., war, bombings, terrorist dealings, etc.). In the combat situation, you will triage the casualties in the group order of 1, 2, 3, and 4. This is done because Group 1 casualties must return to full duty as soon as possible to help fight the enemy, followed by Groups 2 and 3 when they are available. Because Group 4 casualties are hopelessly wounded or dead, they will be last.

- **Noncombat.** This occurs when a disaster strikes (e.g., plane crash, automobile accident, earthquake, flood, etc.). In these situations, the least injured casualties (Groups 1 and 2) can care for themselves while you take care of the wounded in Group 4. In a noncombat situation there is usually no further life-threatening action, so you will have time to treat a Group 4 casualty who has a chance of survival. After you are done with Group 4, go back and treat Group 3, Group 2, and then Group 1.

## BASIC LIFE SUPPORT

In any casualty situation, you will concentrate on maintaining the ABCs (discussed in the “Basic Life Support” section of chapter 9 in *Dental Technician, Volume 2*, NAVEDTRA 12573) of the casualties.

## TREATING OBVIOUS CONDITIONS

In your primary assessment, you will notice some obvious conditions that require treatment (e.g., external hemorrhaging, shock, fractures, wounds, etc.). After you triage the casualties, you will start treatment of the obvious conditions.

### Hemorrhage

Hemorrhage, or bleeding, occurs whenever there is a break in the wall of a blood vessel. Blood circulates throughout the body by means of three different kinds of blood vessels: arteries, veins, and capillaries.

Arteries are large blood vessels that carry the blood away from the heart. Veins are large blood vessels that carry blood back to the heart. Capillaries are smaller blood vessels that form a connecting network between the arteries and veins.

Arterial bleeding is when bright red blood comes from the wound. If the artery is near the surface of the body, the blood will spurt out each time the casualty’s heart beats. If the artery is located deep within the body, the blood will flow from the wound in a steady stream.

Venous bleeding is when dark red blood comes from the wound in a steady stream.

Capillary bleeding is when dark red blood comes from the wound in a steady stream.

Slight wounds usually cause only capillary bleeding. This bleeding can be controlled by lightly fastening a sterile dressing over the wound. Deeper wounds, however, may cause venous or arterial bleeding. Because the veins and arteries are large blood vessels, a casualty may lose a lot of blood.

You should regard venous or arterial bleeding as a serious, life-threatening emergency.

The four methods for controlling hemorrhage are direct pressure, elevation, applying pressure to the pressure points, and the use of a tourniquet.

### WARNING

Apply a tourniquet only as a last resort.

**DIRECT PRESSURE.**—In most cases, serious external bleeding can be controlled by applying pressure directly on the wound with your hand on a sterile dressing as shown in figure 13-1.

A battle dressing is a combination dressing and bandage in one unit. It is made of many layers of gauze sewed to a muslin strip or strips. Emergency medical kits are supplied with battle dressings (fig. 13-2), each stored in a sterile package, ready for instant use. These dressings come in different sizes; select a size to completely cover the wound and extend at least 1 inch in every direction beyond the border of the wound. Make sure that the sterile side covering the wound does not come into contact with your fingers, your clothes, or other unsterile objects. Do not drag the dressing across the casualty’s skin, or allow it to slip out of place once it has been positioned over the wound.

When the dressing is in place over the wound, apply pressure to the dressing with the palm of your hand. Maintain pressure until the bleeding is controlled. If blood soaks through the dressing, do not replace it; add a second dressing on top of the first one and maintain hand pressure.

When the bleeding is controlled, wrap the ends of the dressing around the wound and secure them by tying or pinning.

If you have no battle dressings, you may use the cleanest cloth available (e.g., freshly laundered handkerchief, towel, or shirt) and a roller bandage (fig. 13-3). But never use material that will stick to the wound and be difficult to remove (e.g., absorbent cotton and adhesive or friction tape). The roller bandage is used to hold a compress in place, create pressure, and immobilize joints. The purpose of the bandage is to stop the bleeding, to prevent further



Figure 13-1.—Direct pressure.

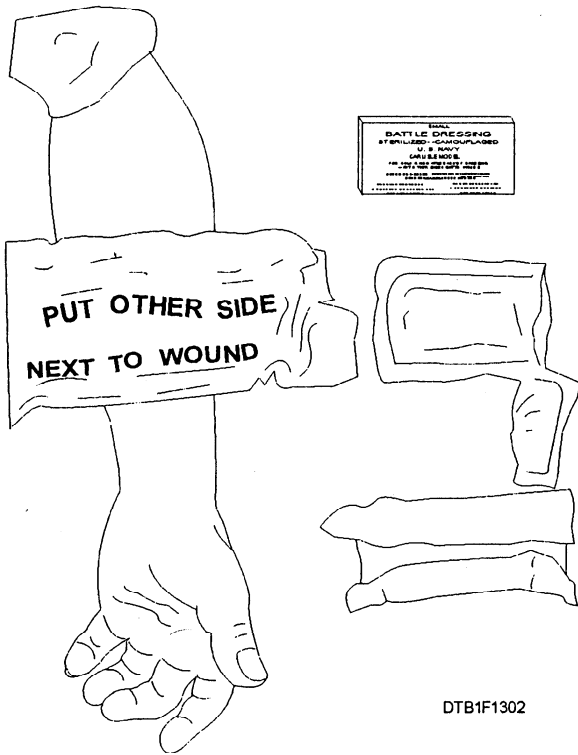
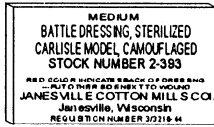
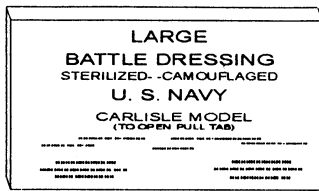
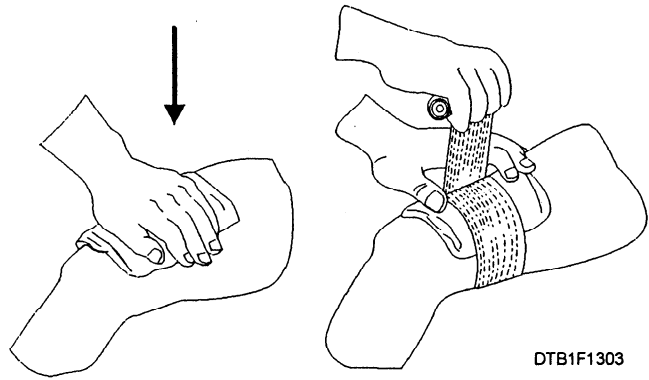


Figure 13-2.—Battle dressings.

contamination, and to prevent further injury to the wound.

When the dressing is in place, treat the casualty for shock and complete the U.S. Field Medical Card, DD Form 1380. In cases of severe hemorrhage, do not worry about the dangers of infection. Although the prevention of infection is important, your main concern is to stop the flow of blood. If there is no material available, simply thrust your hand over the wound.

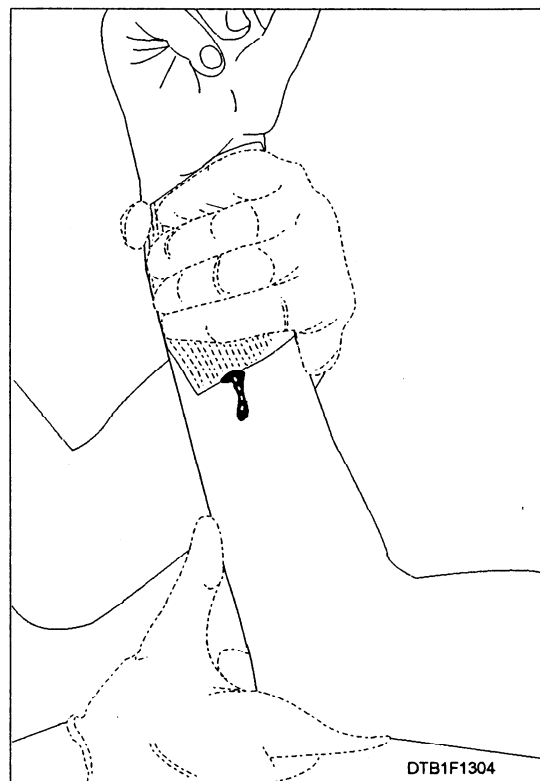


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Figure 13-3.—Direct pressure to control bleeding and application of a roller bandage.

**ELEVATION.**—Elevating or raising an injured limb above the level of the heart will help to control bleeding. Elevation should be used together with direct pressure (fig. 13-4). If you suspect a fracture, do not elevate a limb until the fracture has been splinted and you can be reasonably certain that elevation will cause no further injury. Use a stable object to maintain elevation.

**PRESSURE POINTS.**—If direct pressure and elevation fail to control serious external bleeding, try to control it by applying pressure to the appropriate pressure point.



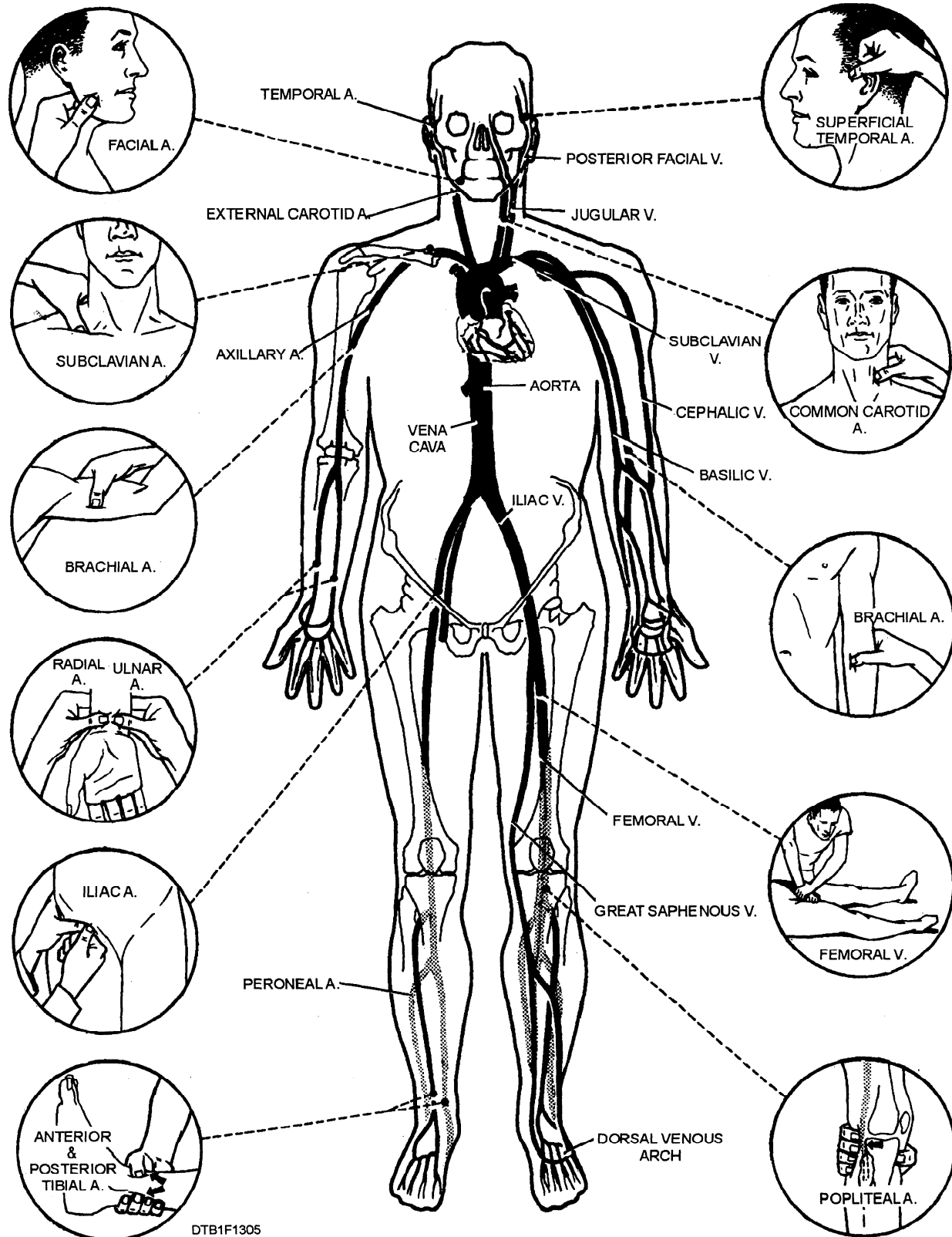
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Figure 13-4.—Combination of direct pressure and elevation.



A pressure point is located where an artery passes over a bone near the surface of the skin. By exerting pressure with your fingers or hand at this point, you will compress the artery against the bone, thus shutting off most of the blood flow to the injured part. There are

22 principal pressure points, 11 on each side of the body. Figure 13-5 shows pressure points for the **right** facial, subclavian, brachial, radial and ulnar, iliac, and anterior and posterior tibial arteries. There are corresponding pressure points in the same locations on



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Figure 13-5.—Principal pressure points.

the left side of the body. This figure also shows pressure points for the **left** superficial temporal, common carotid, brachial, femoral, and popliteal arteries.

Whether you use a pressure point on the left side or the right side of the casualty depends on the side where the wound is found. You must also select the pressure point that is **nearest the wound, and between the wound and the main part of the body.**

The following paragraphs discuss the pressure points used to control hemorrhage in different areas of the body. Throughout the discussion, refer to figure 13-5.

For bleeding of the **temple, forehead, and scalp**, apply pressure to the superficial temporal artery just in front of the upper part of the ear.

For bleeding of the **cheeks, lips, or chin**, apply pressure to the facial artery. To find the pressure point, start at the angle of the mandible until you feel a small notch. The pressure point is in this notch.

For bleeding of the **neck**, apply pressure to the common carotid artery on the side of the neck. You can detect a very strong pulse. At a point below the wound, press inward and slightly backward against the pressure point.

#### **WARNING**

Do not use this pressure point unless it is absolutely necessary, because there is great danger of compressing the windpipe and choking the casualty. **Never** apply pressure to the pressure points on both sides of the neck at the same time.

For bleeding at the **shoulder and upper part of the arm**, apply pressure to the subclavian artery under the front part of the collarbone. You can press down against the first rib or forward against the collarbone.

For bleeding **between the middle of the upper arm and the elbow**, apply pressure to the upper portion of the brachial artery on the inner side of the arm, about halfway between the shoulder and the elbow.

For bleeding **between the middle of the upper arm and the elbow**, apply pressure to the upper portion of the brachial artery on the inner side of the arm, about halfway between the shoulder and the elbow.

For bleeding of the **lower arm** (forearm), apply pressure to the lower portion of the brachial artery on the inner side of the arm at the bend of the elbow.

For bleeding of the **hand**, apply pressure to the radial and ulnar arteries at the wrist.

For bleeding at the **thigh**, apply pressure to the iliac artery in the middle of the groin. It may be more effective to apply pressure to the femoral artery in the upper thigh. If you use this pressure point, apply pressure with the closed fist of one hand and use the other hand to give additional pressure. The femoral artery at this point is deeply buried, so great pressure is needed to compress the artery against the bone.

For bleeding of the **lower leg**, apply pressure to the popliteal artery on the back of the leg, behind the knee. If you are unable to apply enough pressure with your fingers, hold the front of the knee firmly with one hand. With your other hand, make a fist and thrust it firmly against the back of the knee.

For bleeding of the **foot**, apply pressure to the anterior and posterior tibial artery at the ankle.

It is difficult to maintain pressure on a pressure point for more than 15 minutes. If you find you are no longer able to maintain pressure and there is no one to relieve you, you must find another way to control the bleeding. A dressing fixed securely over the wound may be enough.

If this controls the bleeding, treat the casualty for shock and then complete the U.S. Field Medical Card. If you are unable to control the serious bleeding with the dressing, and if the wound is in one of the extremities (arms or legs), you may have to apply a tourniquet.

**TOURNIQUETS.**—Tourniquets are used as a **last resort**, and then only for controlling bleeding in the extremities. If you cannot control serious bleeding in an extremity by applying direct pressure, elevation, or by using the appropriate pressure point, you may apply a tourniquet. You will **rarely** have to apply a tourniquet. When you do, it will most likely be a situation when part of an extremity is amputated (cut off).

A tourniquet consists of a pressure pad, a band, and a device for tightening the band. Place the pressure pad over the main artery supplying blood to the injured extremity. Wrap the band around the extremity and over the pressure pad. Tighten the band only enough to shut off the supply of blood to the injured extremity.

You may use a rolled compress, battle dressing, or bandage as a pressure pad. If the materials are not available, you may use any round, smooth pressure object, such as a rolled handkerchief, a flat stone, or a rifle shell. If no pressure object can be found, apply the band without it.

You may use any long, flat material, (i.e., bandage, belt, stocking, strip of rubber, or necktie) as the tourniquet band. The band **must** be flat. **Narrow materials such as rope, wire, or string should not be used;** they will cut into the casualty's flesh.

Most Navy emergency medical kits contain a webbed band with a buckle on it. The band is tightened by pulling one end through the buckle. This eliminates the need for a separate device to tighten the band. If you are using another type of band, you may use a small, short stick to tighten it.

There are some general rules to keep in mind when applying a tourniquet. Apply it over a main artery **between the wound and the main part of the body**. Apply the tourniquet as close to the wound as possible, making sure that the tourniquet is not touching the wound and that it is not placed over a joint. Once a tourniquet is correctly applied, only experienced medical personnel may loosen or remove it. Refer to figure 13-6 and use the following steps to apply a tourniquet:

1. Place the pressure pad or similar pressure object over the main artery supplying blood to the injured extremity (see A in fig. 13-6).

2. Wrap the band once around the extremity and over the pressure pad. Place a short stick on the crossing band (see B in fig. 13-6).

3. Knot the band over-the-stick (see C in fig. 13-6).

4. Twist the stick to tighten the tourniquet just enough to control the flow of blood. Do not make it any tighter than necessary. A tourniquet that is too loose will not control the bleeding; one that is too tight may further injure the extremity.

5. Tie the stick in place with a strip of bandage or other material (see D in fig. 13-6).

If bleeding fails to stop after the band has been tightened, there is a good chance the pressure pad is not placed directly over the artery. If this is the case, loosen the tourniquet and reposition the pad.

After you have brought the bleeding under control, place a sterile dressing securely over the wound. **Do not cover the tourniquet with a dressing. Do not loosen the tourniquet.** Again, once a tourniquet has been correctly applied, only experienced medical personnel may loosen or remove it.

After placing the dressing, treat the casualty for shock. Finally, complete the field medical card. In addition, write the letter "T" and the time the tourniquet was applied (e.g., T-0830) on the casualty's forehead. Use a skin pencil, colored antiseptic, ink, or crayon for this purpose.

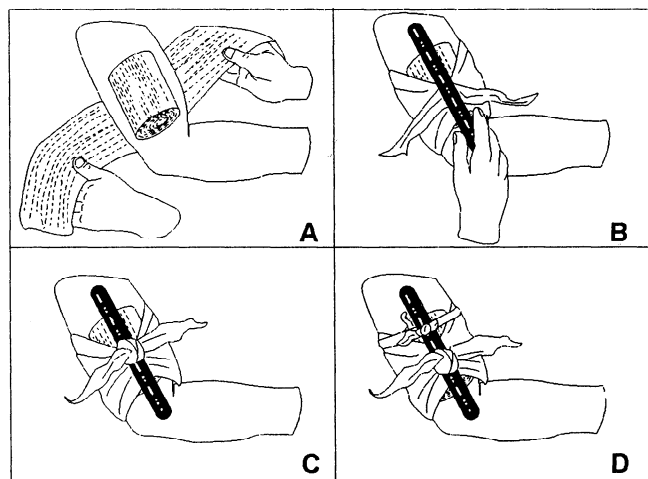
## Shock

Review the shock section in chapter 9, *Dental Technician, Volume 2*, NAVEDTRA 12573, for causes, signs, symptoms, and treatment of basic shock, fainting, anaphylactic shock, and insulin shock.

Shock may develop at the time of the injury or hours later. **Never** put off treating a casualty for shock until the signs and symptoms appear. Begin treatment immediately. If shock has not yet developed, the treatment may prevent it from developing. If shock has already developed, the treatment may prevent it from becoming worse.

**TREATMENT OF SHOCK.**—To prevent shock or to treat shock that has already developed, you should position the casualty, conserve body heat, and relieve pain.

**Position the Casualty.**—The casualty should be lying down. Never let that person sit up, stand, or walk around. Generally, the standard position for the shock casualty is lying on the back with the feet elevated 6 to



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Figure 13-6.—Steps in tourniquet application.

12 inches (fig. 13-7). You must consider the type of injury before deciding on the position. The casualty's injuries may prevent you from using the standard position. For example, if a person with a chest wound has trouble breathing, you will raise the head slightly, and place the patient in a sitting or semi-sitting position. If a casualty is vomiting or bleeding around the mouth, place the patient on the side or back with the head turned to one side and lower the feet. If the face is flush rather than pale, or if you have any reason to suspect head injury, do not raise the feet. Instead, keep the head level with or slightly higher than the feet. If the casualty has broken bones, you must judge the best position for both the fractures and for shock. A fractured spine must be immobilized before the casualty is moved at all to avoid further injuries. A helpful mnemonic: If the face is red, raise the head; if the face is pale, raise the tail (feet).

**Conserve Body Heat.**—Loss of body heat can cause shock to develop or to become worse. Keep the casualty warm. Cover the patient with blankets or any dry material. Do not overheat the casualty.

**Relieve Pain.**—Pain is a major cause of shock. Treatment of injuries will often reduce pain. Pain may also be relieved by slightly repositioning the casualty. Under mass casualty conditions, you may have to administer morphine to certain types of casualties to relieve pain. The condition under which morphine may be administered will be discussed in the Morphine Administration section. **Morphine must never be administered if there is evidence of severe or worsening shock.**

### Injuries to Bones, Joints, and Muscles

Injuries to bones, joints, and muscles are some of the most common situations that you will encounter. These injuries can range from the simple to the critical and life threatening. Whether the injury is mild or severe, your ability to provide quick and efficient emergency care may prevent further pain and injury.

An essential part of emergency treatment for fractures consists of immobilizing the injured part with splints so the sharp ends of broken bones will not move around and cause further damage to nerves, blood vessels, or vital organs. Splints are also used to immobilize severely injured joints or muscles and to prevent the enlargement of extensive wounds. You must have a general understanding of the types and uses of splints.

**SPLINTS.**—Whether ready made or improvised, splints must fulfill certain requirements. They should be lightweight, but must be strong and fairly rigid. They should be long enough to reach the joints above and below the fracture. Splints should be wide enough so that the bandages used to hold them in place will not pinch the injured part.

Splints must be padded on the sides that touch the body; if they are not properly padded, they will not fit well and will not adequately immobilize the injured part. If you have to improvise the padding for a splint, you can use articles of clothing, bandages, cotton blankets, or any other soft material. If the casualty is wearing heavy clothes, you may be able to apply the splint on the outside, allowing the clothing to serve as part of the required padding.

To apply a splint to an injured part, fasten it in place with bandages, strips of adhesive tape, articles of clothing, or any other available material. If possible, one person should hold the splint in position while another person fastens it. Figure 13-8 shows a properly placed splint for a fractured femur.

Although splints should be applied snugly, they should **never** be tight enough to interfere with blood circulation. Remember to leave the fingers or toes exposed. If the tips of the fingers or toes become blue or cold, you will know that the splint or bandages are too tight. You should examine a splinted part approximately every half hour, and loosen the fastenings if the circulation appears to be impaired.

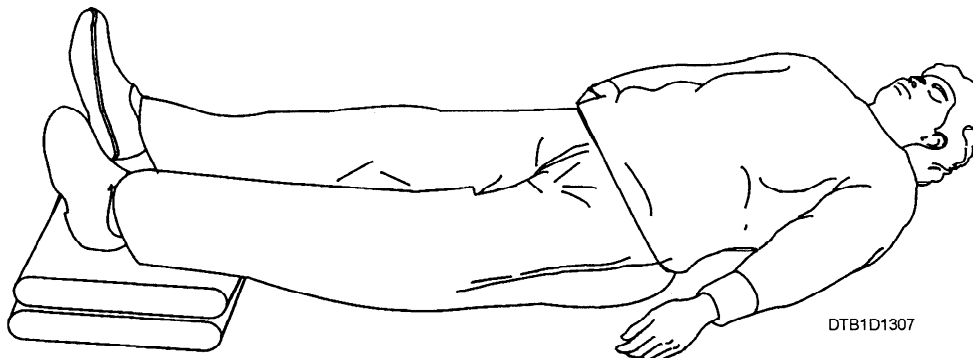
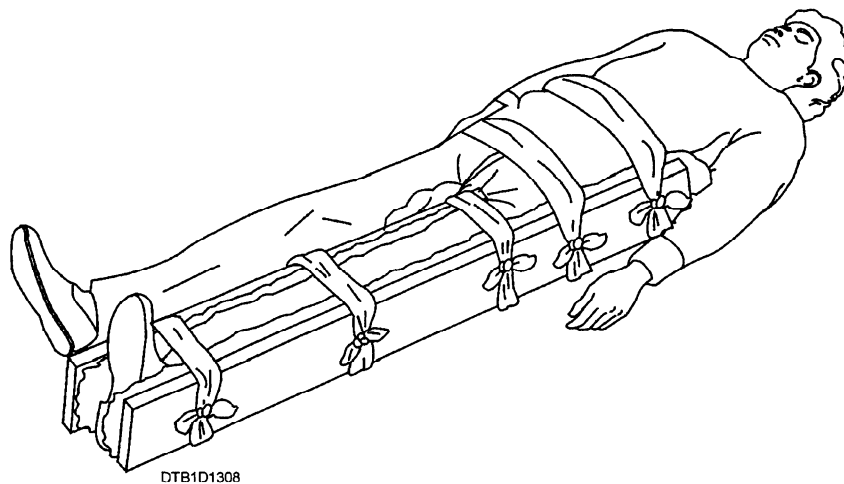


Figure 13-7.—Position of casualty for treatment of shock.



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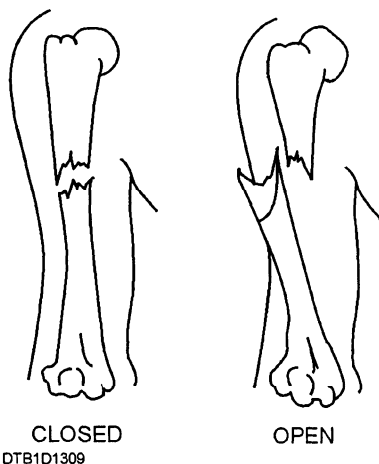
Figure 13-8.—Splint for a fractured femur.

Remember that any injured part is likely to swell, and splints or bandages that are all right when applied may later be too tight.

**FRACTURES.**—A break in a bone is called a *fracture*. There are two main types of fractures. A *closed fracture* is internal where the bone is broken but there is no break in the skin. With an *open fracture*, there is an open wound in the tissues and the skin where the bone has broken through. This type of break and wound is also referred to as a *compound fracture*. Figure 13-9 shows closed and open fractures.

When providing emergency medical treatment to a person who has suffered a fracture, you should follow these general rules:

1. If there is any possibility that a fracture has been sustained, treat the injury as a fracture.
2. Get medical aid at the first possible opportunity. All fractures require medical treatment.
3. Do not move the casualty until the injured part has been splinted.



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Figure 13-9.—Closed and open fractures.

4. Treat for shock.

5. Do not attempt to locate a fracture by grating the ends of the bone together.

6. Do not attempt to set a broken bone.

7. When a long bone in the arm or leg is fractured, the limb should be carefully straightened so splints can be applied. Never attempt to straighten the limb by applying force or traction. Pulling gently with your hands in the direction of the long axis of the limb is permissible, and may be all that is necessary to get the limb back into position.

8. Apply splints. If the casualty is to be transported only a short distance, or if the patient will be seen very soon by a medical officer, it is probably better to leave the clothing on and place emergency splinting over it. If the casualty must be transported for some distance, or if a considerable period of time will elapse before the patient can be treated by a medical officer, it may be better to remove enough clothing so that you can apply well-padded splints directly to the injured part.

9. If the fracture is open, you must take care of the wound before you can treat the fracture.

**SPRAINS.**—A sprain is an injury to the ligaments that support a joint. A sprain usually involves a momentary dislocation, with a bone slipping back into place on its own accord.

Tearing of supporting ligaments is probably the most serious part of a sprain, but there is also a considerable amount of damage to the blood vessels and other soft tissues that surround the joint. When the blood vessels are damaged, some blood may escape into the joint itself and into the tissues. This causes the severe pain and marked swelling characteristic of a sprain.

Immobilize the injured joint with some type of splint or with a snugly fitting adhesive or elastic bandage. Remember that the injured part may continue to swell, so a bandage that is loose enough when applied may soon become too tight.

Elevate the injured part, if possible. This helps reduce the pain and swelling.

It is difficult to tell a sprain from a fracture. If you are not sure which injury is present, always treat it as a fracture until the casualty has been brought under the care of a medical officer.

**STRAINS.**—An injury caused by the forcible overstretching or tearing of a muscle or tendon is known as a *strain*. Strains may be caused by lifting excessively heavy loads, by sudden movements, or by any other action that pulls the muscles beyond their normal limits.

The chief symptoms of a strain are pain, lameness, stiffness (sometimes involving knotting of the muscles), moderate swelling at the place of injury, and discoloration because of escape of blood from the injured blood vessel into the tissue. Have the patient rest the injured part. If the injured muscle is in the arm or leg, elevate the part.

## Wounds

Wounds may be classified according to their general condition, size, location, the manner in which the skin or tissue is broken, and the agent that caused the wound. You must usually consider some or all of these factors to determine what emergency treatment is necessary for a wound. There are six types of wounds: abrasion, incision, laceration, puncture, avulsion, and amputation.

**ABRASIONS.**—Abrasions are made when the skin is rubbed or scraped off. Rope burns, floor burns, and skinned knees or elbows are common examples of abrasions. This kind of wound is easily infected because dirt and germs are usually ground into tissues. There is usually minimal bleeding or an oozing of clear fluid.

**INCISIONS.**—Incisions, commonly called cuts, are wounds made by sharp cutting instruments such as knives, razors, or broken glass. Incisions tend to bleed freely because the blood vessels are cut straight across. There is relatively little damage to surrounding tissues. Of all the classes of wounds, incisions are the least likely to become infected, because the free flow of blood washes the wound.

**LACERATIONS.**—These wounds are wounds that are torn, rather than cut. They have ragged,

irregular edges and masses of torn tissue underneath. These wounds are usually made by blunt force, rather than sharp objects. They are often complicated by crushing of the tissues as well. Because lacerations are frequently contaminated with dirt, grease, or other material that is ground into the tissues, they are very likely to become infected.

**PUNCTURES.**—Punctures are caused by objects that penetrate deeply into the tissues but leave a relatively small surface opening. Wounds made by nails, needles, wire, knives, and bullets are usually punctures. A puncture wound can be classified as penetrating or perforating. A perforation differs from a penetration in that it has an exit as well as an entrance site.

As a rule, small punctures do not bleed freely. But, large puncture wounds may cause severe internal bleeding. The possibility of infection is great in all puncture wounds.

**AVULSIONS.**—An avulsion is the tearing away of tissue from a body part. Bleeding is usually heavy. The torn tissue may be surgically reattached in certain situations. It can be saved for medical evaluation by wrapping in cool, moist toweling and rushing it, along with the victim, to a medical facility.

**AMPUTATIONS.**—A traumatic amputation is the nonsurgical removal of a limb. Bleeding is heavy and requires a tourniquet. Shock is certain to develop. The limb can often be successfully reattached. Wrap the limb in a cool, moist towel and transport to medical as soon as possible.

**HEAD WOUNDS.**—Head wounds can be open or closed. In open head wounds, there is an obvious injury. Closed head wounds may not be obvious, so you may have to base treatment on the history of how the accident happened. You may see only the delayed symptoms, such as a seizure, disorientation, or drastic personality changes.

In all injuries to the skull, check for these signs of an injury to the brain:

- Unequal size of the pupils
- Deformity of the skull
- Blood or sticky fluid coming from the ears and nose

Any time there is blunt trauma to the skull, keep the casualty's neck immobilized in case there is damage to the spine or the neck area.

The emergency care of an individual with a head injury consists of the following:

1. Maintain an open airway.
2. Control the bleeding.
3. Cover skull wounds with sterile dressings.
4. Keep the casualty lying down.
5. Give no medications.
6. If necessary, administer cardiopulmonary resuscitation (CPR).

When controlling bleeding, do not use direct pressure or tie any knots over the wound. If there is a skull fracture, you would not want to force parts of the skull into the brain. When laying a person down, try to keep the head slightly elevated. If there is an injury to the back of the head or bleeding into the throat and mouth, position the casualty on his side so that blood can drain out of the mouth, not down the throat. (Try to keep the neck stiff.) Never raise the feet of a head injury victim.

**CHEST WOUNDS.**—All chest injuries are serious. They can cause severe breathing and bleeding problems. Any casualty showing signs of difficulty in breathing without signs of airway obstruction must be inspected for chest injuries. One of the most serious chest injuries is the **sucking chest wound**. This is a penetrating injury to the chest that produces a hole in the lung, causing the lung to collapse, and thus preventing normal breathing. Immediate medical aid must be provided. The sucking chest wound will result in death if not treated quickly.

A casualty with an open chest wound gasps for breath, has difficulty breathing out, and may have a bluish or grayish color to his face. When you remove clothing over the area, you may or may not hear a sucking sound at the wound site. Frothy blood may bubble from the wound during breathing.

To treat a casualty of a sucking chest wound:

1. Remove any clothing from the chest area.
2. Immediately seal the wound with your hand or any nonporous (airtight) material such as aluminum foil or plastic wrap (cellophane).
3. Wipe the blood from the surrounding skin while holding the airtight material over the wound. Apply tape (wide and nonporous, if possible) to all sides of the material, leaving one corner of the dressing unsealed.

This procedure allows trapped air to escape when the casualty exhales and prevents air entry when the casualty inhales.

4. Give the casualty oxygen if it is available. If a lung is injured, more oxygen will be needed to compensate for the injury.

5. Place the casualty on the wounded side unless there is back injuries. By placing the patient on the wounded side, you will keep the good lung up so breathing will be easier. If the casualty is having difficulty breathing while on the wounded side, you can place him/her in a sitting position. This may help to make breathing easier.

6. Watch the casualty closely for signs of respiratory difficulty or shock. Treat accordingly.

**7. Do not give a casualty with chest injuries anything to eat or drink.**

8. Immediately transport the casualty, wounded side down, to a medical facility.

The procedures described above are also followed when treating a lung injury from the casualty's back.

**ABDOMINAL WOUNDS.**—Many vital organs are located in the abdominal area, so a deep wound in the abdomen is likely to constitute a major emergency. Abdominal wounds usually cause intense pain, nausea and vomiting, spasms of the abdominal muscles, and severe shock. Immediate surgical treatment is almost always required, so the casualty must receive medical attention at once. Give only the most essential treatment, and concentrate your efforts on getting the casualty to a medical facility.

The general procedures for treating an abdominal wound are as follows:

1. Keep the casualty lying on his/her back. If the intestine is protruding or exposed, the patient may be more comfortable with the knees drawn up. Place a coat, a pillow, or some other bulky cloth material under the knees to help maintain this position. **Do not attempt to push the intestines back in or to manipulate them in any way.** Do not try to clean dirty intestines; this will be done thoroughly at the hospital.

2. If the intestine is not exposed, cover the wound with a dry, sterile dressing. If the intestine is exposed (fig. 13-10), apply a sterile bandage moistened with sterile water. If no sterile water is available, clean sea water or any water that is fit to drink may be used to moisten the bandage. The bandage should be large enough to cover the wound and the surrounding area.

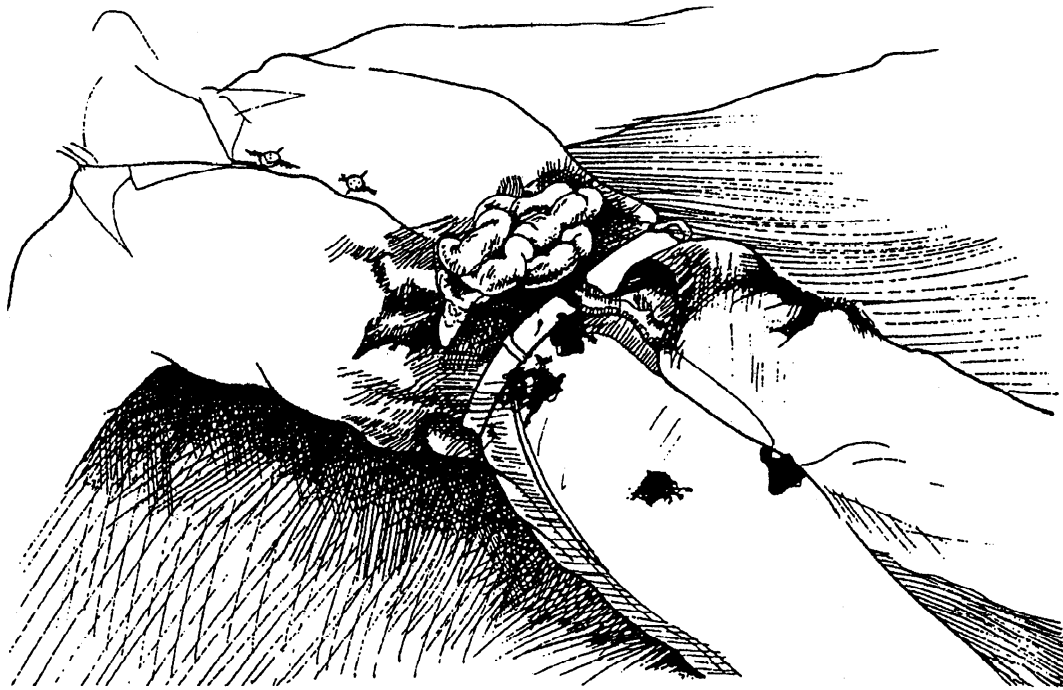


Figure 13-10.—Exposed intestine.

Fasten the bandage firmly so that the dressing will not slip around, but do not apply more pressure than is necessary to hold the bandage in position. Ideally, the dressing should be folded under and then over the intestines (envelope style).

3. Apply an occlusive material such as aluminum foil or plastic wrap over sterile dressing and secure in place with tape or other material. This will help keep the sterile dressing moist.

4. Treat for shock. The casualty must be taken to a medical facility at the earliest opportunity. **Do not give the patient anything to eat or drink.** If he/she complains of great thirst, moisten the lips with a small amount of water, but **do not** allow the patient to swallow.

### Summary of Wounds

Although it is not always necessary to know what agent or object caused a wound, it is often helpful because it may give you some idea of the probable size of the wound, its general nature, the extent to which it is likely to be contaminated with foreign matter, and what special dangers must be guarded against.

The emergency treatment for all wounds consists mainly of stopping the flow of blood, treating for shock, and preventing infection.

For a casualty with multiple wounds, first treat the wound that appears to be most life-threatening. Be sure to check all possible points of the body for injury.

Your first concern is to stop the bleeding, preferably by direct pressure, elevation, or the use of pressure points. A tourniquet should be used only if the other methods do not control the bleeding.

Do not spend undue time trying to clean a dirty wound. This will be done by medical personnel. But, apply a dressing to help prevent additional contamination of the wound.

If a foreign object is near the surface and exposed, you may remove it. But if the injury is caused by a knife or other object that is still embedded, **do not remove the object.** It may cause massive bleeding. Simply apply dressings around the object.

### SECONDARY EXAMINATION

As already explained, the primary examination was to assess the site and the life threatening injuries to the casualties. The secondary examination is much more thorough and extensive. It includes a full-body assessment.

The secondary examination, a systematic full body survey from head to toe, is usually conducted in a relatively safe area. Be careful not to move the casualty unnecessarily until you are satisfied that there are no major injuries (e.g., neck or spinal injuries) not



detected in the primary examination. Use common sense: do not remove wound dressings, pull off clothing attached to the wound, or probe the wound. During the examination:

- **Look** for discolorations, wounds, unusual chest movements, deformities, penetrations, vomit, etc.
- **Listen** for changes in breathing patterns, unusual breathing sounds, and grating noises made by the ends of broken bones.
- **Feel** for deformities, wounds, swelling, abnormal hardness or softness, tenderness, spasms, and skin temperature.
- **Smell** for any unusual odors coming from the casualty's body, breath, or clothing.

### Special Emergency Care Procedures

Special emergency care procedures common to the emergency treatment of practically all casualties include:

- Administering morphine
- Intravenous infusion of fluids
- Transporting an IV casualty

**ADMINISTERING MORPHINE.**—Morphine is the most effective of all available pain-relieving drugs. When administered properly, it can relieve severe pain and prevent shock.

As a dental assistant, you will not ordinarily administer morphine. Experienced medical personnel make the decision to administer this drug. But situations do arise, such as mass casualties, when you may be issued syrettes containing 1/4 grain of morphine (fig. 13-11).

You may give one syrette of morphine to a casualty suffering severe pain. You may give a second syrette only if a casualty's severe pain persists **and at least 4 hours have passed since you administered the first syrette**. After this, **do not** administer any more morphine unless told to do so by a medical or dental officer.

**MORPHINE CANNOT BE GIVEN TO ALL CASUALTIES WHO SUFFER SEVERE PAIN.** Administer morphine **only** if the pain is very severe and **only** if there is:

- No head, neck, or spine injury
- No chest injury

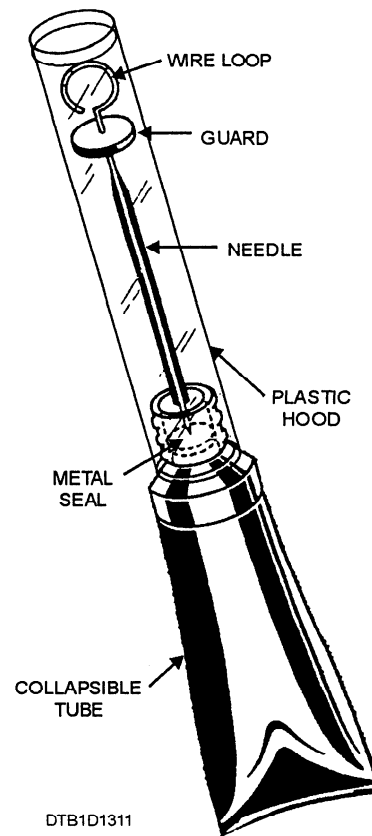


Figure 13-11.—Morphine syrette.

- No airway obstruction or impairment
- No wound of the throat, nasal passages, mouth, or jaws from which blood might flow to obstruct the airway
- No evidence of severe or deepening shock
- No loss of consciousness

If you administer morphine in a mass casualty situation, you should:

1. Select an injection site. The best site is the muscle on the back of the upper arm. If both arms are injured, you may use a thigh or buttock as an injection site.

#### WARNING

If a tourniquet has been applied to the arm or the thigh, you must inject the morphine between the tourniquet and the main part of the body, if no other extremity is available.

2. Disinfect the injection site if you have the time and the materials. Swab the injection site with alcohol or any skin antiseptic. If no antiseptic is available, wash the injection site with soap and water, or with plain tap water.

3. Remove the plastic hood from the syrette.

4. Grasp the wire loop at the end of the needle and push down on the loop until it is stopped by the guard. This will pierce the metal seal on the collapsible tube.

5. Pull on the wire loop and withdraw the wire completely from the needle. Throw the wire away. **Do not touch the needle.**

6. Thrust the full length of the needle straight through the skin at the injection site.

7. Inject the morphine by slowly squeezing the collapsible tube. Start squeezing at the end of the tube and work your way down toward the needle. Once all the morphine has been injected, withdraw the needle and massage the injection site for a few minutes to help circulate the morphine.

8. Record your treatment. Medical personnel who later provide treatment for the casualty must know when the morphine was administered. Record the treatment on the U.S. Field Medical Card (discussed later), and write the letter "M" and the time of the injection (e.g., M 0830), on the casualty's forehead. Use a skin pencil, or another semipermanent marking for this purpose. You should also attach the empty syrette to the casualty's shirt collar or to some other conspicuous part of the clothing.

#### **INTRAVENOUS INFUSION OF FLUIDS.—**

Parenteral therapy is the nonoral (not by mouth) administration of fluids (e.g., intravenous infusion of fluids). This therapy may be required when a casualty loses a large quantity of body fluids as a result of injury and shock. To halt and reverse shock, lost fluids must be replaced. If a casualty cannot take fluids by mouth, or is unable to take enough by mouth, a medical or dental officer may administer fluids by other means. Ordinarily, you will not be involved with the intravenous administration of fluids, but in a mass casualty situation, you may be required to assemble, insert, and maintain intravenous therapy equipment either under the supervision of a medical or dental officer, or on your own.

Intravenous therapy, commonly called an IV, refers to the administration of fluids, drugs, or blood directly into the circulatory system by way of a vein. When whole blood is administered, the technique is called *transfusion*. When sterile fluids (blood volume expanders) are administered, the technique is called *infusion*.

Intravenous infusion is used in the field for three major reasons:

- To add fluid volume to the circulatory system when there is an imbalance or depletion of normal body fluids, as in hemorrhage or burns.

- To establish and maintain life support for a casualty whose condition is questionable, and it is felt that the person might deteriorate.
- To provide an access for the administration of medications.

There are basically four types of fluids used for infusion in the field:

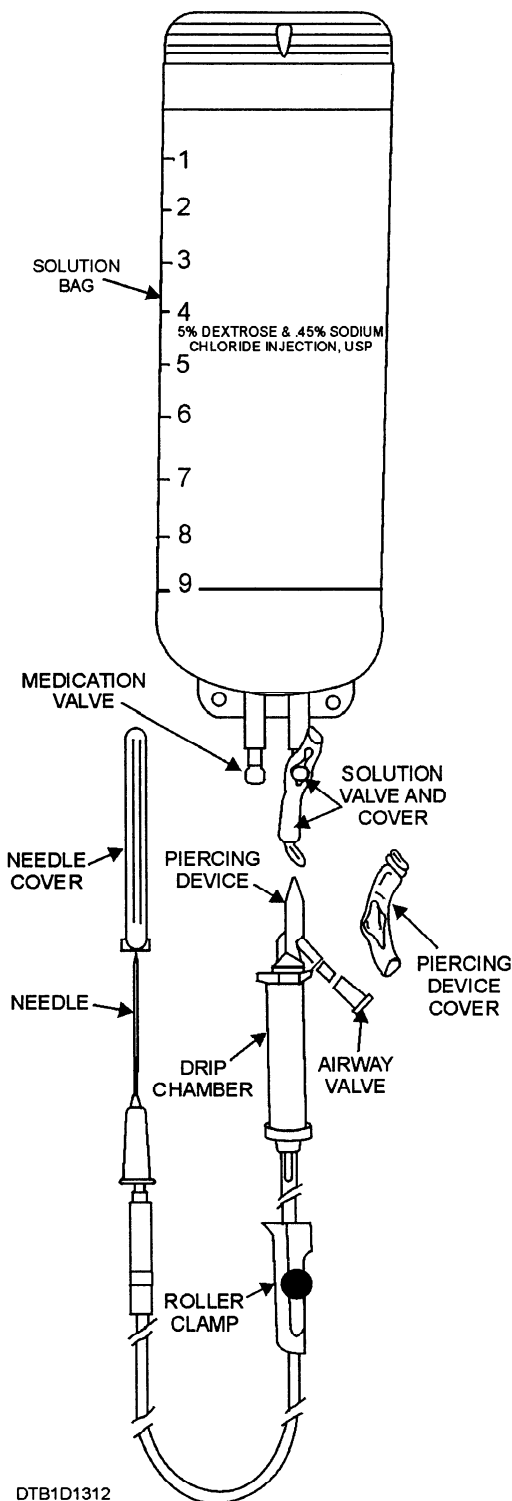
- D5W, 5 percent dextrose and sterile water, given in cases where the IV is used to establish a lifeline or a medication route.
- N.S., or normal saline, which is 0.09 percent sodium chloride in sterile water, and used for irrigation of wounds.
- Lactated Ringers, a solution of electrolytes isotonic (having equal pressure as blood, so that it will not destroy red blood cells when injected into the blood stream) is used for trauma cases, burns, and hemorrhagic shock.
- Dextran, a blood plasma substitute containing large molecules of glucose, used in serious hemorrhage cases.

The equipment used is in sterile disposable sets, as shown in figure 13-12. The equipment set contains:

1. The solution to be infused.
2. The IV itself, consisting of the piercing device cover, piercing device, airway valve, drip chamber, roller clamp, tubing, needle, and needle cover.
3. Some sets may contain auxiliary equipment such as an arm board, antiseptic solution, tape to secure the IV tubing, a tourniquet, and gauze pads to cover the insertion site.

**Preparing the Solution.-**The medical officer will choose the solution and needle for the infusion procedure. The solution comes in a plastic bag that must be connected to the sterile, disposable infusion set. Connect the bag to the infusion set using the following procedures:

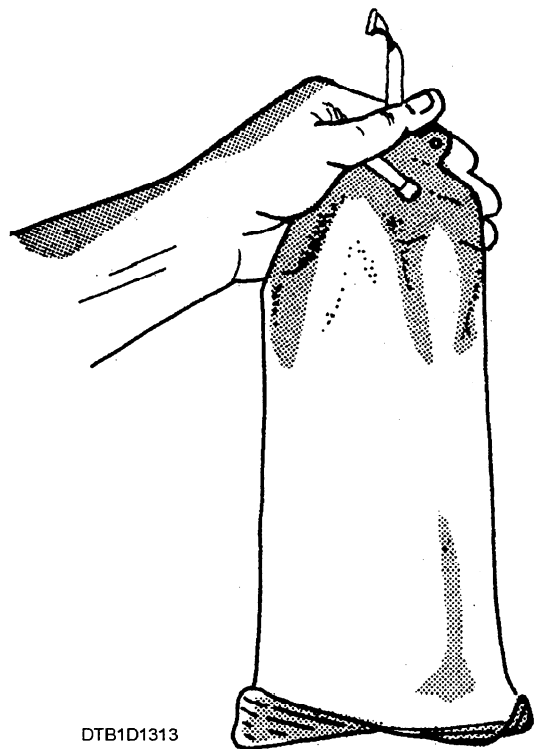
1. Open the infusion set, close the roller clamp on the tubing, and put the infusion set aside.
2. Remove the solution bag from the wrapper. Ensure that the expiration date has not passed. Check the solution by holding the bag up to the light. The solution should be clear. The solution **cannot** be used if it is cloudy or if it contains any sediment or mold. Squeeze the bag and check for small leaks. If there is



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**Figure 13-12.—Plastic solution bag and sterile disposable infusion set.**

anything wrong with the solution or the bag, inform the medical officer. Get a new bag and discard the old one.

3. Hold the medication valve under your thumb as shown in figure 13-13. Remove the cover from the solution valve. Make sure not to touch the end of the solution valve, as this will contaminate it. Continue to



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**Figure 13-13.—Holding the solution bag.**

hold the medication valve under your thumb, so that the medication valve does not come into contact with the solution valve.

4. Remove the cover from the piercing device. Insert the piercing device into the solution valve on the bag.

5. Invert the solution bag and hang it on a rack at least 30 inches above the casualty's head.

6. Remove the airway valve at the top of the drip chamber on the infusion set.

7. Press and release the sides of the drip chamber. This will pump the solution into the chamber. Continue until the chamber is one-half full.

8. Grasp the end of the needle cover and uncover the needle.

**CAUTION**

**Do not touch the needle or the bottom lip of the needle cover.**

9. Hold the needle so the point is down, and then open the roller clamp. Allow the air solution to flow through the tubing until the tubing is filled and all air bubbles are expelled.

10. Close the roller clamp, and then put the cover back on the needle.

**Inserting An IV.**—To infuse an IV solution, perform the following procedures:

1. Choose the insertion site, usually one of the veins in the forearm. Apply a constricting band to the casualty's upper arm. The constricting band should be just tight enough to stop blood flow in the vein. It **should not** be so tight that it cuts off blood flowing in the arteries.

2. You may have to immobilize the casualty's arm. This is done by placing an armboard under the arm and securing the board with bandages above the tourniquet and at the wrist.

3. Locate the vein. This can often be done visually because the tourniquet helps the vein to stand out. Or you can have the casualty clench and unclench the fist several times. As the casualty does this, examine the insertion site with your fingers to detect the vein by touch. It may also help to slap the skin over the vein with your fingers.

4. After locating the vein, thoroughly clean the insertion site with an alcohol sponge.

5. The next step is venipuncture, the piercing of the vein with the needle. Usually a medical officer will do this. However, if you are in a mass casualty situation and if you have had training in venipuncture, the medical officer may direct you to insert the needle. To insert the needle:

a. Remove the protective cover from the needle. Do not touch the needle.

b. Hold the needle so it points toward the casualty's upper arm. One side of the needle is beveled, or slanted. Usually, the needle is inserted in the vein with the beveled side up. The only exception to this would be if the casualty's veins are very small.

c. Hold the needle firmly. The tip of the needle should be directly over the vein. The needle should be at about a 10- to 20-degree angle with the skin.

d. Place the thumb of your free hand about 2 inches beyond the insertion site and stretch the skin tight.

e. Pierce the skin with the needle, and then immediately lower the needle so it is almost parallel with the skin. Exerting slight upward pressure to the needle, slowly and steadily push it forward through the top wall of the vein. Still exerting slight upward pressure, very slowly and very carefully advance the needle along the top wall of the vein for a distance of about 1 inch. The upward pressure will cause the vein to

rise slightly. Do not exert downward pressure, as the needle could puncture the bottom wall of the vein.

6. Secure the needle in place with one or two strips of adhesive tape. Make a loop in the tubing and then secure the tubing in place with adhesive tape.

7. Adjust the roller clamp on the tubing for the proper flow rate, as directed by the medical officer. You can determine the flow rate by observing the drip chamber for 1 minute. The usual flow rate is 40 to 60 drops per minute.

8. While the fluid is being infused, the officer may have you monitor the casualty. Try to keep the casualty still, so the patient doesn't dislodge the needle. Observe the drip chamber on the infusion set to see that the fluid flows properly. If there is any irregularity in the flow rate or if the fluid stops flowing, inform the officer at once. When the solution bag is almost empty, inform the medical officer. Be on the lookout for any of the following reactions and report them to the officer immediately:

- Casualty shivers or shows signs of being chilly.
- Those hopelessly wounded or dead on arrival.
- Casualty's pulse rate increases.
- Casualty's color changes.
- Signs of swelling around the needle insertion site.

9. When the casualty has received enough fluid, the officer may direct you to remove the infusion set. To do this, close the roller clamp on the tubing. Remove the tape used to hold the needle and tubing in place. Place an alcohol sponge over the needle insertion site, and withdraw the needle. After withdrawing the needle, press the alcohol sponge over the insertion site until bleeding stops.

10. Discard the solution bag and the infusion set. They cannot be reused.

#### **TRANSPORTING AN IV CASUALTY.**—

When the casualty is stabilized and ready to be moved, elevate the fluid container well above the level of the casualty's heart. If you are using fluid in a bag, place the bag under the patient until it can be hung up. During transporting, continue to monitor the IV to ensure that it does not become dislodged.

When moving over rough terrain or heavy underbrush, you can stop the IV drip for 4 or 5 minutes,

if necessary. Strap the container to the casualty so that the needle does not become dislodged.

**PREPARING MEDICAL TAGS.**—In a combat or mass situation, it is important for you to document

the treatment provided in the field or at the site so that medical personnel providing definitive treatment will know what emergency measures were taken and the circumstances involved. To aid in this documentation, use the U.S. Field Medical Card.

1. NAME (Last-First-Middle Initial)/NOM, PRENOMS <b>FROST, JACK R</b>		2. SERVICE NUMBER/NUMERO MATRICULE <b>333-33-3333</b>		3. GRADE/GRADE <b>LT 03</b>		4. NATION/NATION (e.g. Etats Unis) <b>U.S</b>	
5. FORCE/ARMEE <b>USN</b>		6. BRANCH AND TRADE/ARME (e.g. Infantry) <b>AIR</b>		7. UNIT/UNITE <b>VF-101</b>		8. SERVICE (Yrs)/DUREE DES SERVICES (e.g. 2 6/12) <b>5</b>	
9. AGE/AGE <b>28</b>		10. RACE/RACE <b>BLK</b>		11. RELIGION/RELIGION <b>METH</b>		12. FACILITY WHERE TAGGED/LIEU D'ETABLISSEMENT DE LA FICHE <b>FLEET HOSPITAL 4</b>	
13. DATE AND HOUR TAGGED/DATE ET HEURE D'ETABLISSEMENT DE LA FICHE <b>11 Aug 98 1345</b>		14. DIAGNOSIS (Including cause)/DIAGNOSTIC (Cause comprise) <b>FX (L) FEMUR</b>					
15. LINE OF DUTY/EN RELATION AVEC LE SERVICE <b>yes</b>				18. DATE & HOUR INJURED/DATE ET HEURE DE LA BLESSURE <b>11 Aug 98 0610</b>			
16. INJURY/BLESSURE <input checked="" type="checkbox"/> YES/OUI <input type="checkbox"/> NO/NON				17. SICK/MALADIE <input type="checkbox"/> YES/OUI <input type="checkbox"/> NO/NON			
19. WHAT WAS HE DOING WHEN INJURED/QUE FAISAIT-IL LORSQU'IL FUT BLESSE <b>AIRCRAFT SHOT DOWN/PILOT EJECTED</b>				20. TREATMENT GIVEN (For antibiotics specify which and give dose, hour and date)/TRAITEMENT EFFECTUE (Si des antibiotiques ont été donnés, précisez leur nature, la dose, l'heure et la date) <b>FX-SPLINTED, DRESSING AT FX SITE</b>			
21. TOURNIQUET (Yes or No; Time & date applied)/MISE EN PLACE D'UN GARROT (Oui ou Non; heure et date) <b>NO</b>				22. MORPHINE-1st/MORPHINE-1ere <b>1/4 gr 0630 11 AUG 98</b>			
23. MORPHINE-2nd/MORPHINE-2eme				24. MORPHINE-3rd/MORPHINE-3eme			
25. TETANUS TOXOID/VACCIN ANTITETANIQUE				26. A. T. SERUM/SERUM ANTITETANIQUE			
27. DISPOSITION-DISPOSAL/DESTINATION DONNEE AU BLESSE <b>MEDAVAC TO N.H. ROTA</b>		28. HOUR AND DATE/HEURE ET DATE <b>1500 11 AUG 98</b>		29. MEDICAL OFFICER (Signature & Grade)/SIGNATURE ET GRADE DU MEDECIN <b>John R. Doe CD/MD/USN</b>			

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S/N 0102-LF-013-5500

U. S. FIELD MEDICAL CARD/FICHE MEDICALE DE L'AVANT ETATS-UNIS

Figure 13-14A.—U.S. Field Medical Card (front).

a. ABSOLUTION/CONFESSION		b. HOLY COMMUNION/SAINTE COMMUNION		c. EXTREME UNCTION/EXTREME ONCTION	
30. d. OTHER MINISTRATIONS/AUTRES MINISTERES				e. CHAPLAIN (Signature)/SIGNATURE DE L'AUMONIER	
31. DIET/REGIME ALIMENTAIRE <input type="checkbox"/> REGULAR/NORMAL <input type="checkbox"/> LIQUID/LIQUIDE <input type="checkbox"/> NOTHING BY MOUTH/RIEN PAR VOIE ORALE					
32. REMARKS/REMARQUES <b>ORTHOPEDIC CLINIC, NAVAL HOSPITAL ROTA WILL TREAT PATIENT.</b>					

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Figure 13-14B.—U.S. Field Medical Card (back).

This card is two-sided (figs. 13-14A and 13-14B) and contains blocks for recording the casualty's personal data, the initial diagnosis, nature of the casualty, date and time of the injury, emergency medical treatment rendered, casualty disposition, and the signature of the aid person rendering the initial treatment. Make every effort to complete the card as accurately as possible. This information will be extremely helpful to the medical staff after the casualty has been transported for further medical treatment.

## Heat Injuries

Burns, heat cramps, heat exhaustion, and heat stroke are the injuries most commonly caused by exposure to extreme heat. Although burns caused by contact with acids, alkalis, and other chemicals are not true heat burns, they are discussed here.

**BURNS.**—To provide the proper emergency treatment for a burn, you must determine the type of burn, the depth of the burn, and how much of the casualty's body is burned.

Three types of burns are covered here: thermal, chemical, and electrical. A thermal burn is caused by exposure to heat from sources such as fire, hot objects, hot gases, hot liquids, or explosions. A chemical burn occurs when a person comes in contact with a caustic chemical. An electrical burn occurs when a person

comes in contact with a live wire or is struck by lightning. It is important to distinguish between these types of burns because the treatment is different for each.

You can visually examine a burn to determine how deep it is. Burns are classified according to their depth as first degree, second degree, and third degree as shown in figure 13-15.

First-degree burns are the mildest, producing a redness of the skin's outer layer, increased warmth, tenderness, and mild pain.

Second-degree burns extend through the skin's outer layer to involve the deeper layers. The skin reddens and blisters, and the casualty experiences severe pain.

Third-degree burns destroy the skin and may destroy underlying tissue and bone. The casualty may not experience severe pain, because all the nerve endings in the burn area may have been destroyed. The color of the third-degree burn may vary from white and lifeless to black.

To determine how much of a casualty's body is burned, use the rules of nine (fig. 13-16). According to this method, each of the following areas of the body represent 9 percent of the body's surface, with the genital area representing 1 percent.

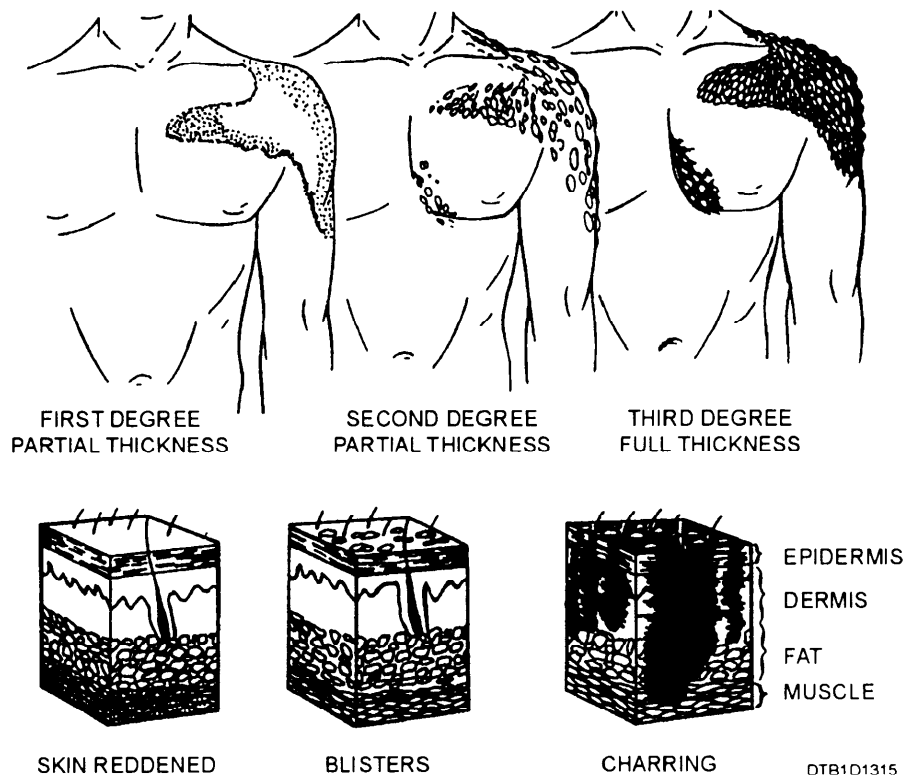


Figure 13-15.—First, second, and third degree burns.

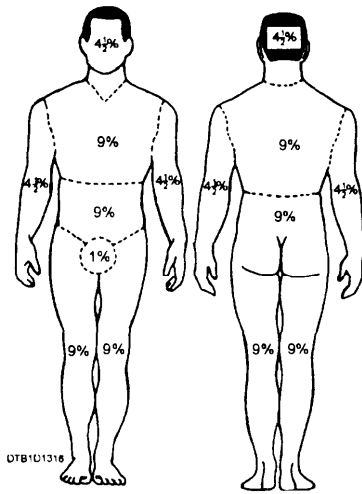


Figure 13-16.—Rules of nine.

- The head and neck
- The front of each leg
- The back of each leg
- The chest
- The abdomen
- The upper back
- The lower back and buttocks

As a general rule, all third-degree burns should be regarded as serious, as should first-degree and second-degree burns that cover more than 15 percent of a casualty's body. All facial burns should also be regarded as serious.

A casualty with a serious burn will usually be experiencing shock, and the patient's life may be in danger. The casualty must receive emergency treatment immediately. You should then get medical assistance or transport the casualty to an aid station as soon as possible.

**Thermal Burns.**—If a casualty is suffering from a serious thermal burn, you should take the following steps:

1. Ensure there is an open airway.
2. Treat to prevent infection.
3. Treat for shock.

Ensure there is an open airway. Hot gases or smoke may have caused the casualty's airway to swell shut. Tilt the casualty's head to the chin-up position. If the casualty is not breathing, apply artificial ventilation. If the casualty is breathing but has facial burns, place the casualty in a sitting position if this makes breathing easier.

**TREAT TO PREVENT INFECTION.**—Cover the entire burned area with a sterile dressing. **Do not put ointments, antiseptics, or other medications on a burn.** These will interfere with later treatment. To prevent infection of the burn, you must observe the following precautions:

- Never allow any unsterile objects or material to come into contact with the burn. (However, in an emergency situation when no sterile dressing is available, you may cover the burn with a clean sheet or an unused plastic bag.)
- Never use rough textured materials like blankets to cover the burn.
- Never attempt to break blisters.
- Never attempt to remove shreds of tissue or charred clothing from the burn.

For thermal burns of the eye, make sure that the casualty does not rub the eyes. Cover each eye with a small, moist, thick compress. Fasten the compress in place with a bandage. Treat the casualty for shock.

To treat for shock, maintain the casualty's body heat, but do not allow the casualty to become overheated. If the casualty is in severe pain, you may administer morphine, but only under the mass casualty conditions discussed earlier. A seriously burned casualty has an overwhelming need for liquids. If the casualty is conscious, has no internal injuries, and is not vomiting, prepare a weak solution of salt (1 teaspoon) and baking soda (1/2 teaspoon) in a quart of warm water. Allow the casualty to sip slowly.

**Chemical Burns.**—Corrosive chemicals that come in contact with body tissues may cause chemical burns. To treat a casualty with a serious chemical burn, take the following steps:

1. Immediately flush the burned area with large amounts of water. Pour water over the area; use a hose or shower if one is available. Do not apply water too forcefully, because this could further damage the burned tissue. While the area is being flushed, remove the casualty's clothing, including the shoes and socks. Keep flushing the area until all traces of the chemical have been removed.

2. Gently pat the burned area with sterile gauze. Do not rub the area with the gauze. Be careful not to break the skin or open any blisters.

3. Prevent infection by covering the entire burned area with a sterile dressing, just as you would for a thermal burn.

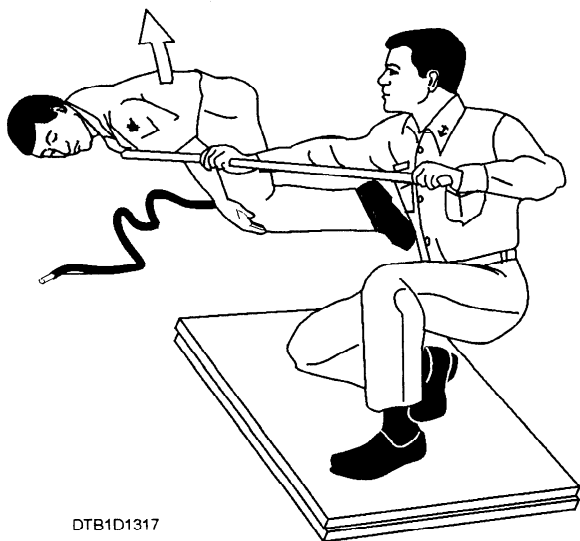
4. Treat for shock, just as you would for a thermal burn. For chemical burns of the eye, make sure that the casualty does not rub the eyes. Immediately flush the eyes with large quantities of fresh, clean water. Have the casualty lie down with the head turned slightly to one side. To flush the eye, pour water into the **inside** corner of the eye and let it flow across the eyeball to the **outside** corner. The water must not be poured with any greater force than is necessary to sustain the flow across the eyeball. **Because of the intense pain, the casualty may be unable to open the eyes. If this occurs, you must hold the eyelids open so that the water can flow across the eyeball.** After irrigating the eyes, loosely cover them with a sterile dressing. Treat the casualty for shock.

**Electrical Burns.**—Electrical burns are more serious than they first appear. The entrance wound may be small, but as electricity penetrates the skin, it burns a large area below the surface. Usually there are two external burn areas: one where the current enters the body and another where it leaves.

Before administering emergency treatment, remove the casualty from the electrical source. If power equipment is involved, shut it off or disconnect it immediately.

When rescuing a casualty who is in direct contact with a power line, stand on a well-insulated object, and use a dry rope or a wooden pole to either push or pull the wire away from the casualty, or the casualty away from the wire (fig. 13-17). Do not touch the casualty until this is done or you, too, will become a casualty.

Electrical burns are often accompanied by respiratory failure and cardiac arrest, which are of more immediate danger to the casualty than the burn



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Figure 13-17.—Pushing a casualty away from a power line.

itself. Start cardiopulmonary resuscitation (CPR) (explained in *Dental Technician*, Volume 2, NAVEDTRA 12573, chapter 9) immediately and continue until the casualty regains a normal heartbeat and breathing pattern. Finally, lightly cover the site of the burn with a preferably dry sterile dressing, treat for shock, and transport the casualty to a medical facility.

**HEAT EXPOSURE INJURIES.**—Excessive heat affects the body in a variety of ways. When a person exercises in a hot environment, heat builds up inside the body. The body automatically reacts to get rid of this heat through the sweating mechanism. If the body loses large amounts of water and salt from sweating, heat cramps and heat exhaustion are likely to follow. When the body becomes overheated and cannot eliminate the excessive heat, heat stroke will result.

**Heat Cramps.**—Heat cramps usually affect people who work in hot environments or who engage in strenuous exercise without acclimatization and proper training. Excessive sweating may result in painful heat cramps in the muscles of the abdomen, legs, and arms. Heat cramps may also result from drinking ice water or other cold drinks either too quickly or in too large a quantity after exercise. Muscle cramps are often an early sign of approaching heat exhaustion. Muscle spasms or heat cramps usually last only a few minutes and disappear spontaneously.

To provide emergency treatment for heat cramps, move the casualty to a cool place. Heat cramps are caused by loss of salt and water, so give the casualty plenty of water to drink, adding about 1 teaspoon of salt to a quart of water. Apply manual pressure to the cramped muscle, or gently massage it to relieve the spasm. If the heat cramps do not pass, or if they become more severe, other symptoms may follow. The casualty should be treated as a heat exhaustion casualty and then transferred to a medical facility for further treatment.

**Heat Exhaustion.**—Heat exhaustion is the most common condition resulting from exposure to hot environments. Heat exhaustion is not easily diagnosed because it can be a combination of several factors. Because of these factors, the signs and symptoms may vary. As a general rule, heat exhaustion will involve a serious disturbance of blood flow to the brain, heart, and lungs. This may cause the casualty to experience weakness, fatigue, headache, loss of appetite, and nausea. The person may faint, but will probably regain consciousness when the head is lowered to improve the blood supply to the brain. The casualty will appear



ashen gray, the skin will be cold, moist, clammy, and the pupils of the eyes may be dilated (enlarged). Vital signs are usually normal but the casualty may have a weak pulse, together with rapid, shallow breathing. The body temperature may be below normal.

Treat the casualty as if the patient were in shock. Move the person to a cool or air-conditioned area. Loosen the clothing; apply cool wet cloths to the head, neck, groin, and ankles; and fan the casualty. Do not allow the person to become chilled. If they become chilled, cover with a light blanket and move to a warmer area. If the casualty is conscious, give a solution of 1 teaspoon of salt mixed in a quart of cool water. If the person vomits, do not give any more fluids. Transport the casualty to a medical facility as soon as possible.

**Heat Stroke.**—Sunstroke is more accurately called heat stroke because a person need not be exposed to the sun for the condition to develop. Heat stroke is a less common but far more serious condition than heat exhaustion because it carries a 20 percent mortality rate. The most important feature of heat stroke is the extremely high body temperature (105°F or 41°C) or higher. In heat stroke, the casualty's sweating mechanism breaks down and cannot eliminate excess body heat. If the body temperature rises too high, the brain, kidneys, and liver may be permanently damaged.

Sometimes the casualty may have preliminary symptoms such as headache, nausea, dizziness, or weakness. Breathing will be deep and rapid at first; later it will be shallow and almost absent. Usually the casualty will be flushed, very dry, and very hot. Pupils will be constricted (pinpointed) and the pulse will be fast and strong. Compare heat stroke symptoms with those of heat exhaustion. (See figure 13-18.)

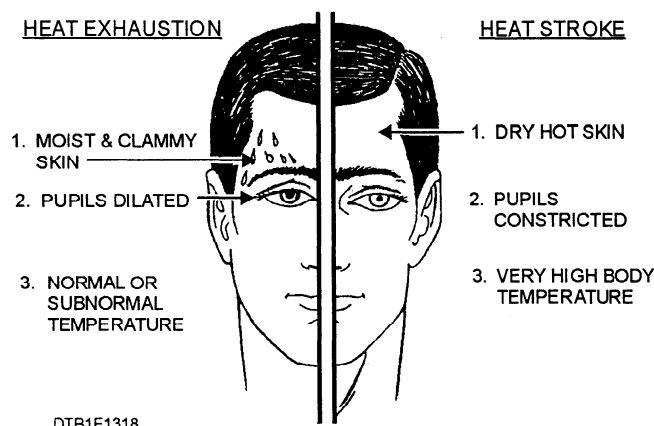


Figure 13-18.—Symptoms of heat exhaustion and heat stroke.

When providing emergency treatment for heat stroke, keep in mind that if the casualty remains overheated, the more likely he/she will suffer irreversible body damage or death. Your main objective is to get the body temperature down as quickly as possible.

Move the casualty to the coolest possible place, and remove as much clothing as possible. Body heat can be reduced quickly by immersing the casualty in a cold water bath. If that is not possible, give the casualty a sponge bath by applying wet, cold towels to the entire body. Or you can expose him/her to a fan or air conditioner. If cold packs are available, place them under the arms, around the neck, at the ankles, and in the groin. If the casualty is conscious, give him/her cool water to drink. Do not give any hot drinks or stimulants.

Because of the seriousness of heat stroke, it is important to get the casualty to a medical facility as soon as possible. Continue the cooling measures during transportation.

### Cold Weather Injuries

When the body is subjected to severely cold temperatures, the blood vessels constrict and body heat is gradually lost. As the body temperature drops, tissues are easily damaged or destroyed.

All cold weather injuries are similar, varying only in the degree of injury to tissues. The extent of injury depends on such factors as wind speed, temperature, type and duration of exposure, and humidity. Freezing of tissue accelerates with wind, humidity, or a combination of the two.

Fatigue, smoking, drugs, alcoholic beverages, emotional stress, dehydration, and the presence of other injuries intensify the harmful effects of the cold. In cold weather, wounds bleed easily because the low temperatures keep the blood from clotting; increased bleeding increases the likelihood of shock.

**GENERAL COOLING (HYPOTHERMIA).**—General cooling of the whole body is caused by continued exposure to low or rapidly falling temperatures, cold moisture, snow, or ice. Even though well protected by clothing, a person exposed to low temperatures for an extended period may suffer ill effects because cold temperatures affect the body systems slowly, almost without notice. As the body cools, the casualty goes through several stages of progressive discomfort and disability. The first symptom is shivering, the body's attempt to generate heat by repeated contractions of surface muscles. This

is followed by a feeling of listlessness, indifference, and drowsiness. Unconsciousness can follow quickly. Shock becomes evident as the casualty's eyes assume a glassy stare, respiration becomes slow and shallow, and the pulse is weak or absent. As body temperature drops even lower, peripheral circulation decreases, and the extremities become susceptible to freezing. Finally, death results as the core temperature of the body approaches 80°F.

To treat hypothermia, take the following steps:

1. Carefully observe respiratory effort and heartbeat; you may have to give CPR during the warming process.

2. Rewarm the casualty as soon as possible. Severe bleeding must be controlled and fractures splinted over clothing before the casualty is moved.

3. Replace wet or frozen clothing and remove anything that constricts the casualty's arms, legs, or fingers, interfering with blood circulation.

4. If the casualty is inside a warm place and is conscious, the most effective method of warming is immersion in a tub of warm water (100°F to 105°F or 38°C to 41°C). The water should be warm to the elbow and never hot. Observe closely for signs of respiratory failure and cardiac arrest (rewarming shock).

5. If a tub is not available, apply external heat to both sides of the casualty. Natural body heat (skin to skin) from two rescuers is the best method. This is called "buddy warming." If this is not practical, use hot water bottles or an electric rewarming blanket, but do not place them next to bare skin. Be careful to monitor the temperature of the artificial heat source; the casualty is very susceptible to burn injury. Because casualties are unable to generate adequate body heat, placing them under a blanket or in a sleeping bag is not sufficient treatment.

6. If the casualty is conscious, give warm liquids to drink. Never give alcoholic beverages, or allow the casualty to smoke.

7. Dry the casualty thoroughly if water is used for rewarming.

8. As soon as possible, transfer the casualty to a definitive care facility. Be alert for the signs of respiratory and cardiac arrest during transfer, and keep the casualty warm.

**CHILBLAINS.**—Chilblains are a mild cold injury caused by prolonged and repeated exposure to air temperatures from just above freezing (32°F or

0°C) to as high as 60°F or 16°C. Chilblains are characterized by redness, swelling, tingling, and pain of the skin area. Injuries of this nature require no specific treatment except warming of the affected part, keeping it dry, and preventing further exposure.

**IMMERSION FOOT.**—Immersion foot, which also may occur in the hands, results from prolonged exposure to wet cold at temperatures ranging from just above freezing to 50°F or 10°C. It is usually in connection with limited motion of the extremities and water-soaked protective clothing.

Signs and symptoms of immersion foot are tingling and numbness of the affected areas; swelling of the legs, feet, or hands; bluish discoloration of the skin; and painful blisters. Gangrene may occur.

To treat immersion foot, follow these steps:

1. Get the casualty off his/her feet as soon as possible.

2. Remove wet shoes, socks, and gloves to improve circulation.

3. Expose the affected area to warm dry air.

4. Keep the casualty warm.

5. Do not rupture blisters or apply salves and ointments.

6. If the skin is not broken or loose, the injured part may be left exposed; however, if you must transport the casualty, cover the injured area with loosely wrapped fluff bandages of sterile gauze.

7. If the skin is broken, place a sterile sheet under the extremity and gently wrap it to protect the sensitive tissue from pressure and additional injury.

8. Transport the casualty as soon as possible to a medical facility as a litter patient.

**FROSTBITE.**—Frostbite occurs when ice crystals form in the skin or deeper tissues after exposure to a cold temperature, high altitude, and high-wind speed. The exposure time necessary to produce frostbite varies from a few minutes to several hours. The areas commonly affected are the face and extremities.

The symptoms of frostbite are progressive. Casualties generally incur this injury without being acutely aware of it. Initially, the affected skin reddens and there is an uncomfortable coldness. With continued heat loss, there is a numbness of the affected

area because of reduced circulation. As ice crystals form, the frozen extremity appears white, yellow-white, or mottled blue-white, and is cold, hard, and insensitive to touch or pressure.

Frostbite is classified as superficial or deep, depending on the extent of tissue involvement.

**Superficial Frostbite.**—In superficial frostbite, the surface of the skin will feel hard, but the underlying tissue will be soft, allowing it to move over bony ridges. This is evidence that only the skin and the region just below it are involved.

To treat superficial frostbite, follow these steps:

1. Take the casualty indoors.
2. Rewarm hands by placing them under the armpit, against the abdomen, or between the legs.
3. Rewarm feet by placing them in the armpit or against the abdomen of a buddy.
4. Gradually rewarm the affected area by warm water immersion, skin to skin contact, or hot water bottles.
5. Never rub a frostbite area.

**Deep Frostbite.**—In deep frostbite, the freezing reaches into the deep tissue layers. There are ice crystals in the entire thickness or the extremity. The skin will not move over bony ridges and feels hard and solid.

The objectives of treatment are to protect the frozen areas from further injury, to rapidly thaw the affected area, and to be prepared to respond to circulatory or respiratory difficulties.

To treat deep frostbite, follow these steps:

1. Carefully assess and treat any other injuries first. Constantly monitor the casualty's pulse and breathing since respiratory and heart problems can develop rapidly. Administer CPR if necessary.
2. Make no attempt to thaw the frostbitten area if there is a possibility of refreezing. It is better to leave the part frozen until the casualty arrives at a medical facility equipped for long term care. Refreezing of a thawed extremity causes severe and disabling damage.
3. Treat all casualties with injuries to feet or legs as litter patients. When this is not possible, the casualty may walk on the frozen limb, since it has been proved that walking will not lessen the chances of successful treatment as long as the limb has not thawed out.

4. When adequate protection from further cold exposure is available, prepare the casualty for rewarming by removing all constricting clothing such as gloves, boots, and socks. Boots and clothing frozen on the body should be thawed by warm water immersion before removal.

5. Rapidly rewarm frozen areas by immersion in water at 100°F to 105°F or 38°C to 41°C. Keep the water warm by adding fresh water, but do not pour it directly on the injured area. Ensure that the frozen area is completely surrounded by water; do not let it rest on the side or bottom of the tub.

6. After rewarming has been completed, pat the area dry with a soft towel. At first, the injured area will feel numb and look mottled blue or purple. Later it will swell, sting, and burn. Blisters may develop and should be protected from breaking. Avoid pressure, rubbing, or constriction of the injured area. Keep the skin dry with sterile dressings and place cotton between the toes and fingers to prevent them from sticking together.

7. Protect the tissue from additional injury and keep it as clean as possible (sterile dressings and linen should be used).

8. Try to improve the general morale and comfort of the casualty by giving hot, stimulating fluids such as tea or coffee. Do not allow the casualty to smoke or use alcoholic beverages while being treated.

9. Transfer the casualty to a medical facility as soon as possible. During transportation, slightly elevate the frostbitten area and keep the casualty and the injured area warm. Do not allow the injured area to be exposed to the cold.

## **PREPARING THE CASUALTY FOR TRANSPORTING**

Before transporting the casualty, ensure that the patient is stable enough to be moved. First, make sure that all hemorrhaging is under control and wounds have been dressed. Second, make sure that all fractures have been splinted and the victim has been treated for shock. If morphine or an IV was administered, see that the casualty has been marked and a U.S. Field Medical Card filled out. The casualty's vital signs should be stable so there will be no problems in route.

## **TRANSPORTING THE INJURED**

It is a basic principle that an injured person must be given essential treatment before being moved. However, it is obviously impossible to treat injuries while the casualty is in a position of immediate danger.

If the casualty is drowning, or life is endangered by fire, steam, electricity, poisonous or explosive gases, live fire in combat situations, or other hazards, rescue the person before giving emergency medical treatment.

The life of an injured person may well depend upon the manner in which he is transported. Rescue operations must be accomplished quickly, but unnecessary haste is both futile and dangerous. After rescue, and after essential emergency treatment has been given, further transportation must be accomplished in a manner that will not aggravate the casualty's injuries.

Next, we will explain the emergency methods of moving injured persons to safety, and the procedures for transporting them after emergency medical treatment has been rendered.

### Moving the Casualty to Safety

In an emergency, you may have to hoist, carry, or drag an injured person away from a position of danger. In some instances, you will be able to do this using a Neil Robertson stretcher, an Army litter, or by using an improvised stretcher; in other cases you will have to move the casualty by using the fireman's carry, the tied-hands crawl, the blanket drag, the pack-strap carry, the chair carry, or some type of arm carry. Sometimes, it is necessary to move the patient with all possible speed, without regard to the severity of the injuries.

The military uses a number of standard stretchers. The following discussion will familiarize you with the most common types. Keep in mind these general rules when using a stretcher:

1. Use standard stretchers when available, but be ready to use safe alternatives.
2. When possible, bring the stretcher to the casualty.
3. Always fasten the casualty securely to the stretcher.
4. Always move the casualty **FEET FIRST** so the rear bearer can watch for signs of breathing difficulty.

**NEIL ROBERTSON STRETCHER.**—The Neil Robertson stretcher (fig. 13-19) is especially designed for removing an injured person from engine room spaces, holes, and other compartments where access hatches or ladders are too small to permit the use of a regular stretcher. This stretcher is extremely valuable aboard ship. It is made of semirigid canvas, which has wooden slats sewn inside the canvas and canvas straps



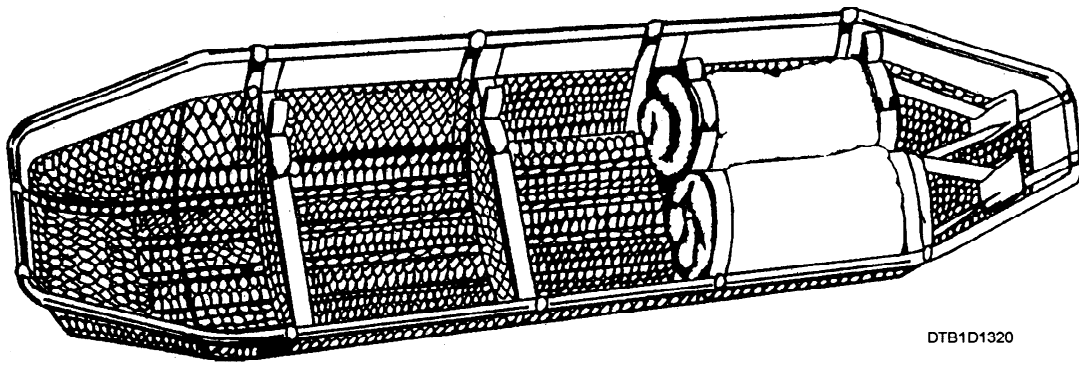
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Figure 13-19.—Neil Robertson stretcher.

to secure the casualty in the stretcher. When firmly wrapped around the casualty in mummy fashion, it gives sufficient support so that the casualty may be lifted vertically. A guideline is tied to the casualty's ankles to keep them from swaying against bulkheads and hatchways while being lifted. If a Neil Robertson stretcher is not available, a piece of heavy canvas wrapped firmly around the casualty will serve somewhat the same purpose.

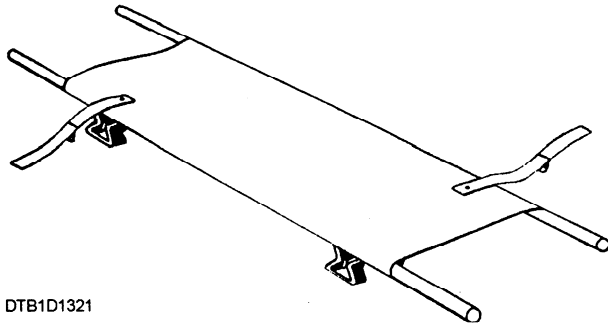
**STOKES STRETCHER.**—The Stokes stretcher is commonly used for transporting sick or injured people. The Stokes stretcher is essentially a wire basket supported by iron or aluminum rods. It is adaptable to a variety of uses, since the casualty can be held securely in place even if the stretcher is tipped or turned. The Stokes stretcher is particularly valuable for transporting injured persons to and from ships. It can be used with flotation devices to rescue injured survivors from the water. Fifteen-foot handling lines are attached to each end for shipboard use in moving the casualty.

The Stokes stretcher (fig. 13-20) should be padded with three blankets: two of them should be placed lengthwise, so that one will be under each of the casualty's legs, and the third should be folded in half and placed in the upper part of the stretcher to protect



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Figure 13-20.—Stokes stretcher.



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Figure 13-21.—Army litter.

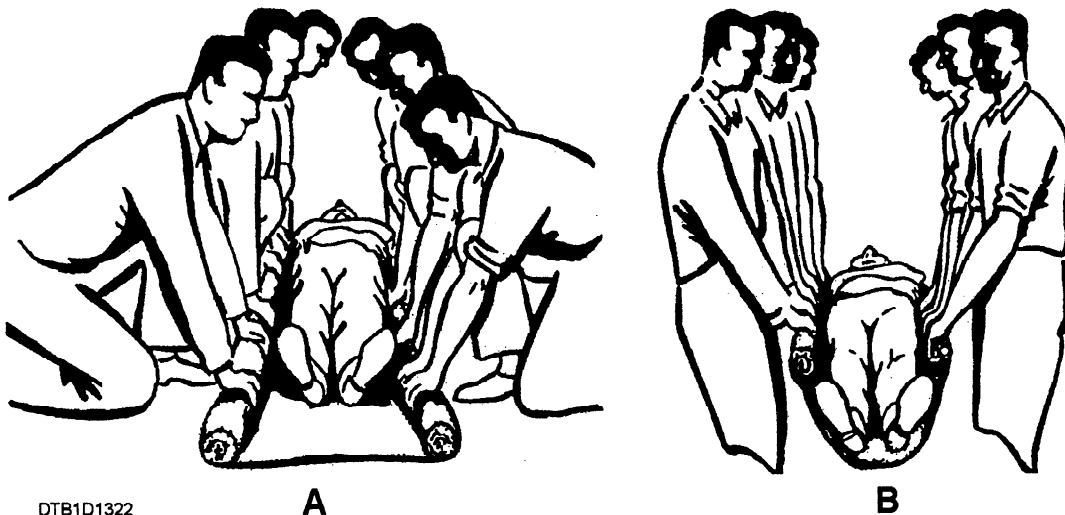
the head and shoulders. The casualty should be lowered gently onto the stretcher and be made as comfortable as possible. The feet must be fastened to the end of the stretcher so they will not slide down. Another blanket (or more, if necessary) should be used to cover the casualty. The casualty must be fastened to the stretcher by means of straps that go over the chest, hips, and knees. Make sure the straps go over the blanket or other covering, to hold it in place.

**ARMY LITTER.**—The Army litter (fig. 13-21) is a collapsible stretcher made of canvas and supported by wooden or aluminum poles. It is useful for transporting battle casualties in the field. However,

because it is sometimes difficult to fasten the casualty onto the Army litter, its use is limited aboard ship. It is most useful aboard ship in mass casualty situations to hold casualties in one stationary area. The litter is designed so its legs keep the patient off the ground and fit into the restraining tracks of a jeep or field ambulance to hold the litter in place.

**IMPROVISED STRETCHER.**—Standard stretchers should be used whenever possible to transport a seriously injured person. If no stretcher is available, you may have to improvise. Shutters, doors, boards, and even ladders may be used as stretchers. An improvised stretcher must be well padded and great care must be taken to see that the casualty is fastened securely in place.

Sometimes a blanket may be used as a stretcher (fig. 13-22). The casualty is placed in the middle of the blanket on his/her back. Three or four people kneel on each side and roll the edges of the blanket toward the casualty (see A in fig. 13-22). When the rolled edges are tight and large enough to grab securely, the casualty can be lifted and carried (see B in fig. 13-22).



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Figure 13-22.—Blanket used as an improvised stretcher.

Stretchers may also be improvised by using two long poles (about 7 feet long) and any strong cloth, such as a rug, blanket, sheet, mattress cover, two or three gunny sacks, or two coats.

**WARNING**

Many improvised stretchers do not give sufficient support to be used in cases where there are fractures or extensive wounds.

**EMERGENCY RESCUE LINES.**—The steel wire lifeline can be used to haul a casualty to safety. An emergency rescue line can also be made from a strong fiber line. Both are used only in extreme emergencies, when no other means are available to move a casualty.

**FIREMAN'S CARRY.**—One of the easiest ways to carry an unconscious casualty is by means of the fireman's carry. Figure 13-23 shows the procedures described in the following steps:

1. Turn the casualty so he/she is lying face down (see A in fig. 13-23). Kneel on one knee at the patient's head, facing the casualty. Pass your hands under the patient's armpits; then slide your hands down the back.

2. Raise the casualty to his/her knees (see B in fig. 13-23). Take a better hold across the patient's back.

3. Raise the casualty to a standing position, and stick your right leg between the patient's legs (see C in fig. 13-23). Grasp the patient's right wrist in your left hand and swing the casualty around the back of your neck and down your left shoulder.

4. Stoop quickly and pull the casualty across your shoulders. At the same time, put your right arm between the patient's legs (see D in fig. 13-23).

5. Grasp the patient's right wrist with your right hand and straighten up (see E in fig. 13-23).

**TIED-HANDS CRAWL.**—The tied-hands crawl, shown in figure 13-24, may be used to drag an unconscious casualty for a short distance; it is particularly useful when you must crawl underneath a low structure.

To carry a casualty by this method, lie the patient flat on his/her back. Cross the patient's wrists and tie them together. Kneel astride the casualty and lift the patient's arms over your head so his/her wrists are at the back of your neck. When you crawl forward, raise your shoulders high enough so that the casualty's head will not bump against the deck or ground.

**BLANKET DRAG.**—The blanket drag can be used to remove a casualty who is so seriously injured that the person should not be lifted or carried by one

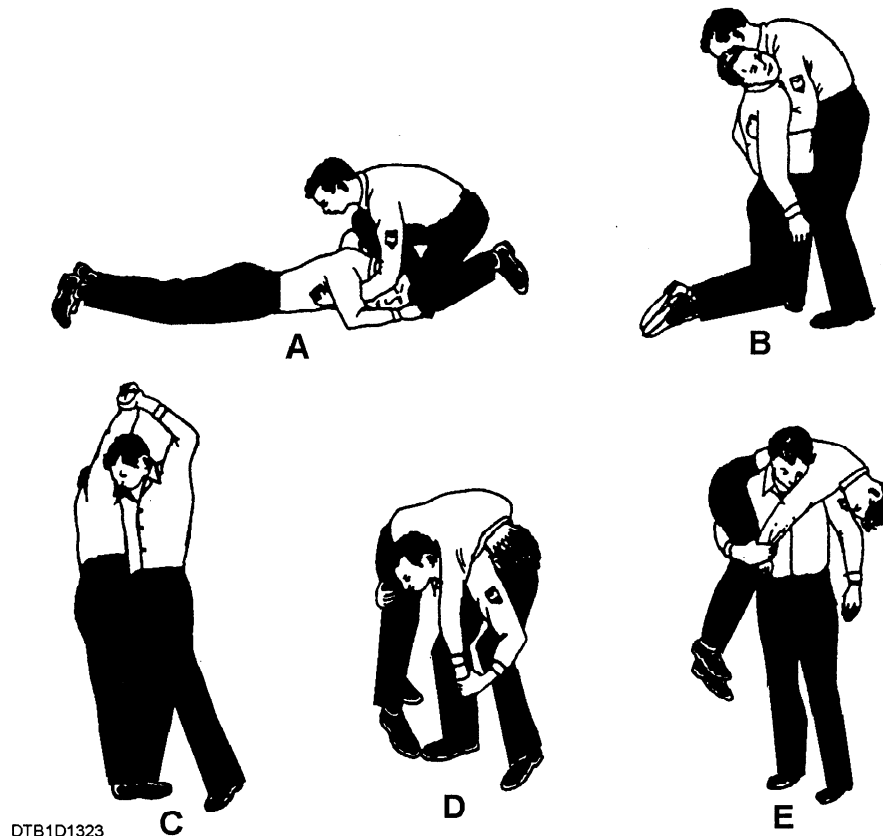
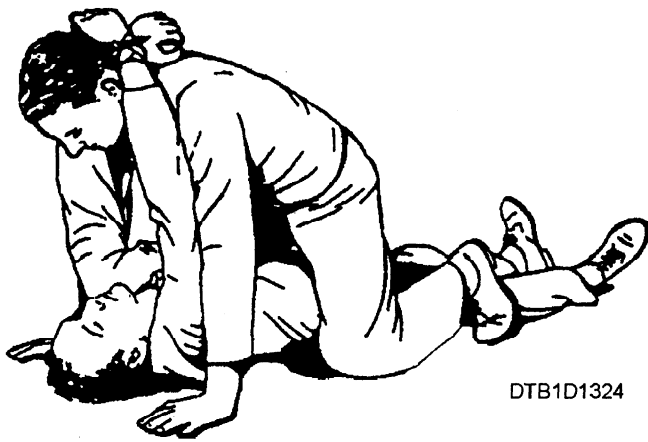


Figure 13-23.—Fireman's carry.



DTB1D1324

Figure 13-24.—Tied-hands crawl.

person alone. Place the patient on his or her back on a blanket, and pull the blanket along the floor, deck, or ground. Always pull the casualty head first, with the head and shoulders slightly raised.

**CHAIR CARRY.**—The chair carry can often be used to move a sick or injured person away from a position of danger. This is a particularly good method to use when you must carry a person up or down stairs or through narrow, winding passageways. It must never be used to move a person who has an injured neck, back, or pelvis.

**ARM CARRIES.**—Several kinds of arm carries can be used in emergency situations to move a casualty to safety. Figure 13-25 shows how one person can carry the casualty alone. Never try to carry a person this way unless the casualty is considerably smaller



DTB1D1325

Figure 13-25.—Arm carry.

than you are because you can carry them only a short distance using this method.

The two-person carry, shown in figure 13-26, can be used in some cases to move a casualty. Do not use it to carry a casualty who has serious wounds or broken bones.

A two-person arm carry that can be used in emergencies is shown in figure 13-27. Two people kneel beside the casualty at the level of the hips, and carefully raise the casualty to a sitting position. Each person puts one arm under the casualty's thighs; hands are clasped and arms are braced. Both people then rise slowly and steadily to a standing position. This carry must not be used to move seriously injured persons.

## LAW OF ARMED CONFLICT

The law of armed conflict encompasses all international law regulating the conduct of nations and individuals engaged in armed conflict.

As world tension increases, so does the potential for armed conflict. As members of a force dedicated to prevent such a conflict, we as medical personnel must face the reality of becoming involved. A basic understanding of the principles and applications of the law of armed conflict will help enhance our efforts in providing the best medical care possible while maintaining our moral and ethical obligation.

The terms *combatant* and *noncombatant* need to be defined. A combatant is anyone participating in



DTB1D1326

Figure 13-26.—Two-person carry.



DTB1D1327

Figure 13-27.—Two-person arm carry.

military operations or activities. Generally, this means members of a military force, with certain exceptions, and civilian personnel who are actually engaged in hostilities.

Noncombatants include all others (e.g., civilians not engaged in hostilities, medical personnel, chaplains, other persons you capture or detain, and people who surrender, are captured, shipwrecked, sick, or wounded).

## GENERAL PRINCIPLES AND GUIDELINES

The general principles and guidelines include:

- Only combatants are proper targets. Non-combatants must not be attacked.
- Do not cause destruction beyond the requirements of your mission.
- Do not attack protected property (e.g., buildings dedicated to religion, art, sciences, or charitable purposes; historical monuments; hospitals and places where the sick and wounded are collected and cared for; schools and orphanages).
- Do not shoot at the Red Cross.
- Do not hide behind the medical service symbols.
- Do not shoot at a parachute, unless, it is a paratrooper.
- Do not fire at shipwrecked personnel in the water.
- Do not alter your weapons or ammunition to increase enemy suffering.

- Let enemy personnel surrender.
- Treat all captives and detainees humanely.
- Provide medical care for sick and wounded captives.
- Do not take personal property from captives.
- Do not violate civilian rights in war zones.
- Do not steal or burn civilian property.

## SPECIAL APPLICATIONS

The law of armed conflict has special applications for medical personnel. These applications include: do not shoot at the Red Cross and do not hide behind the medical service symbols.

### Do Not Shoot at the Red Cross

Medical and religious personnel and facilities are usually marked with the Red Cross on a white background. However, some countries use different distinctive emblems to designate their medical service personnel and facilities. For example, Turkey and most other Moslem countries use the Red Crescent. Other countries may use different red symbols on a white background that are not recognized by international conventions as protective symbols; e.g., Israel uses the Red Shield of David. Nevertheless, all persons or objects so marked are to be treated with care and protection.

Whether or not they are marked with a protective symbol, you must not fire at any person or object that you recognize as being a medical or religious person or facility.



Do not fire at hospital ships, medical personnel, chaplains, vehicles (air or ground), buildings, tents, or other facilities used for the care of wounded, sick, shipwrecked, and disabled persons.

### **Do Not Hide Behind the Medical Services Symbols**

The medical service emblems (Red Cross, Red Crescent, and Red Shield of David) are symbols of protection for the wounded, sick, and disabled. In combat, the purpose of these emblems is to protect those who have become casualties and those personnel who are caring for them. It is a serious breach of the rules of war to use these signs to protect or hide military activities. Do not mark your position or yourself with a medical service emblem unless you have been designated to perform only medical duties.

Medical personnel or facilities will lose their special status if they commit injurious acts to the enemy. Furthermore, hospitals and ambulances lose their special protection when using hospitals as an observation post, as a shelter for able bodied combatants, or as a storeroom for arms or ammunition (except ammunition of the wounded until they are transferred), and when using ambulances to fire upon the enemy.

## **DEFENSE AGAINST CBR WARFARE**

As members of the healthcare team, Dental Technicians are trained in the recognition and treatment of chemical, biological, and radiological (CBR) hazards. The purpose of CBR warfare is to produce casualties, disable, or kill the enemy. In the event that an enemy uses any CBR warfare, U.S. forces must be trained to survive. The enemy's aim is to force U.S. forces into protective gear, restrict our capability to perform our mission, and contaminate our combat systems. To survive, it is essential that all Navy personnel have a good working knowledge of all aspects of CBR defense. All personnel should be familiar with self-protection and treatment procedures. We will explain how to recognize CBR agents and to treat casualties.

## **CHEMICAL WARFARE**

Chemical warfare (CW), or "gas warfare," is the deliberate use of a variety of chemical agents in gaseous, solid, or liquid state. These agents are toxic

(poisonous) chemicals that can produce death, injury, or irritating effects.

All service members must take every precaution against becoming chemical casualties. Medical personnel must apply the principles of first aid, treatment, and decontamination to increase their's and their patients' chances of survival.

This section of chemical warfare outlines the basic recognition and treatment principles. For specific detailed treatment, refer to Navy NAVMED P-5041, *Treatment of Chemical Agent Casualties and Conventional Military Injuries*.

Chemical agents attack the body and produce specific damage depending upon the nature of the agent used. The most common types of agents are listed below:

- Nerve agents
- Blister agents (vesicants)
- Incapacitating agents (psychochemical agents)
- Blood agents (cyanogens)
- Choking agents
- Vomiting and tear agents (sternutators and lacrimators, respectively)

## **NERVE AGENTS**

Nerve agents are among the deadliest of chemical agents and may produce rapid symptoms. They include the G and V agents. Examples of G agents are Tabun (GA), Sarin (GB), Soman (GD), and VX.

Nerve agents can be dispersed by artillery shell, mortar shell, rocket, land mine, missile, aircraft spray, and aircraft bomb.

### **Physical Properties**

Nerve agents are colorless to light brown liquids. Most nerve agents are essentially odorless; however, some have a faint fruity or paint odor. In toxic amounts, aqueous solutions of nerve agents are tasteless.

### **Protection Against Absorption of Nerve Agents**

Nerve agents may be absorbed through any body surface. When dispersed as a spray or aerosol, droplets can be absorbed through the skin, eyes, and respiratory tract. When dispersed as a vapor, it is primarily

absorbed through the respiratory tract. Liquid nerve agents may also be absorbed through the skin, eyes, mouth, and membranes of the nose. Nerve agents may also be absorbed through the stomach when ingesting contaminated food or water.

A protective mask and hood should be used to protect the face and neck, eyes, mouth, and respiratory tract against nerve agent spray, vapor, and aerosol. To prevent inhaling an incapacitating or lethal dose, you should hold your breath and put on the mask within 9 seconds of the first warning of a nerve agent presence.

Liquid nerve agents penetrate ordinary clothing rapidly. However, significant absorption through the skin requires a period of minutes. The effects may be reduced by quickly removing contaminated clothing and neutralizing liquid nerve agent on the skin by washing off, blotting, or wiping away. Prompt decontamination (decon) of the skin is imperative. Decon of nerve agents on the skin within 1 minute after contamination is perhaps 10 times more effective than it would be if delayed 5 minutes. A nerve agent on the skin can be removed effectively by using the M291 skin decontamination kit (fig. 13-28). The M291 skin decontamination kit is replacing the M258A1 (fig. 13-29). Upon receipt of the M291, discontinue use of the M258A1 on the skin. Detailed instructions on the use of skin decontamination kits can be found in Navy NAVMED P-5041 and in the kit itself. Liquid nerve agent in the eye is absorbed faster than on the skin and is extremely dangerous; **immediately** irrigate the eye with an abundant amount of water.

## Diagnosis of Nerve Agent Poisoning

Nerve agent poisoning may be identified from the characteristic signs and symptoms. It is important that all service members know the following **mild** and **severe** signs and symptoms of nerve agent poisoning. Service members who have most or all of the symptoms listed must **immediately** receive first aid (self-aid or buddy aid).

Self-aid is provided by the person affected by chemical agents. They know who they are, where they are, and what they are doing. They are able to move around freely without assistance. Buddy aid is provided when individuals cannot care for themselves and require assistance.

**MILD POISONING (SELF-AID).**—Casualties with **mild** poisoning may experience most or all of the following symptoms:

- Unexplained runny nose
- Unexplained sudden headache
- Sudden drooling
- Difficulty in seeing
- Tightness in the chest or difficulty in breathing
- Wheezing and coughing
- Localized sweating and muscular twitching in the area of the contaminated skin
- Stomach cramps
- Nausea with or without vomiting
- Tachycardia followed by bradycardia



Figure 13-28.—M291 skin decontamination kit.

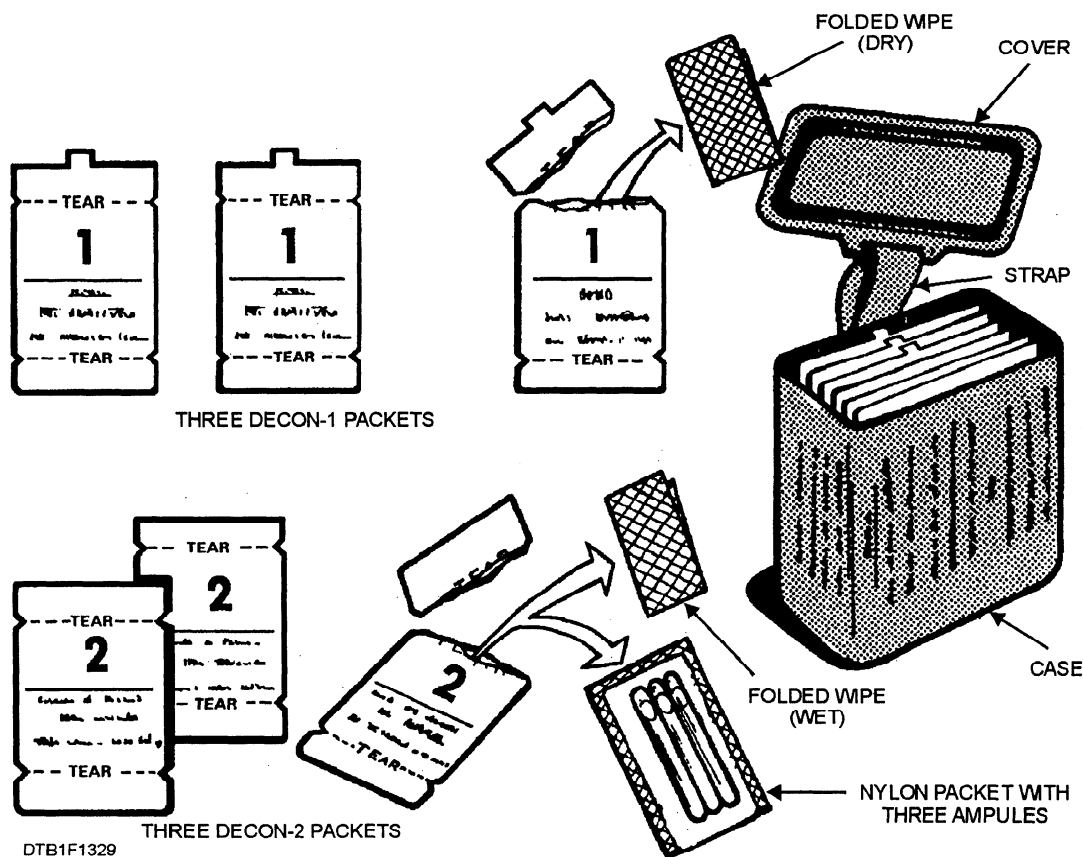


Figure 13-29.—M258A1 skin decontamination kit.

**SEVERE SYMPTOMS (BUDDY AID).**—Casualties with **severe** symptoms may experience most or all of the **mild** symptoms, plus most or all of the following:

- Strange or confused behavior
- Increased wheezing and difficulty in breathing
- Severely pinpointed pupils
- Red eyes and tearing
- Vomiting
- Severe muscular twitching and general weakness
- Involuntary urination and defecation
- Convulsions
- Unconsciousness
- Respiratory failure
- Bradycardia

Casualties with severe symptoms **will not** be able to treat themselves and **must receive** prompt buddy aid and follow-on medical treatment if they are to survive.

Casualties with **moderate** poisoning will experience an increase in the severity of most or all of the **mild** symptoms. Especially prominent will be

fatigue, weakness, and muscle contraction. The progress of symptoms from **mild** to **moderate** indicates either inadequate treatment or continuing exposure to the agent.

#### PREVENTION AND TREATMENT OF NERVE AGENT POISONING

The essential prevention and treatment of nerve agent poisoning include the following actions:

- Donning the protective mask and hood at the first indication of a nerve agent attack.
- Administering **atropine** and **pralidoxime chloride** (2 PAM Cl) as soon as any symptoms are noted.
- Administering convulsant antidote for nerve agents (CANA) to **moderately** or to **severely** poisoned casualties. CANA is also referred to as diazepam.
- Removing or neutralizing any liquid contamination immediately.
- Removing airway secretions if they are obstructing the airway. Airway suction may be needed.

- Establishing a patient airway (for example, with a cricothyroidotomy or endotracheal tube) and administering assisted ventilation, if required. Only qualified personnel can perform these procedures. You should use oxygen if available.

## NERVE AGENT ANTIDOTES

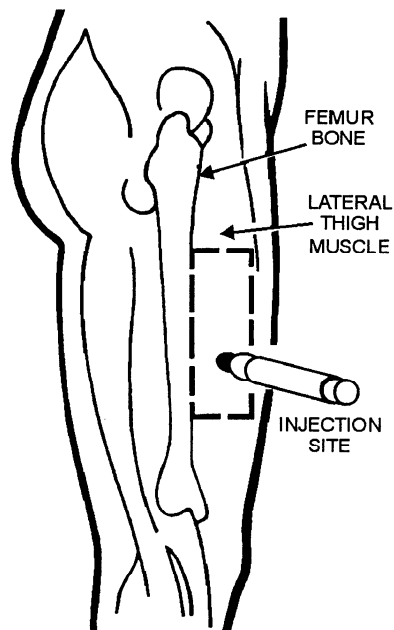
Atropine sulfate and 2 PAM Cl remain essential drugs in the treatment of nerve agent poisoning. When exposed, each member of the Navy and Marine Corps is issued three 2 mg auto injectors of atropine and three 600 mg auto injectors of 2 PAM Cl (fig. 13-30). **Do not** give nerve agent antidotes for preventive purposes **before** contemplated exposure to a nerve agent.

The atropine auto injector consists of a hard plastic tube containing 2 mg (0.7 ml) of atropine in solution. It has a pressure activated coiled spring mechanism that triggers the needle for injection of the antidote solution. The 2 PAM Cl auto injector is a hard plastic tube, which dispenses 600 mg of 2 PAM Cl (300 mg/ml) solution when activated. It also has a pressure activated coiled spring mechanism identical to that in the atropine auto injector. Diazepam (CANA) is administered as a single-dose 10 mg autoinjector.

### General Usage Principles for Nerve Agent Antidotes

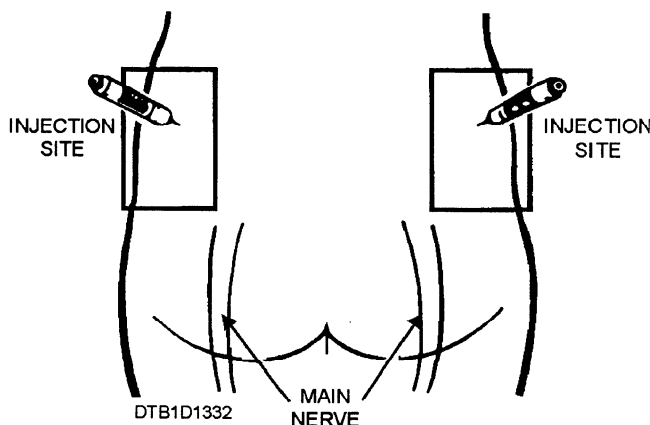
Certain general usage principles should be followed in the administration of nerve agent antidotes. Complete instructions for the administration of nerve agent antidotes are found on the auto injectors and also in the Navy NAVMED P-5041.

**SELF-AID.**—If you experience most or all of the **mild** symptoms of nerve agent poisoning, you should **IMMEDIATELY** hold your breath (**without first inhaling**) and put on your protective mask. Then, administer **one set** of (atropine and 2 PAM Cl) injections into your lateral thigh muscle or buttocks as illustrated in figures 13-31 and 13-32. Position the

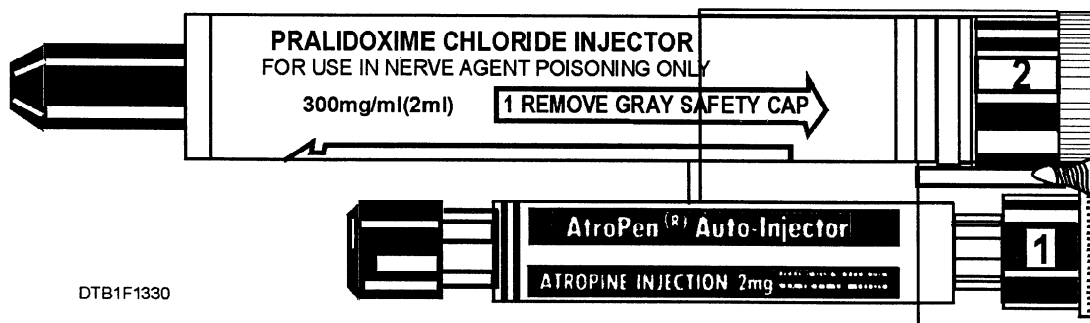


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Figure 13-31.—Thigh injection site.

needle end of the **atropine** injector against the injection site and apply firm, even pressure (not jabbing motion) to the injector until it pushes the needle into your thigh (or buttocks). Make sure you **do not** hit any buttons or other objects. Using a jabbing motion may result in an improper injection or injury to the thigh or buttocks.



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Figure 13-32.—Buttocks injection sites.



DTB1F1330  
Figure 13-30.—Nerve agent antidotes.

Hold the atropine injector firmly in place for at **least 10 seconds**. The seconds can be estimated by counting “one thousand one, one thousand two,” and so forth. Firm pressure automatically triggers the coiled mechanism. This plunges the needle through the clothing into the muscle and at the same time injects the atropine antidote into the muscle tissue.

Next, inject yourself in the same manner with the **2 PAM CI** injector using the same procedure as you did for the atropine. This will now complete one set of nerve agent antidotes. Attach the used injectors to your clothing (fig. 13-33).

After administering the **first** set of injections, wait 5 to 10 minutes before administering the **second** set since it takes that long for the antidote to take effect. However, if you are able to walk and know who you are, you **will not need a second set** of antidote injections.

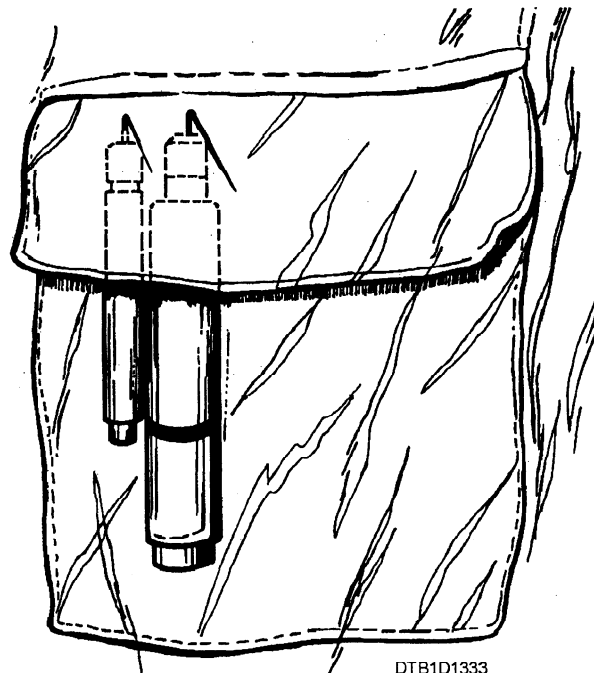


Figure 13-33.—One set of used auto injectors attached to a pocket flap.

### WARNINGS

Giving yourself a second set of injections may create a nerve agent antidote overdose, which could result in incapacitation.

If symptoms of nerve agent poisoning are not relieved after administering one set of nerve agent antidote injections, seek someone else to check your symptoms. A buddy must administer the second and possibly a third set of injections, if needed.

After administering one set of injections, you should decontaminate your skin if necessary, and put on any remaining protective clothing.

**BUDDY AID.**—If you encounter a service member suffering from **severe** signs of nerve agent poisoning, provide the following aid:

1. Mask the casualty, if necessary. Do not fasten the hood.
2. Administer, in rapid succession, **three** sets of the nerve agent antidotes. Follow the procedures for administration as described previously in the self-aid section.

In addition to administering atropine and 2 PAM CI antidotes for nerve agents as buddy aid, also administer the CANA to a casualty suffering from convulsions. **DO NOT** administer more than one CANA.

**NOTE:** Use the casualty's own antidote auto injectors when providing aid. Do not use your injectors on a casualty. If you do, you may not have any antidote available when needed for self-aid.

### BLISTER AGENTS

Blister agents or vesicants are likely to be used to produce casualties and force opposition to wear full protective equipment. Blister agents are used to degrade fighting efficiency rather than kill, although exposure to such agents can be fatal. More likely they will cause severe blistering and burning of the exposed skin. In either liquid or vapor form, these agents will irritate and blister any part of the body that they touch. Blister agents can be effective in small amounts; a drop the size of a pinhead may produce a blister the size of a quarter. These agents are more effective in hot weather than in cold weather. They first affect the moist parts of the body (bends of arms and knees, armpits, and crotch.) People who are sweating are especially subject to severe burns. If you are exposed to blister agents, changes may not occur immediately. One to several hours may pass before your skin starts to turn red. It may be hours or even days later before blisters appear. However, the damage is inflicted during the first few minutes of exposure. That is why speed in applying self-aid is so important. Self aid is explained later in this chapter.

Damage to the eyes may be more serious than the effects on the skin. Gases and even liquids may irritate the eyes only mildly at first, or there may be no pain at all. In a few hours your eyes may become painful, inflamed, and sensitive to light. Tears and severe pain will follow, with possible permanent injury.

If inhaled into the lungs, blister agents will inflame the throat and windpipe, producing a harsh cough. In a prolonged exposure, this may result in pneumonia and death. Quick detection of blister agents and prompt protection against entry into the eyes, lungs, or skin is vital.

## INCAPACITATING AGENTS

Incapacitating agents, or psychochemical agents, can cause mental symptoms. They may also produce physical symptoms such as staggering gait, dizziness, and blurred vision. Some of these agents cause fainting spells and others cause severe muscle weakness. The mental symptoms often resemble alcoholic drunkenness; for example, individuals may act silly, giggle, or become angry and belligerent similar to a "fighting drunk." Incapacitating agents can also cause hallucinations. Many of these incapacitating gases prevent sleep, causing some people to stay awake for days and be mentally confused for the entire period. These agents do not kill, but they can make a person noneffective. Many of them do not produce effects until several hours after inhalation. The effects of incapacitating agents can last from 8 hours to 4 days.

## BLOOD AGENTS

Blood agents or cyanogens get their name from the action they have on your blood. If you inhale these agents, your blood cannot furnish enough oxygen to your body's cells. As a result, body tissues suffocate and die. Large amounts of blood agents produce rapid breathing and violent convulsions; mild exposure may produce headache, dizziness, and nausea. Blood agents will cause either a speedy death or there will be a complete recovery within a few hours. Like the nerve agents, blood agents may be quick killers. Speed in putting on a mask is essential.

## CHOKING AGENTS

The lungs are the target for choking agents. Choking agents do not harm your skin or digestive system but they will actually choke an unprotected person. If large amounts enter the lungs, they will become filled with fluid and death may result from lack

of oxygen. Your protective mask gives you complete protection against all choking agents. The instant you suspect the presence of a chemical agent, carry out these three steps as quickly as possible.

1. Hold your breath; not inhaling before
2. Put on your protective mask
3. Clear your mask (explained later in this chapter)

## RIOT CONTROL AGENTS

Vomiting and tear agents, known as "riot control agents," can produce unpleasant symptoms that usually last for a short time period. When properly used, these agents do not cause death. They are used to control riots, to force people out of buildings, and to capture enemy forces without injury. These agents are also often used for training purposes.

### Vomiting Agents

Inhaling vomiting agents (sternutators) can make you ill. A sense of fullness in the nose, severe headache, intense burning in the throat, and tightness and pain in the chest are the general symptoms. These symptoms are followed by uncontrollable coughing, violent sneezing, nausea, and vomiting.

The symptoms may be delayed for several minutes. If you should inhale a vomiting agent before putting on your protective mask, you might become ill later. **You must wear your protective mask as long as the agent is present. Pull it away from your chin during actual vomiting, but do not take it off** The mask offers adequate protection against vomiting agents. The effects of vomiting agents will usually disappear in 20 minutes to 2 hours.

### Tear Agents

Tear agents, or lacrimators, are the least toxic of the six groups of chemical agents. These agents may be used in civil riots to disperse the crowds or to squelch prison riots. The vapors of tear agents can produce a sharp, irritating pain in the eyes resulting in an abundant flow of tears. There is no permanent damage to the eyes and the effects wear off quickly. For a short period, you will not be able to see clearly. The protective mask, used before tear agents get into your eyes, will give complete protection. Some of the new tear agents can cause runny noses, severe chest pains, nausea, and vomiting.

## DECONTAMINATION

The guiding principles in personal decontamination are to avoid spreading contamination, to clean contaminated areas, and to manage casualties without aggravating other injuries.

The decontamination of chemical hazards can be accomplished by removing, neutralizing, or destroying the chemical warfare (CW) agents. The purpose of personal decontamination is to remove toxic substances from your body or personal equipment before serious injury occurs. Examples of these principles are as follows:

- Removing: pinch-blotting the agent from your skin
- Neutralizing: using the M291 or M258A1 decontamination kit to make the agent harmless
- Destroying: burning or burying a contaminated cloth that was used to blot off the agent

### Self-Aid Decontamination

Self-aid or personal decontamination is solely your responsibility. If tactical conditions at the time of exposure require you to keep fighting, you must decontaminate at the earliest opportunity.

There are definite time limits after which self-aid becomes useless, so immediate personal decontamination is important if you are exposed to CW agents. Decontamination by either neutralizing or removing the agent, or both, should be carried out before serious injury occurs. You may have to rely on whatever you have on hand to remove these agents from your skin, eyes, or equipment. If liquid nerve or blister agents touch any part of your body, you must remove them rapidly, for these agents can quickly penetrate the skin. If you are caught without the M291 or M258A1 decontamination kit or soap and water, then use anything that is available. It may be mud, gun oil, or even urine. A crude remover may get off only two-thirds of the agent, but it is better than nothing. When you are removing any agent from your body with soap and water, scrub your body just as vigorously as a physician scrubs his/her hands before an operation. Exposed regions and hairy areas should be given extra attention.

Speed is essential in self-aid. You may not know whether you have been contaminated with liquid nerve or blister agents, the following standard procedures must be observed to prevent injury from liquid agents.

- Decontaminate the eyes and face, if necessary
- Put on a protective mask
- Use the M291 or M258A1 kit for decontamination of the skin
- Throw away any contaminated clothing (or cut away the contaminated parts)
- Use the antidote injector **only** if you experience the symptoms produced by **nerve agents**

The self-aid procedures for specific agents given later should be employed if the agent has been identified.

### Skin Decontamination

If chemical agents contact your skin, you must take immediate action to decontaminate yourself. Start the skin decontamination (or decon) within 1 minute of becoming contaminated. Some toxic chemical agents, especially nerve agents, are rapidly absorbed by the skin and can kill in minutes.

If you do not have a skin decon kit, chemical contamination may be pinch-blotted from the skin with a cloth and then flushed with water. Pinch-blotting is better than rubbing because it limits the spread of contamination. Soap, if available, can also be used to wash the agent from the skin. Washing with soap and water (or hot water) is the next best method for toxic agent decon. This method is not as effective as using the decon kits.

### Self-Aid for Blister Agents

Blister agents are usually released as gases and have the odor of garlic, fish, or geraniums.

**FOR THE EYES.**—If a blister agent gets in your eyes, treat them instantly. Every second counts. If there is no pain in your eyes, treat them with water only (as described next). If there is pain in your eyes, flush the eyes with water and seek medical aid immediately.

- Flush the eyes with water. The best method is to tilt the head back so that the eyes look straight up. Pull the lids apart with the fingers of one hand. With the other hand, pour water slowly into the eyes. Try to regulate the flow of water so the flushing lasts not less than 30 seconds and not more than 2 minutes.

- **Speed** in decontaminating the eyes is **absolutely essential**. Decontamination will be very effective for mustard agents if it is applied within the first few seconds; after 2 minutes it has little benefit.

**SKIN AND CLOTHING.**—The following measures are recommended for decontamination of the skin and clothing.

- Use the M291 or M258A1 decontamination kit.
- If the contamination is discovered late, when no liquid blister agent is visible and reddening of the skin has developed, wash the contaminated area with soap and water. The decontamination kit will not be helpful at this stage.
- Cut off hair that becomes contaminated with the liquid blister agent. Decontaminate the exposed scalp with the M291 or M258A1 decontamination kit.
- If in a secure place, remove clothing that is contaminated with liquid blister agents. This applies to both ordinary clothing and to impregnated protective clothing. Decontaminate small areas with soap and water. If contamination is too great to handle with the equipment you have, cut out the contaminated parts. Do not wear the clothes; when you are able, boil them with soap and water. This will make them safe to wear.

### **Self-Aid and First Aid for Incapacitating Agents**

By the time a victim of an incapacitating agent exposure realizes something is wrong, the individual may be too confused to handle his/her own decontamination. Take these cases to medical immediately. These victims may not be responsible for their actions.

### **Self-Aid for Blood Agents**

Blood agents are usually released as a gas and have an odor of bitter almonds. As a victim of blood agent exposure, you must first put on your mask and then avoid any unnecessary movements. The medical officer or Hospital Corpsman will give you amyl nitrate to inhale. Squeeze the ampule until it pops. Insert 2 ampules inside the face piece of your mask under the eye lens. Repeat this at intervals of 3 or 4 minutes until normal breathing returns or until a total of 8 ampules are used.

### **Self-Aid for Choking Agents**

Upon detecting any choking agent in the air, put on your protective mask **immediately**. The odor is like new-mown grass or hay. Continue with your combat duties unless you have a difficult time breathing, feel

nauseated, or vomit. In those cases, take it easy and avoid unnecessary movement.

### **Self-Aid for Vomiting Agents**

Vomiting agents are usually released as a gas and have the odor of burning fireworks. For protection against vomiting agents, put on your mask and wear it in spite of coughing, sneezing, excessive salivation, or nausea. If necessary, briefly lift the mask from your face to permit vomiting or to drain saliva from the facepiece. Clear your mask each time you adjust it to your face and before you resume breathing. **Carry on with your duties as vigorously** as possible; this will help to lessen and to shorten the symptoms. Combat duties can usually be performed in spite of the effects of vomiting agents.

### **Self-Aid for Tear Agents**

Tear agents are usually released as a gas and have the odor of apple blossoms, chloroform, or pepper. If a liquid or solid agent has entered your eyes, force your eyes open and flush them with water. **To clear your mask, you should put it on, cover the outlet valve, and blow hard until clear.** When it is safe to remove your mask, blot away tears, but do not rub your eyes. Then, face into the wind if possible.

## **BIOLOGICAL WARFARE**

Biological warfare (BW) is the deliberate use of germs or their poisonous products to produce disease, injury, or death in man, animals, or plants. It is the intentional use of biological agents that makes BW dangerous.

### **CHARACTERISTICS OF BIOLOGICAL WARFARE AGENTS**

Germs are alive. Behaving in the manner of other living things, they multiply, breathe, eat, grow, and die. Thus they depend on moisture, food, and certain limits of temperature for life and growth. When their surroundings do not provide suitable conditions, they die. Most germs are killed by boiling water, adding chlorine tablets to water, cooking food, exposing them to sunlight, and using soap and water. BW agents or their poisonous products attack your body by the same routes as CW agents—through your nose, mouth, or skin.



In contrast to CW agents, the presence of BW agents cannot be detected by the physical senses or by chemical detectors. Their presence or identity can be determined only by laboratory examination of air samples or contaminated objects. The time lag between exposure to BW and the onset of symptoms will usually be a matter of days, rather than hours. All persons will not be similarly affected even though exposed to the same dosage of BW agents. Some may escape disease entirely, some may have a very mild attack, and some may become seriously ill.

## PROTECTIVE MEASURES

Defense against BW is not simple or easy. Individual protection against a BW attack includes the use of protective equipment. The protective equipment used for defense against CW may also be used for BW defense. Your first line of defense against BW is the natural resistance of the body (the immune system) and maintaining your body in the best possible physical condition. A high standard of personal cleanliness and careful attention to sanitation are your best assurance against the spread of disease. Such steps are supported by the immunizations you receive periodically.

The inhalation of airborne germs is considered to be the greatest potential hazard in BW. Your protective mask is an important component of defensive equipment. A properly fitted mask, which has been kept in good condition, will greatly reduce the danger of inhaling infectious material present in the air. Since you cannot detect the presence of biological agents, you may be ordered to use your protective mask and equipment until the danger has passed. Your commanding officer will base his/her decision upon information received from intelligence reports and the advice of his/her technical staff or higher headquarters.

To produce disease, germs must actually gain entrance into your body. When germs collect on your skin, they may be transferred to a portal of entry, through your nose or mouth. Cuts or open sores are an invitation to germs trying to enter your body. Make sure you keep cuts bandaged. Any type of clothing will provide some protection against BW agents. The degree of protection depends upon the size of the pores in the fabric and the number of layers of clothing being worn. To keep out germs and disease-bearing insects such as mosquitoes, fleas, and ticks, it is important to fasten the shirt and jacket collar, roll down sleeves and button cuffs, and tie down all other clothes. A special uniform (not discussed in this book) used for

protection against CW agents gives a higher degree of protection against BW agents than ordinary clothing.

## DECONTAMINATION

The extent to which decontamination can be accomplished following exposure to BW agents depends upon the existing tactical situation and the facilities available. Each person is responsible for carrying out personal decontamination measures at the earliest opportunity.

If you are exposed to BW agents, scrub yourself thoroughly with soap and water as soon as the combat situation permits. Give special attention to your face and hands. To remove dirt from under your nails, use a fingernail brush. Also, brush your teeth frequently. Carefully remove your contaminated clothes and take a bath or shower. All washable clothes polluted with germs should be scrubbed at the first opportunity.

Always be careful about the food and water you consume in combat. If you are told that a BW attack has occurred, be **extremely** cautious. One of the easiest ways to get biological agents inside your body is to swallow them along with your food and water. Defense against BW includes:

- Remember the "BIO" sign; it means the area is contaminated with biological agents.
- Do not pick and eat fruits or berries.
- Do not chew grass or leaves.
- Do not eat native food or drink native beverages. They may be contaminated intentionally or unintentionally.
- Do not take souvenirs.
- Consume only beverages received from military sources.
- Do not bathe in lakes or ponds.
- Do not touch animals.

## Survival Tips for Biological Warfare

The following survival tips are recommended for your protection:

- **REPORT SICKNESS PROMPTLY.** If you become ill, notify medical immediately.
- **KEEP YOURSELF AND YOUR LIVING QUARTERS CLEAN.** Do not foster the growth of germs by making it easy for them to multiply. Germs

have trouble living in clean places. If you keep clean, the odds increase that you may not become ill.

- **DO NOT NEGLECT PREVENTIVE MEDICINE.** Take pills, shots, or vaccinations at the appropriate time.

- **KEEP YOUR NOSE, MOUTH, AND SKIN COVERED.** When BW agents are known or suspected to be present, make sure that you use all of your protective equipment.

- **KEEP YOUR FOOD AND WATER PROTECTED.** Bottled or canned foods are safe after a BW attack if the seals are not broken. Food in the open will be contaminated. If in doubt, discard the food. Always clean cans, packages, etc., with soap and water before opening.

- **BE ALERT FOR ANY SIGNS OF A BW ATTACK.** Any clues such as new or unusual types of shells or bombs, strange material sprayed by aircraft, smokes or mists of unknown nature, or other strange substances should be reported to your commanding officer immediately.

- **WATCH OUT FOR “BOOBY TRAPS.”** The enemy may challenge your discipline and self-control by making available all sorts of tempting items of food. To eat or drink these contaminated items may mean death.

## TREATMENT OF CASUALTIES

There are no self-aid measures for the diseases that are caused by BW agents. It may be a matter of days before it can be determined what types of BW agents are present. Medical personnel will direct the decontamination of these casualties.

## RADIOLOGICAL WARFARE

Radiological warfare (RW) is the deliberate use of radiological weapons to produce injury and death. The explosion of a radiological weapon, similar to that of an ordinary bomb, causes damage by the heat and blast liberated at the time of detonation. Nuclear radiation is emitted when the bomb explodes. This radiation may also be released by particles called radioactive fallout.

## EFFECTS OF RADIATION

The first indication of an overdose of radiation probably will not occur for several hours or days. At that time, you will probably become ill with nausea and

vomiting. The length of time it takes for these symptoms to appear generally depends on the extent of radiation exposure. The larger the dose, the quicker you may become ill.

## TYPES OF EXPLOSIONS

An **air burst** is a nuclear explosion that causes damage by heat and blast. The initial radiation from an air burst occurs within the first minute after the blast and disappears quickly.

A **ground or surface burst** is one that is low or on the ground surface. It causes less damage from the heat and blast. This type of burst produces radioactivity fallout or **residual radiation**, which lasts for a long time period.

## PROTECTIVE MEASURES

To protect yourself against RW, you must know how to protect yourself during nuclear attacks and be familiar with the kinds of equipment available for your protection.

### Self-Protection

Speed in taking cover is vital; you must protect yourself from the heat and the blast. Remember that the initial radiation after an explosion can be very dangerous. As with any explosion, the more material or distance between you and the burst, the safer you are. Falling flat and covering your face is better than standing.

### Protective Clothing

Any type of clothing that covers you gives some protection against radiological weapons. To protect the clothes you are wearing from radioactive materials, an extra protective covering is recommended.

### Gloves and Masks

When you enter a radioactive area, you must wear gloves to protect your hands. Touching radiographic material with bare hands may result in serious burns. You should wear a protective mask or a dust respirator in the affected area to prevent inhaling radioactive materials. The point to remember is never inhale radioactive material. Serious injury and radiation sickness may result.

## **DECONTAMINATION**

If you suspect that you are contaminated, or if detection equipment indicates you are, report to a personnel decontamination station. Outer clothing will serve as a trap for most radioactive contamination. By taking off your clothes, you may remove most of the contamination.

The usual procedure at the personnel decontamination station is as follows: discard clothing and equipment as directed. Enter the shower; then bathe, using plenty of soap and warm water. In scrubbing the entire body, give particular attention to the hair, fingernails, body creases, and ears. After the shower, you will be directed to a monitor who will check you with a radiation detector. If any contamination remains, you must shower again. If no contamination is detected, you may proceed to the dressing room for a new issue of clothing and equipment.

Since food and water are especially subject to contamination, avoid consuming uncovered food and water if they are in a radioactive area. Canned foods and covered water supplies may be consumed with safety, even after the outside of the containers are decontaminated.

## **Self-Aid**

If the situation does not permit you to go to a decontamination station, you must be able to remove most of the radioactive material with whatever you have on hand. If you become heavily contaminated, the following measures are recommended:

1. Remove your outer garments. Shake them vigorously or brush them off. Be sure that the clothing is held downwind. This will remove most of the radioactive material, unless it is wet and muddy
2. If it is too cold or wet to remove your clothing, brush or scrape them carefully.
3. The same procedure should be used to decontaminate your equipment.

## **Treatment of Casualties**

In the case of an air burst explosion, you may administer first aid to those casualties who received injuries from nuclear explosions, without fear of becoming contaminated by the casualties. If the weapon has been detonated close to the ground, both you and the casualties may have some radioactive fallout on your skin and clothing. You must treat for hemorrhage, shock, wounds, fractures, burns, and other injuries.



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# *Assignment Questions*

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**Information:** The text pages that you are to study are provided at the beginning of the assignment questions.



# ASSIGNMENT 1

Textbook Assignment: "General Administration and Orientation," chapter 1, pages 1-1 through 1-6; and "Technician Administration and Responsibilities," chapter 2, pages 2-1 through 2-23.

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- 1-1. Which of the following training manuals includes the basic organizational shipboard elements?
1. Dental Assistant, Advanced
  2. Basic Shipboard Requirements
  3. Advanced Shipboard Requirements
  4. Basic Military Requirements
- 1-2. What is the primary function of a basic dental technician?
1. Assist medical officers
  2. Assist dental officers
  3. Assist nurse officers
  4. Assist all officers
- 1-3. The Medical Department of the Navy is composed of how many total corps and ratings?
1. Six
  2. Five
  3. Four
  4. Three
- 1-4. What person is responsible for ensuring personnel and material readiness of shore activities as assigned by the CNO?
1. Chief, Dental Corps
  2. Commanding Officer
  3. Chief, BUMED
  4. Deputy CNO
- 1-5. Who is the Medical Department's spokesperson for all dental professional matters?
1. Chief, Medical Corps
  2. Chief, Dental Corps
  3. Chief, Nurse Corps
  4. Chief, BUMED
- 1-6. Which of the following people is responsible for matters involving enlisted personnel assigned to Navy Medicine?
1. Chief, BUMED
  2. Chief, Dental Corps
  3. Chief, Surgeon General
  4. Director, Medical Department Enlisted Personnel
- 1-7. Who is the principle enlisted advisor to the Chief of BUMED?
1. Force Master Chief, BUMED
  2. Force Master Chief, NAVMEDCOM
  3. Force Master Chief, Atlantic
  4. Force Master Chief, DEPMEDS
- 1-8. NDCs can be divided into how many different types based on size and function?
1. One
  2. Two
  3. Three
  4. Four
- 1-9. Which person at an NDC is responsible for the professional care and services provided to patients?
1. Patient Contact Representative
  2. Director Clinical Services
  3. Executive Officer
  4. Commanding Officer
- 1-10. At an NDC, who is the CO's senior enlisted adviser for all matters relating to enlisted policy?
1. Patient Contact Representative
  2. Command Master Chief
  3. Leading Chief Petty Officer
  4. All of the above

- 1-11. What type of officer is appointed as the director for dental center administration?
1. Nurse Corps
  2. Dental Corps
  3. Dental Service Corps
  4. Medical Service Corps
- 1-12. All orders issued by the director of a branch dental clinic will be regarded as proceeding from the Chief of the Dental Corps.
1. True
  2. False
- 1-13. The DT rating was first established by the SECNAV on which of the following dates?
1. 02 Dec 47
  2. 12 Dec 47
  3. 30 Dec 47
  4. 31 Dec 47
- 1-14. On what date did the DT rate become effective?
1. 12 Dec 47
  2. 02 Dec 48
  3. 02 Apr 48
  4. 22 Apr 48
- 1-15. Dental Technicians and Hospital Corpsman make up which of the following Occupational Fields?
1. XIV
  2. 14
  3. Both 1 and 2
  4. XVI
- 1-16. What type of system is used to identify enlisted personnel with special skills, knowledge, or aptitude for filling billets?
1. NICS
  2. NCE
  3. NEC
  4. NAC
- 1-17. Assignments to duty stations are made by which of the following people?
1. EPMAC
  2. BUMED
  3. Assigners
  4. Detailers

- 1-18. Dental Assistant, Basic, Class "A" school graduates will be assigned what identifier for job assignments?
1. DT-0000
  2. DT-8700
  3. DT-8703
  4. DT-8707

- |   |
|---|
| <p>A. DT-8700</p> <p>B. DT-8707</p> <p>C. DT-8703</p> <p>D. DT-8708</p> <p>E. DT-8732</p> <p>F. DT-8752</p> <p>G. DT-8753</p> <p>H. DT-8765</p> <p>I. DT-8783</p> |
|---|

Figure 1A.—Dental Technician NEC's.

IN ANSWERING QUESTIONS 1-19 THROUGH 1-26, SELECT FROM FIGURE 1A THE DENTAL TECHNICIAN NEC THAT BEST DESCRIBES THE SKILLS GIVEN IN THE QUESTION. YOU WILL NOT USE ALL OF THE NEC'S IN FIGURE 1-A.

- 1-19. Assist the dental officer in organizing and managing a dental clinic or facility.
1. A
  2. C
  3. E
  4. I
- 1-20. Maintain dental central sterilization facilities.
1. C
  2. E
  3. G
  4. I
- 1-21. Repair, reconstruct, and reline dental prostheses.
1. E
  2. F
  3. H
  4. I
- 1-22. Assist the dental officer in providing treatment in the field.
1. D
  2. C
  3. B
  4. A



- 1-23. Constructs ocular, extraoral, and intraoral prostheses.
1. H
  2. G
  3. F
  4. D
- 1-24. Performs scaling and root planning.
1. A
  2. C
  3. D
  4. G
- 1-25. Constructs complex and precision dental prostheses.
1. F
  2. G
  3. H
  4. I
- 1-26. Handles the maintenance, repair, and installation of dental equipment and diagnostic services.
1. B
  2. C
  3. D
  4. E
- 1-27. The efficient operation of a dental clinic depends on its personnel and what other aspect?
1. Administrative support
  2. Medical support
  3. Maintenance
  4. X-ray
- 1-28. What is the most important aspect of dental care that your patients receive?
1. Low-cost
  2. Esthetics
  3. Both 1 and 2
  4. Quality
- 1-29. What total number of factors are involved in a patient contact point?
1. One
  2. Two
  3. Three
  4. Four
- 1-30. Which of the following definitions best defines a patient that is dental phobic?
1. Enjoys the dentist and staff
  2. Overwhelming feeling of panic and terror
  3. Overwhelming feeling of joy and happiness
  4. Enjoys the affects of local dental anesthesia
- 1-31. Which of the following attributes are marks of an outstanding Dental Technician?
1. Courteous
  2. Efficient
  3. Pays attention to detail
  4. All of the above
- 1-32. Which department is directly responsible for the image of the dental service provided?
1. Front desk
  2. Oral diagnosis
  3. Operative
  4. Surgical
- 1-33. When communicating with a patient, what type of terms should you use?
1. Technical
  2. Medical
  3. Dental
  4. Laymen
- 1-34. Wincing of the eyes may indicate that a patient is feeling which, if any, of the following responses?
1. Comfortable
  2. Uncomfortable
  3. Needs a drink of water
  4. None of the above
- 1-35. A good rule is to try to answer the telephone by which maximum number of rings?
1. One
  2. Two
  3. Three
  4. Four
- 1-36. Which of the following information should you never communicate over the telephone to a patient?
1. Clinic hours
  2. Diagnosis
  3. Prescription
  4. Both 2 and 3

- 1-37. A patient's eligibility must be verified through which of the following systems?
1. DEERS
  2. DEARS
  3. NEETS
  4. DIRS
- 1-38. Which of the following type of treatment is considered as routine dental care?
1. Orthodontics
  2. Malocclusion
  3. Oral bleeding
  4. Dental examination
- 1-39. Which of the following type of treatment is considered as emergency dental care?
1. Removing stain
  2. Relieving pain
  3. Orthodontics
  4. Dental exam
- 1-40. Which of the following type of treatment is considered as elective dental care.
1. Removing stain
  2. Relieving pain
  3. Orthodontics
  4. Dental exam
- 1-41. What priority category will family members of an active duty member be placed on for treatment eligibility?
1. 1A
  2. 2
  3. 1B
  4. 4
- 1-42. Which of the following methods is often the best use of treatment time?
1. Block
  2. Fixed
  3. Non-fixed
  4. Increment
- 1-43. When making a patient an appointment, where should you first enter the information?
1. Appointment book
  2. Appointment card
  3. Patient's record
  4. Patient log
- 1-44. Which type of register will show the date, name, grade/rate, and reason for visit?
1. Front desk
  2. Special
  3. Appointment
  4. Patient
- 1-45. Which NAVMED form is used to schedule dental appointments?
1. 6600/5
  2. 6600/2
  3. 6600/3
  4. 6600/4
- 1-46. Which NAVMED form is used as a dental appointment card?
1. 6600/2
  2. 6600/4
  3. 6600/6
  4. 6600/8
- 1-47. What type of list is used for patients requiring extensive treatment?
1. Class three priority list
  2. Patient three list
  3. Patient call list
  4. Both 2 and 3
- 1-48. The dental computerized recall system uses a maximum of how many lists?
1. 3
  2. 6
  3. 9
  4. 12
- 1-49. Which of the following information does DENMIS NOT have the capability to process?
1. Dental Workload reports
  2. Provider NMIMC reports
  3. Provider Treatment Time reports
  4. Patient and Unit Dental Treatment Needs reports
- 1-50. The Daily DIRS record is designed to give providers what type of a treatment record?
1. Monthly
  2. Weekly
  3. Bi-weekly
  4. Daily

- 1-51. BUMED Instruction 6300.10 is divided into how many parts?
1. Five
  2. Two
  3. Three
  4. Four
- 1-52. Which program allows patients to voice and document how they are treated?
1. Patient Complaint
  2. Patient Contact
  3. Patient Survey
  4. Patient Quality Assurance
- 1-53. Validated patient complaints and compliments are incorporated into which of the command's annual assessments?
1. Quality of Life
  2. Quality of Care
  3. Quality Insurance
  4. Quality Assurance
- 1-54. The new Dental Record Jacket is which of the following NAVMED forms?
1. 6150/21-30
  2. 6150/10-19
  3. 6150/09-19
  4. 6150/00-08
- 1-55. Which number of the SSN is preprinted on the Dental Record Jacket?
1. Last
  2. Second to last
  3. Third to last
  4. Fourth to last
- 1-56. A patient without an SSN will have which of the following substitute SSN's established if the birth date is August 11, 1959?
1. 000-08-1159
  2. 001-08-1159
  3. 800-59-1108
  4. 800-08-1159
- 1-57. Which of the following FMP codes will be placed in the two diamonds preceding the SSN for a retired member from the USN?
1. 01
  2. 20
  3. 30
  4. 60
- 1-58. Which of the following phrases is written in the lower portion of the patient's identification box for retired 0-7 and above personnel?
1. "VIP"
  2. "ADMIRAL"
  3. "FLAG/GENERAL OFFICER"
  4. "ATTENTION ON DECK"
- 1-59. Which of the following symbols and color of felt-tip pen will be placed in the alert box if the patient has an allergy or sensitivity?
1. "A/S" Black
  2. "X" Red
  3. "A/S" Red
  4. "X" Black
- 1-60. Which, if any, of the following color felt-tip pen is used to mark the annual verification section on the right-hand side of the jacket?
1. Red
  2. Blue
  3. Black
  4. None of the above
- 1-61. The format printed on the inside of the jacket cover should be completed in what type of writing utensil?
1. Pen
  2. Pencil
  3. Crayon
  4. Magic marker
- 1-62. Where is the DD 2005, Privacy Act Statement located in the NAVMED 6150/21-30?
1. Back cover
  2. Back of front page
  3. Back of center page
  4. Front of center page

- 1-63. Where is the Disclosure Accounting Record located in the NAVMED 6150/21-30?
1. Back cover
  2. Back of front page
  3. Back of center page
  4. Front of center page
- 1-64. Where is the Forensic Examination form located in the NAVMED 6150/21-30?
1. Inside back cover
  2. Back of front page
  3. Back of center page
  4. Front of center page
- 1-65. What color of record category tape is used to indicate active duty military?
1. Yellow
  2. Green
  3. Blue
  4. Red
- 1-66. What color of dental classification tape, if any, is used to indicate a dental "class 3" on the NAVMED 6150-21/30?
1. Red
  2. Green
  3. Yellow
  4. None
- 1-67. All forms documenting patient care placed in the NAVMED 6150-21/30 will contain which of the following patient information?
1. FMP and sponsor's SSN
  2. Name- last, first, middle initial
  3. Sponsor's branch of service and status
  4. All of the above
- 1-68. Sequential bitewing radiographs should be filed in which section of the NAVMED 6150/21-30?
1. Back of dental record jacket center page
  2. Front of dental record jacket center page
  3. Inside back cover of dental record jacket
  4. Inside front cover of dental record jacket
- 1-69. Dental Exam Forms and EZ 603s should be filed in which section of the NAVMED 6150/21-30?
1. Back of dental record jacket center page
  2. Front of dental record jacket center page
  3. Inside back cover of dental record jacket
  4. Inside front cover of dental record jacket
- 1-70. The most current Dental Treatment Form, EZ603A is filed in which section of the NAVMED 6150/21-30?
1. Back of dental record jacket center page
  2. Front of dental record jacket center page
  3. Inside back cover of dental record jacket
  4. Inside front cover of dental record jacket
- 1-71. The NAVMED 6600/3 is filed in which section of the NAVMED 6150/21-30?
1. Back of dental record jacket center page
  2. Front of dental record jacket center page
  3. Inside back cover of dental record jacket
  4. Inside front cover of dental record jacket
- 1-72. When using the terminal digit filing system, how many equal sections are the central files divided into?
1. 100
  2. 200
  3. 300
  4. 50
- 1-73. Which of the following NAVMED Forms is the Health Record Receipt?
1. 6150/1
  2. 6150/6
  3. 6150/7
  4. 6150/8
- 1-74. The Request for a Medical/Dental Record Information Form is identified by which of the following DD numbers?
1. 778
  2. 878
  3. 978
  4. 877

1-75. What is the maximum time allowed for the retention of loose treatment forms?

1. 3 months
2. 6 months
3. 1 year
4. 2 years

# ASSIGNMENT 2

Textbook Assignment: "Head and Neck Anatomy," chapter 3, pages 3-1 through 3-14; and "Oral Anatomy," chapter 4, pages 4-1 through 4-26.

---

2-1. Bone is composed of which of the following elements?

1. Organic only
2. Inorganic only
3. Both 1 and 2 above
4. Ethmoid

2-2. The inner spongy, porous portion of bone is referred to as what type of bone?

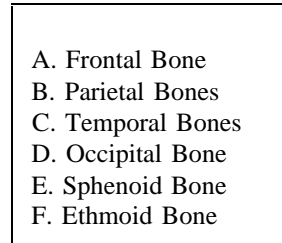
1. Cortical
2. Compact
3. Connective
4. Cancellous

2-3. The thin layered connective tissue that surrounds each bone and provides nourishment through many vascular vessels is referred to as what type of bone?

1. Cartilage
2. Periosteum
3. Inner mucosa
4. Cartilaginous

2-4. The cranium is formed by how many cranial bones?

1. 8
2. 6
3. 3
4. 28



**Figure 2A.—Cranial bones.**

IN ANSWERING QUESTIONS 2-5 THROUGH 2-10, SELECT FROM FIGURE 2A THE CRANIAL BONE(S) THAT BEST DESCRIBES THE INFORMATION GIVEN IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

2-5. This bone is shaped like a wing.

1. B
2. C
3. D
4. E

2-6. These bone(s) has/have four borders and is/are shaped like a curved plate.

1. A
2. B
3. D
4. F

2-7. This bone has small openings through which nerves pass to the roof of the mouth.

1. A
2. C
3. D
4. F

2-8. This bone has a large opening called the foramen magnum.

1. A
2. C
3. D
4. E

**THIS SPACE LEFT BLANK INTENTIONALLY.**

2-9. By the time a child reaches 5 or 6 years of age, this bone has usually fused together.

1. A
2. B
3. C
4. D

2-10. The internal ear structures are enclosed by these bone(s).

1. C
2. D
3. E
4. F

2-11. The facial skeleton is made up of how many stationary bones including the mandible?

1. 7
2. 15
3. 22
4. 28

- |  |
|--|
| A. Maxille bones<br>B. Palatine bones<br>C. Zygomatic bones<br>D. Lacrimal bones<br>E. Nasal bones<br>F. Vomer bone<br>G. Mandible |
|--|

**Figure 2B.—Bones of the face.**

IN ANSWERING QUESTIONS 2-12 THROUGH 2-18, SELECT FROM FIGURE 2-B, THE BONE(S) OF THE FACE THAT BEST DESCRIBES THE INFORMATION GIVEN IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

2-12. These bones form the cheek bones, and help form the sides and floor of the orbits.

1. A
2. B
3. C
4. D

2-13. The smallest and most fragile of the cranial bones.

1. D
2. E
3. F
4. G

2-14. The only movable bone in the skull.

1. D
2. E
3. F
4. G

2-15. The bones are somewhat L-shaped.

1. A
2. B
3. C
4. D

2-16. Small oblong bones, somewhat rectangular in shape.

1. C
2. D
3. E
4. F

2-17. Consists of a body and four processes.

1. A
2. B
3. C
4. D

2-18. Connects with the ethmoid bone and together they form the nasal septum.

1. D
2. E
3. F
4. G

2-19. The process that is located posterior on the ramus and forms the head of the mandible is known by which of the following terms?

1. Palatine
2. Coronoid
3. Condylloid
4. Alveolar

2-20. A dentist will use anesthetic to block nerve impulses of the mandibular teeth in which of the following areas?

1. Mental protuberance
2. Mandibular foramen
3. Maxillary foramen
4. Zygomatic foramen

- 2-21. What process helps lift the mandible to close the mouth?
1. Palatine
  2. Coronoid
  3. Condylloid
  4. Alveolar
- 2-22. How many small bones are located in each middle ear?
1. One
  2. Two
  3. Three
  4. Four
- 2-23. What oval depression in the temporal bone articulates with the mandibular condyle?
1. Glenoid fossa
  2. Temporal fossa
  3. Coronoid eminence
  4. Articular eminence
- 2-24. When you are smiling, what muscle raises the corner of the mouth?
1. Zygomaticus major
  2. Zygomaticus minor
  3. Buccinator
  4. Mentalis
- 2-25. How many pairs of muscles in the mandible make chewing movements possible?
1. One
  2. Two
  3. Three
  4. Four
- 2-26. The moist inner lining of the side walls of the mouth is known by which of the following terms?
1. Fat tissue
  2. Papillae
  3. Mucosa
  4. TMJ
- 2-27. In what area of the external lips does the red mucous membrane end and the normal outside skin of the face begin?
1. Lip border
  2. Lip point
  3. Vermilion border
  4. Orbicularis oris
- 2-28. What are the rough projections on the surface of the tongue called?
1. Taste buds
  2. Papillae
  3. Fissures
  4. Warts
- 2-29. Where are the taste buds located?
1. Cheeks
  2. Tongue only
  3. Roof of the mouth only
  4. Both 2 and 3 above
- 2-30. What muscles elevate the tongue and depress the mandible?
1. Mylohyoid
  2. Temporalis
  3. Medial pterygoid
  4. Lateral pterygoid
- 2-31. What is the name of irregular ridges or folds that are located behind the central incisors?
1. Skin tags
  2. Palate
  3. Pugae
  4. Rugae
- 2-32. How many pints of saliva do the salivary glands produce on a daily basis?
1. One to four
  2. Two to three
  3. Two to four
  4. Six to eight
- 2-33. How many phases is deglutition divided into?
1. One
  2. Two
  3. Three
  4. Four
- 2-34. When teeth are in the odontogenesis phase, every tooth goes through how many developmental processes?
1. One
  2. Two
  3. Three
  4. Four



- 2-35. Dental development usually begins in which of the following weeks of prenatal life?
1. Fourth
  2. Fifth only
  3. Sixth only
  4. Either 2 and 3
- 2-36. How many total tooth buds are present in a prenatal maxillary and mandibular arch?
1. 32
  2. 20
  3. 15
  4. 10
- 2-37. What is the name of the last period of tooth growth?
1. Histodifferentiation
  2. Morphodifferentiation only
  3. Eruptodifferentiation only
  4. Both 2 and 3 above
- 2-38. How many years does it take permanent teeth to emerge after crown completion?
1. One
  2. Two
  3. Three
  4. Four
- 2-39. When primary teeth get ready to fall out and make way for the eruption of permanent teeth, what is the name of the process?
1. Exposure
  2. Histology
  3. Infoliation
  4. Exfoliation
- 2-40. The part of the crown that is visible in the mouth is known by which of the following terms?
1. Clinical crown
  2. Clinical tooth
  3. Clinical enamel
  4. Clinical exposure
- 2-41. What is the name of the region where the roots separate?
1. Apex
  2. Furcation
  3. Bifurcated
  4. Trifurcated
- 2-42. The tip of each root is known by which of the following terms?
1. End
  2. Arch
  3. Angle
  4. Apex
- 2-43. When there is a slight indentation that encircles the tooth and marks the junction of the crown with the root, it is known by which of the following terms?
1. Bifurcation
  2. Cervical line
  3. Clinical line
  4. Junction line
- 2-44. Enamel is formed by what type of epithelial cells?
1. Cementoblast
  2. Enamelblasts
  3. Odontoblasts
  4. Ameloblasts
- 2-45. What is the name of the junction where the cementum joins the enamel?
1. Cementoenamel
  2. Dentinoenamel
  3. Petticoat
  4. Enamel
- 2-46. What is the chief function of the pulp?
1. Provides feeling to the tooth
  2. Formation of cementum
  3. Formation of dentin
  4. Formation of enamel
- 2-47. What is the name of the process where the bony portion of the maxilla and mandible teeth are embedded?
1. Alveolar
  2. Alveolus
  3. Socket
  4. Root
- 2-48. When viewed by a radiograph, trabecular bone will have what type of an appearance?
1. Spongy-like
  2. Wavy-like
  3. Plate-like
  4. Web-like

- 2-49. A tooth is suspended in its socket by what ligament?
1. Lamina dura
  2. Masticatory
  3. Periodontal
  4. Alveolar
- 2-50. The oral mucosa consists of how many total types of mucosa?
1. One
  2. Two
  3. Three
  4. Four
- 2-51. The hard palate is covered with what type of mucosa?
1. Masticatory
  2. Specialized
  3. Lining
  4. Rugae
- 2-52. What is the name of the term that is given to the portion of gingiva that extends from the gingival crest to the crest of the bone?
1. Gingival margin
  2. Unattached gingiva
  3. Attached gingiva
  4. Gingival sulcus
- 2-53. What area is the first to show symptoms of gingivitis?
1. Interdental papilla
  2. Muco-gingival junction
  3. Epithelial attachment
  4. Gingival margin
- 2-54. What area helps prevent food from packing between the teeth?
1. Interdental papilla
  2. Muco-gingival junction
  3. Epithelial attachment
  4. Gingival margin
- 2-55. What type of tissue is found on the inside of the lips, cheeks, vestibule, soft palate, and under the tongue?
1. Lining mucosa
  2. Inter mucosa
  3. Soft mucosa
  4. Gingiva
- 2-56. Which of the following reasons is/are teeth formed?
1. Cutting
  2. Tearing
  3. Grinding
  4. All of the above
- 2-57. What type of shape does the lingual surface of an incisor have?
1. Axe
  2. Rake
  3. Shovel
  4. Angled
- 2-58. Cuspids are designed to perform what type of function?
1. Cutting and tearing
  2. Cutting and grinding
  3. Crushing and holding
  4. Grinding and chewing
- 2-59. Each molar has what maximum amount of cusps?
1. Six
  2. Five
  3. Four
  4. Three
- 2-60. How many dental quadrants are in the mouth?
1. One
  2. Two
  3. Three
  4. Four
- 2-61. How many primary teeth are there in a normal deciduous mouth?
1. 32
  2. 20
  3. 16
  4. 12
- 2-62. Primary teeth are identified by which letters of the alphabet?
1. A to W
  2. A to V
  3. A to U
  4. A to T

- 2-63. What is the name of the system that is used by the armed forces to identify teeth?
1. Universal location
  2. Universal positioning
  3. Universal numbering
  4. Universal selection
- 2-64. A tooth has how many total proximal surfaces?
1. One
  2. Two
  3. Three
  4. Four
- 2-65. The mesial surface of a tooth is located in which area?
1. Closest to the midline of the arch
  2. Toward the cheeks
  3. Toward the tongue
  4. Away from the midline of the arch
- 2-66. The distal surface of a tooth is located in which area?
1. Closest to the midline of the arch
  2. Toward the cheeks
  3. Toward the tongue
  4. Away from the midline of the arch
- 2-67. The inter-proximal space is occupied by what type of anatomy?
1. Embrasure
  2. Interdental klingons
  3. Interdental papilla
  4. Interdental contact
- 2-68. The anteroposterior curve is referred to by what term?
1. Curve of Koffax
  2. Curve of Wilson
  3. Curve of Splee
  4. Curve of Spee
- 2-69. If a patient's profile is characterized as normal, he/she will be what class according to Dr. Angle?
1. I
  2. II
  3. III
  4. IV
- 2-70. The mesial margin of a maxillary central incisor meets the incisal edge at almost what degree angle?
1. 30
  2. 90
  3. 110
  4. 180
- 2-71. What are the first permanent teeth to erupt?
1. Maxillary lateral incisors
  2. Maxillary central incisors
  3. Mandibular lateral incisors
  4. Mandibular central incisors
- 2-72. What is the term used to describe the appearance of a mandibular first bicuspid?
1. Bell-ringer
  2. Bell-crowned
  3. Bell-cusp
  4. Bell-shaped
- 2-73. What tooth will have a fifth cusp on it?
1. Maxillary first molar
  2. Maxillary second molar
  3. Mandibular first molar
  4. Mandibular second molar
- 2-74. What is the name of the dental anatomy that has small, rounded projections of enamel from the incisal edges of newly erupted anterior teeth?
1. Oblique ridge
  2. Cusp ridge
  3. Groove
  4. Mamelons
- 2-75. What dental anatomy has a rounded or angular depression of varying sizes found on the surface of a tooth?
1. Groove
  2. Fossa
  3. Cusp
  4. Pit

# ASSIGNMENT 3

Textbook Assignment: "Oral Pathology," chapter 5, pages 5-1 through 5-15; and "Emergency Treatment for Oral Diseases and Injuries," chapter 6, pages 6-1 through 6-11.

3-1. Which of the following conditions does the science of Oral Pathology NOT treat?

1. Nature of the disease
2. Surgical procedures
3. Causes of the disease
4. Development of the disease

3-2. Who is responsible for informing a patient when an oral disease is found?

1. Dental technician (basic)
2. Dental technician (advanced) only
3. Dental officer only
4. Both 2 and 3 above

3-3. When do congenital anomalies occur?

1. At death
2. After birth
3. During birth
4. Before birth

3-4. When do acquired anomalies occur?

1. At death
2. After birth
3. During birth
4. Before birth

3-5. About how many milliliters (ml) of saliva do the salivary glands secrete on a daily basis?

1. 150
2. 750
3. 1500
4. 1750

- |               |
|---------------|
| A. Abscess    |
| B. Cyst       |
| C. Ulcers     |
| D. Vesicles   |
| E. Hematoma   |
| F. Petechiae  |
| G. Ecchymoses |

Figure 3A—Oral lesions

IN ANSWERING QUESTIONS 3-6 THROUGH 3-12, SELECT FROM FIGURE 3A THE ORAL LESION THAT BEST DESCRIBES THE INFORMATION GIVEN IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

3-6. A round pinpoint, nonraised, lesion with purplish-red spots.

1. C
2. E
3. F
4. G

3-7. An enclosed pouch or sac that contains fluid or semisolid material.

1. A
2. B
3. C
4. E

3-8. A localized collection of blood that escaped from blood vessels because of trauma.

1. A
2. E
3. F
4. G

3-9. A small elevation that contains fluid.

1. A
2. B
3. c
4. D

3-10. May be caused by biting, denture irritation, toothbrush injury, viruses, or other irritants.

1. c
2. D
3. E
4. G

3-11. Large, purplish-red areas caused by blood under the skin or mucosa.

1. A
2. E
3. F
4. G

- 3-12. Commonly caused by a bacterial infection.
1. A
  2. C
  3. E
  4. F
- 3-13. What condition must exist for an impaction to occur?
1. Missing deciduous teeth
  2. Abnormal position
  3. Physical barrier
  4. All of the above
- 3-14. Which of the following conditions causes attrition?
1. Breakdown of enamel, dentin, and cementum
  2. Wear involving teeth against teeth
  3. Large tooth crowns
  4. Bulimia
- 3-15. When a dental caries first appears on enamel, what is the appearance?
1. A chalky white spot
  2. A small brown spot
  3. A hollowed out hole
  4. All of the above
- 3-16. What will a dental explorer do when it is passed over an incipient lesion?
1. Sink in
  2. Feel soft
  3. Feel hard
  4. Disappear
- 3-17. Recurrent carries will occur in a tooth in which of the following circumstances?
1. Trapped air pockets
  2. Sealed margins
  3. Leaky margins
  4. All of the above
- 3-18. Pit and fissure caries develop in what area of a tooth?
1. Depressions
  2. Pulp chamber
  3. Smooth surfaces
  4. Proximal surfaces
- 3-19. Smooth surface caries develop in what area of a tooth?
1. Depressions
  2. Pulp chamber
  3. Incisal third
  4. Proximal surfaces
- 3-20. Pulpalgia commonly occurs after which of the following procedures has been performed on a tooth?
1. Extraction
  2. After a restoration
  3. Before a restoration
  4. After placement of gutta-percha
- 3-21. Which of the following definitions best describes pulpitis?
1. Restoration of the dental pulp
  2. Inflammation of the restoration
  3. Inflammation of the dental pulp
  4. Periapical abscess of the dental pulp
- 3-22. If a periapical abscess is left untreated, in what area of a tooth will bone loss occur?
1. Apex
  2. Pulp only
  3. Crown only
  4. Both 2 and 3 above
- 3-23. Dead pulpal tissue will decompose and produce which of the following results?
1. Secondary dentin
  2. Secondary pulp tissue
  3. Toxins
  4. Fistula
- 3-24. What chronic disease is the most prevalent in mankind?
1. Periapical
  2. Periodontal
  3. AIDS
  4. HIV
- 3-25. Marginal gingivitis usually starts in which of the following areas?
1. Sulcus
  2. Front teeth
  3. Periodontal pockets
  4. Tips of the papillae

- 3-26. The ulceration of the gingival crest in ANUG results in what type of an appearance?
1. Punched-out
  2. Stippling
  3. Swollen
  4. Torn
- 3-27. When periodontitis progresses, the gingival tissues will appear as what color?
1. Dark red
  2. Bluish red
  3. Bluish yellow
  4. Grayish white
- 3-28. During pocket formation, what type of projections of calculus form between the teeth?
1. Shelf-like
  2. Bone-like
  3. Crystal-like
  4. Smooth-like
- 3-29. The gingiva surrounding a periodontal abscess will have which of the following appearances?
1. Red and hard
  2. Hollow and swollen
  3. Bleeding and swollen
  4. Inflamed and swollen
- 3-30. Recurrent aphthous stomatitis are what type of lesion?
1. Ulcers
  2. Abscess
  3. Blisters
  4. Neoplasms
- 3-31. What type of the herpes simplex virus is most commonly diagnosed in oral pathology?
1. HSV-1
  2. HSV-2
  3. HSV-3
  4. HSV-4
- 3-32. Recurrent herpes simplex lesions that affect routine dental treatment should be rescheduled for what period of time?
1. 2-3 days
  2. 3-6 days
  3. After the active phase
  4. Before the active phase
- 3-33. Which of the following oral manifestations are signs of HIV infection?
1. Candidiasis
  2. Hairy leukoplakia
  3. Kaposi's sarcoma
  4. All of the above
- 3-34. What are the two types of neoplasms that can be diagnosed in oral cancer?
1. Neo-carcinoma and malignant
  2. Benign and malignant
  3. Benign and neo-carcinoma
  4. HSV-1 and HSV-2
- 3-35. The growth or spread of malignant tumors from one area to another is known by which of the following conditions?
1. Transdermal
  2. Transfusion
  3. Transferism
  4. Metastasis
- 3-36. The area where the user of smokeless tobacco develops an oral precancerous lesions is defined as what type of pathology?
1. Sportsman 's dipper keratosis
  2. Snuff-dipper's keratosis
  3. Farmers lesions
  4. Leuko-keratosis
- 3-37. A Dental Technician may provide temporary emergency dental treatment under which of the following conditions?
1. To combat infection
  2. To provide relief from pain
  3. To prevent further damage to oral structures
  4. All of the. above
- 3-38. If a patient reports to the dental clinic after hours with a toothache and you are the duty Dental Technician, which of the following steps should you first take?
1. Give them 2 aspirins and schedule a sick call appointment for the next day
  2. Notify the duty dental officer
  3. Notify the duty medical officer
  4. Place a temporary filling, check the occlusion, and make an appointment for the patient

- 3-39. Which of the following choices best describes a symptom?
1. You observe bleeding gums
  2. You observe a fractured tooth
  3. The patient informs you of a toothache
  4. Both 2 and 3 above
- 3-40. Which of the following choices best describes a sign?
1. You observe a large hole in a patient's tooth
  2. Patient tells you he/she chewed a piece of ice
  3. Patient tells you he/she has the filling in their pocket
  4. Patient tells you he/she has been in pain for 2 weeks
- 3-41. When pain from an affected tooth manifest to a healthy, non-involved tooth, what is the condition called?
1. Referral symptom
  2. Referred pain
  3. Pain manifesto
  4. TMJ
- 3-42. Which of the following conditions exist if a patient is experiencing pain caused by the pressure of fluid building up inside the pulp chamber?
1. Periodontal abscess
  2. Periodontitis
  3. Acute pulpitis
  4. Pericoronitis
- 3-43. Which of the following conditions exists when swelling is confined to a small area at the site of a sinus tract?
1. Sinus abscess
  2. Grape abscess
  3. Cellulitis
  4. Gumboil
- 3-44. When performing an emergency treatment for a periapical abscess, what instrument, if any, will you use to drain the abscess?
1. Bard Parker and #15 blade
  2. Explorer
  3. Syringe
  4. None of the above
- 3-45. What type of inflammation is present in marginal gingivitis?
1. Cratered
  2. Severe
  3. Oozing
  4. Mild
- 3-46. A patient with acute gingivitis may complain of which of the following symptoms:
1. Teeth are loose
  2. Bad taste in the mouth
  3. Sore or swollen gums
  4. Excessive bleeding
- 3-47. Necrotizing ulcerative gingivitis is commonly referred to by what term?
1. Trenchcoat
  2. Trenchmouth
  3. Foul mouth syndrome
  4. Glowing gums syndrome
- 3-48. What colored membrane will be covering the gingiva if a patient has NUG?
1. Bluish-grey
  2. Reddish-white
  3. Bluish-white
  4. Gray-white
- 3-49. Periodontitis usually results from what untreated condition?
1. Marginal gingivitis
  2. Congenital birth defect
  3. Juvenile periodontitis
  4. Periodontal syndrome
- 3-50. What is the correct emergency treatment for a periodontal abscess?
1. Irrigate affected area with a 3-way syringe
  2. Use a soft-bristled toothbrush and angle the bristles on the affected area using the "Bass Technique"
  3. Gently probe the affected area with a scaler to establish drainage
  4. Use an explorer and puncture the most raised portion of the abscess to express the pus
- 3-51. Which of the following solutions should you use to irrigate the tissue flap if a patient has pericoronitis?
1. Glycerite of iodine
  2. Warm saline solution
  3. Hydrogen peroxide
  4. Flap conditioner

- 3-52. What are the two common types of stomatitis found in the oral mucosa?
1. Genital herpes and aphthous
  2. HIV and aphthous
  3. Herpetic and cold sores
  4. Herpetic and aphthous
- 3-53. Bleeding from an extraction site is referred to by which of the following terms?
1. Postextraction alveolar osteitis
  2. Postextraction hemorrhage
  3. Postbleeding hemorrhage
  4. Postsocket hemorrhage
- 3-54. Postextraction alveolar osteitis is a condition commonly referred to by what term?
1. Dry socket
  2. Dry tooth
  3. Dry clot
  4. Dry hole
- 3-55. To treat post extraction alveolar osteitis, what type of dental material do you place in a tooth socket?
1. 2 x 2 gauze pad with eugenol
  2. Penrose drain with eugenol
  3. Iodoform gauze with eugenol
  4. Cottonballs with eugenol
- 3-56. Tooth fractures are classified into how many different types?
1. One
  2. Two
  3. Three
  4. Four
- 3-57. Fractured teeth can involve which of the following parts of a tooth?
1. Enamel and dentin only
  2. Enamel, dentin, and pulp only
  3. Enamel, dentin, pulp, and root
  4. Enamel, dentin, and cementum only
- 3-58. With which of the following dental materials will you use to treat a Type I fracture?
1. Cavity varnish
  2. Temporary splint
  3. Temporary crown form
  4. Zinc oxide and eugenol
- 3-59. A Type II fracture involves an exposure of the pulp.
1. True
  2. False
- 3-60. Dental Technicians who provide emergency treatment of a fractured mandible will use which of the following materials?
1. Arch bars and wires only
  2. Dental splints only
  3. Both 1 and 2 above
  4. Elastic bandage



# ASSIGNMENT 4

Textbook Assignment: "Oral Pharmacology," chapter 7, pages 7-1 through 7-7; and "Nutrition and Diet," chapter 8, pages 8-1 through 8-3.

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- 4-1. Pharmacology is a basic medical science that deals with the study of which specialty?
1. Drugs
  2. Diseases
  3. Compounds
  4. Pharmacy operations
- 4-2. What chapter of *The Manual of the Medical Department* gives guidance on pharmacy operation and drug control?
1. 6
  2. 9
  3. 15
  4. 21
- 4-3. The amount of a medication administered is referred to as which of the following units?
1. Pill
  2. Dose
  3. Unit amount
  4. Average amount
- 4-4. Which of the following units refers to the amount of medication given to a normal adult?
1. Therapeutic amount
  2. Therapeutic unit only
  3. Therapeutic dose only
  4. Both 2 and 3 above
- 4-5. The minimum and maximum amount of a drug required to produce the desired effect is referred to by what term?
1. Dosage factor
  2. Dosage range
  3. Dosage drug
  4. Dosage age
- 4-6. What dose refers to the least amount of a drug that can cause death?
1. Toxic
  2. Minimum toxic
  3. Minimum lethal
  4. Maximum lethal
- 4-7. What dose refers to the amount of a drug that will produce symptoms of poisoning?
1. Toxic
  2. Minimum toxic
  3. Minimum lethal
  4. Maximum lethal
- 4-8. What two primary factors, if any, determine a dose?
1. Sex and age
  2. Age and weight
  3. Weight and sex
  4. None
- 4-9. How are parenteral medications introduced?
1. Orally
  2. Parents
  3. Topically
  4. Injection
- 4-10. What technique is the most effective means to achieve anesthesia of the mandibular teeth?
1. Apex
  2. Nerve
  3. Block
  4. Ligament
- 4-11. What technique introduces a drug directly into a vein?
1. Intravenous
  2. Infiltration
  3. Brachial ligament
  4. Periodontal ligament
- 4-12. What injection technique places the needle and anesthetic along the side of a tooth?
1. Parallel
  2. Side by side
  3. Periapical ligament
  4. Periodontal ligament

- 4-13. What technique is commonly used to anesthetize maxillary teeth?
1. Block
  2. Intravenous
  3. Infiltration
  4. Periodontal ligament
- 4-14. What term is used to define medication that is placed under the tongue?
1. Submandibular
  2. Sublingual
  3. Subcavity
  4. Suboral
- 4-15. In what form are medications introduced into the body through inhalation?
1. Gas
  2. Oral
  3. Topical
  4. All of the above
- 4-16. Drugs are classified into which of the following categories?
1. Chemical, biological, and therapeutic
  2. Therapeutic, scientific, chemical, and scheduled
  3. General, and therapeutic
  4. Chemical, general, and therapeutic
- 4-17. What type of prescription drugs have the potential for abuse?
1. Noncontrolled
  2. Controlled
  3. Schedule 6
  4. All of the above
- 4-18. Under which of the following schedule of substances must ethyl alcohol be received, accounted, and dispensed?
1. I
  2. II
  3. III
  4. VI
- 4-19. Normally, how many names do drugs have?
1. One
  2. Two
  3. Three
  4. Four
- 4-20. Which of the following emollients is used as a lubricant in rubber dam procedures?
1. Cocoa butter
  2. Petrolatum
  3. Oral jelly
  4. Dam jelly
- 4-21. Which of the following drugs will a patient with a heart murmur receive before and after a dental appointment?
1. Antibiotic
  2. Vasodilator
  3. Vasoconstrictor
  4. Anti-inflammatory
- 4-22. What antibiotic may produce discoloration of the teeth to children and pregnant women?
1. Cephalosporin
  2. Penicillin
  3. Tetracycline
  4. Erythromycin
- 4-23. Aspirin provides which of the following effects?
1. Analgesic
  2. Antipyretic
  3. Anti-inflammatory
  4. All of the above
- 4-24. Ibuprofen should not be given to patients in which of the following trimesters of pregnancy?
1. First
  2. Second
  3. Third
  4. All of the above
- 4-25. Codeine sulfate has which of the following analgesic powers of morphine?
1. One-sixth
  2. Two-sixth
  3. Three-fourth
  4. Three-sixth
- 4-26. Which of the following drugs is used in some dental anesthetics?
1. Anticoagulants
  2. Vasoconstrictors
  3. Anticonstrictors
  4. Meperidine hydrochloride

- 4-27. What percent of nitrous oxide to oxygen mixture is used in inhalation sedation?
1. 10/60
  2. 20/60
  3. 40/60
  4. 60/40
- 4-28. What are the two categories of chemically classified local anesthetic solutions?
1. Amides and topical
  2. Topical and esters
  3. Ammos and esters
  4. Amides and esters
- 4-29. What maximum amount of minutes will 2% lidocaine hydrochloride provide complete anesthetic for an area of the mouth being treated?
1. 120
  2. 90
  3. 45
  4. 15
- 4-30. After application, what is the minimum and maximum amount of minutes recommended for topical anesthetic to reach its full effectiveness?
1. One to two
  2. One to three
  3. One to five
  4. Five to ten
- 4-31. The use of topical spray and liquid anesthetics is--useful for patients with which of the following conditions?
1. Cardiac
  2. Stuttering
  3. Drug allergies
  4. Gag reflex
- 4-32. What type of drug reduces a patient's salivary flow?
1. Antisialagogues
  2. Antianesthetics
  3. Antivasodilators
  4. Antivasoconstrictors
- 4-33. What DD form is used to prescribe controlled and noncontrolled drugs?
1. 6710
  2. 1289
  3. 1210
  4. 1209
- 4-34. When using special labels on drugs and medications, what color should the information on the caution warning be?
1. Black and white
  2. Black and red
  3. Yellow
  4. Red
- 4-35. Part of maintaining a healthy lifestyle starts with which of the following choices?
1. Eating salads only
  2. Eating "fat free" foods only
  3. Balanced diet and exercising
  4. Reading nutrition and fitness magazines
- 4-36. Which of the following statements best defines an essential nutrient?
1. 10% of U.S. Recommended Dietary Allowance
  2. Used to build strong bones and teeth
  3. Must be provided by vitamins because the body cannot synthesize it
  4. Must be provided by food because the body cannot synthesize it

- |   |
|---|
| <p>A. Carbohydrates<br/>         B. Proteins<br/>         C. Fats<br/>         D. Vitamins<br/>         E. Minerals<br/>         F. Water</p> |
|---|

**Figure 4-A.—Six classes of nutrients.**

IN ANSWERING QUESTIONS 4-37 THROUGH 4-42, SELECT FROM FIGURE 4-A THE NUTRIENT THAT BEST DESCRIBES THE INFORMATION GIVEN IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

- 4-37. Needed by the body in very small amounts.
- A
  - B
  - C
  - D
- 4-38. Starch and sugar supply the body with energy.
- A
  - c
  - D
  - E
- 4-39. Help carry fat soluble vitamins.
- A
  - c
  - E
  - F
- 4-40. The “forgotten nutrient.”
- B
  - c
  - E
  - F
- 4-41. The building blocks of the body.
- A
  - B
  - D
  - E
- 4-42. Used to build strong bones and teeth.
- B
  - D
  - E
  - F
- 4-43. Which of the following nutrients provides 4 calories per gram?
- Fat
  - Protein
  - Carbohydrate
  - Both 2 and 3 above
- 4-44. Simple carbohydrates are found in which of the following foods?
- Corn
  - Honey
  - Breads
  - Cereals
- 4-45. Approximately how many amino acids are there in protein?
- 20
  - 22
  - 29
  - 27
- 4-46. What substance contains all 9 of the essential amino acids?
- Animal foods
  - Calorie
  - Plants
  - Water
- 4-47. Which of the following foods contain complete proteins?
- Eggs
  - Rice
  - Beans
  - Grains
- 4-48. An adult over the age of 30 should have which of the following serum cholesterol levels?
- Over 200 mg/dL
  - Under 200 mg/dL
  - Under 230 mg/dL
  - Under 300 mg/dL

4-49. How many calories are there in a gram of fat?

1. Eleven
2. Seven
3. Nine
4. Four

4-50. How many categories of vitamins are there?

1. 13
2. 2
3. 6
4. 11

A. Vitamin A
B. Vitamin B-12
C. Vitamin C
D. Vitamin D
E. Vitamin E
F. Vitamin K

Figure 4-B.—Vitamins.

IN ANSWERING QUESTIONS 4-51 THROUGH 4-57, SELECT FROM FIGURE 4-B, THE VITAMIN THAT BEST DESCRIBES THE INFORMATION GIVEN IN THE QUESTION. YOU MAY USE SOME ANSWERS MORE THAN ONCE.

4-51. Protects vitamin A.

1. c
2. D
3. E
4. F

4-52. Involved in the formation of mucous membranes.

1. A
2. B
3. C
4. F

4-53. Water soluble.

1. A
2. C
3. D
4. E

4-54. Promotes clotting of the blood.

1. B
2. D
3. E
4. F

4-55. Helps us to see in dim light.

1. A
2. B
3. D
4. F

4-56. Promotes calcium and phosphorous absorption.

1. B
2. D
3. E
4. F

4-57. For the most part, this vitamin is not stored.

1. B
2. D
3. E
4. F

4-58. Which nutrient makes up the major portion of bones and teeth making them rigid in their composition?

1. Carbohydrates
2. Water
3. Minerals
4. Proteins

4-59. Which of the following diets is recommended for good health?

1. Low in complex carbohydrates and high in protein and fat
2. High in complex carbohydrates and high in protein and fat
3. High in complex carbohydrates and low in protein and fat
4. Two combined servings of fruits and vegetables

4-60. What term describes foods that contain carbohydrates?

1. Cavity-genic
2. Cardiogenic
3. Carbogenic
4. Cariogenic

4-61. How many combined servings of fruits and vegetables should be eaten each day?

1. Six
2. Five
3. Three
4. Four

4-62. Ideally, caries may be avoided by performing which of the following measures?

1. Going to a dentist twice a year
2. Brushing and rinsing right after eating
3. Brushing and flossing right after eating
4. Not eating any snack foods

# ASSIGNMENT 5

Textbook Assignment: "Infection Control," chapter 9, pages 9-1 through 9-14.

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- 5-1. What BUMED instruction explains the Dental Infection Control Program?
1. 6600.3
  2. 6600.10
  3. 6610.10
  4. 6610.13
- 5-2. Who is responsible for the documentation of variation changes to the Dental Infection Control Manual?
1. CO
  2. XO
  3. ICO
  4. CMC
- 5-3. Approximately how many deaths occur annually from HBV infection?
1. 100
  2. 200
  3. 300
  4. 400
- 5-4. Microbiology is the study of microscopic life forms referred to by what term?
1. Biological asepsis
  2. Immunodeficiency
  3. Micropathogens
  4. Micro-organisms
- 5-5. What type of an organism is capable of causing disease?
1. Pathogen
  2. Pathology
  3. Pathococci
  4. Pathomimia
- 5-6. How many medium-sized bacteria may be contained in a single drop of water?
1. 20 million
  2. 20 billion
  3. 2 million
  4. 2 billion
- 5-7. What is the shape of bacilli?
1. Rod
  2. Spiral
  3. Bead-like
  4. Both 2 and 3 above
- 5-8. What shape are spirochetes?
1. Spiral
  2. Spinal
  3. Spirochetal
  4. Spirohetemia
- 5-9. What shape are cocci?
1. Cocculin
  2. Bead-like
  3. Spherical
  4. Both 2 and 3 above
- 5-10. What is the name of the liquid dye used on bacteria to determine its type?
1. Dye stain
  2. Gram stain
  3. Negative stain
  4. Positive stain
- 5-11. What color, if any, will gram-positive bacteria turn when stained?
1. Purple
  2. Orange
  3. Violet
  4. No color
- 5-12. What color, if any, will gram-negative bacteria turn when stained?
1. Purple
  2. Orange
  3. Violet
  4. No color

5-13. What protective surface material helps bacteria evade the defense mechanisms of the body?

1. Stain
2. Capsule
3. Coating
4. Inter-lining

5-14. How many maximum minutes are most viruses susceptible to while immersed in boiling water?

1. 10
2. 20
3. 30
4. 90

5-15. How many maximum minutes in a dry heat sterilizer will infectious hepatitis be controlled?

1. 10
2. 20
3. 30
4. 90

5-16. What type of animals are protozoa?

1. Multi-celled
2. Single-celled
3. Division-celled
4. Chlorophyll-celled

Which of the following is the most common mold infection in humans?

1. Ringworm
2. Thrash
3. Smallpox
4. Candidiasis

- |                         |
|-------------------------|
| A. Asepsis              |
| B. Barrier Technique    |
| C. Bioburden            |
| D. Biological monitor   |
| E. Bloodborne pathogens |
| F. Bowie-Dick Type Test |
| G. Critical items       |

IN ANSWERING QUESTIONS 5-18 THROUGH 5-24, SELECT FROM FIGURE 5A THE INFECTION CONTROL TERM THAT BEST DESCRIBES THE DEFINITION GIVEN IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

5-18. Instruments and materials that penetrate the skin, mucous membranes, or bone.

1. E
2. F
3. G
4. H

5-19. The number of micro-organisms contaminating an object.

1. C
2. D
3. E
4. F

5-20. A bacterial endospore test.

1. A
2. B
3. C
4. D

5-21. Detects air leaks.

1. D
2. E
3. F
4. G

5-22. The prevention of contact with micro-organisms.

1. A
2. B
3. C
4. D

Figure 5A.—Infection control term and definitions.



5-23. Pathogenic micro-organisms that are present in human blood and capable of causing disease in humans.

1. D
2. E
3. F
4. G

5-24. The use of rubber, plastic, foil, or other fluid resistant materials to cover surfaces and protect them from contamination.

1. A
2. B
3. C
4. D

- |   |
|---|
| A. Semicritical items<br>B. Noncritical items<br>C. Infectious waste<br>D. Personal protective attire<br>E. Sterilization<br>F. Unit Dose<br>G. Universal precautions |
|---|

Figure 5B.—Additional infection control terms and definitions.

IN ANSWERING QUESTIONS 5-25 THROUGH 5-31, SELECT FROM FIGURE 5B THE INFECTION CONTROL TERM THAT BEST DESCRIBES THE DEFINITION GIVEN IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

5-25. Treats all human blood and body fluids as if known to be infectious for HIV and HBV.

1. D
2. E
3. F
4. G

5-26. Requires intermediate-level disinfection.

1. A
2. B
3. C
4. D

5-27. Quantity of material or supplies required to treat a single patient.

1. C
2. D
3. E
4. F

5-28. Other potentially infectious materials (OPIM).

1. B
2. C
3. D
4. E

5-29. Cannot be sterilized because of their design or inability to withstand heat.

1. A
2. B
3. C
4. D

5-30. Process that destroys all types and forms of micro-organisms.

1. B
2. C
3. D
4. E

5-31. Specialized barrier attire worn by an employee to protect against a hazard.

1. D
2. E
3. F
4. G

5-32. How often are active duty healthcare personnel required to receive an HIV and a tuberculosis test and or screening?

1. Monthly
2. Quarterly
3. Annually
4. Every 5 years

5-33. What does PPE stand for?

1. Personnel Protective Equipment
2. Personal Protective Equipment
3. Protective Personal Equipment
4. Personal Protection Equipment

- 5-34. Washing increases the porosity of gloves up to what maximum percent?
1. 15
  2. 30
  3. 45
  4. 60
- 5-35. What type of gloves are most commonly used in routine dental procedures?
1. Procedural
  2. Routine rubber
  3. Sterile surgical
  4. Latex examination
- 5-36. What type of gloves provide maximum protection against infection for the patient and the provider?
1. Sterile surgical
  2. Procedural
  3. Latex examination
  4. Routine rubber
- 5-37. What type of gloves offer the highest quality and best fit at a greatly reduced cost?
1. Sterile surgical
  2. Procedural
  3. Latex examination
  4. Routine rubber
- 5-38. What type of procedure requires dental personnel to wear long-sleeved gowns?
1. Prosthetic
  2. Endodontic
  3. Operative
  4. Surgical
- 5-39. Which of the following situations does NOT require personnel to change their face mask?
1. Sorting laundry
  2. Decontamination procedures
  3. Processing radiographic films
  4. After each patient or when the mask is visibly soiled
- 5-40. What feature must eyewear goggles have in order to provide maximum protection?
1. Tinted lenses
  2. Sterile nose pads
  3. Solid side shields
  4. One-inch protective lens
- 5-41. How long should you flush each of the unit water lines and hoses for at the beginning of each work day?
1. 1 minute
  2. 2 minutes
  3. 3 minutes
  4. 30 seconds
- 5-42. Where should wrapping material be placed on open instrument trays, packs, or cassettes to protect work surfaces against contamination?
1. Top
  2. Middle
  3. Underneath
  4. Both 2 and 3 above
- 5-43. Which of the following supplies and equipment can reduce the volume of aerosols and decrease the level of micro-organisms during dental procedures?
1. Dehumidifiers and mask
  2. HVEs and rubber dams
  3. Saliva ejectors and rubber dams
  4. Aerosol fan and surgical face mask
- 5-44. How many 10-second rinses with a mouthwash will temporarily reduce a patient's microbial count?
1. One
  2. Two
  3. Three
  4. Four
- 5-45. Which, if any, of the following protective attire worn during patient treatment should you remove before leaving the DTR to transport contaminated items to the CSR?
1. Gloves and mask
  2. Gloves and scrubs
  3. Scrubs and mask
  4. None of the above
- 5-46. Which of the following ultimate goals should be accomplished with an aseptic technique?
1. Use only 1 pair of gloves
  2. Break the chain of infection
  3. Make DTR completely sterile
  4. Ensuring no patient time is lost

- 5-47. All regulated liquid waste should be placed in what type of a container?
1. Leakproof
  2. Waterproof
  3. Leak resistant
  4. Water resistant
- 5-48. How should disposable sharps be treated?
1. Non-infectious material
  2. Hazardous supplies
  3. Hazardous metal
  4. Regulated waste
- 5-49. Which of the following techniques should be used when recapping a needle?
1. Two-handed
  2. Sterile
  3. scoop
  4. Sharp
- 5-50. Which area of the dental clinic can be used to handle, disinfect, and lubricate contaminated handpieces saving time and avoiding excess aerosols?
1. DTR
  2. CSR
  3. Dental repair
  4. Handpiece room
- 5-51. How many containers of lubricant are used when performing handpiece maintenance?
1. One
  2. Two
  3. Three
  4. Four
- 5-52. When must you clean and disinfect the previously covered surfaces between patients?
1. All times
  2. Every other patient
  3. When surface is visibly soiled
  4. At the end of the normal workday
- 5-53. What technique is used to clean unprotected areas between patients?
1. scoop
  2. Wipe-spray-wipe
  3. Spray-wipe-spray
  4. High-touch-spray
- 5-54. Dental personnel who sustain percutaneous inoculation of serum by accidental puncture must receive which of the following actions?
1. Immediate medical evaluation
  2. Counseling sheet
  3. HIV vaccine
  4. HBV vaccine
- 5-55. When securing the DTR at the end of the day, how many quarts of water should be flushed through the HVE?
1. One
  2. Two
  3. Three
  4. Four
- 5-56. The OSHA and Navy requirements for housekeeping include how many sections?
1. One
  2. Two
  3. Three
  4. Four
- 5-57. When using a detergent with sodium hypochlorite, what dilution ratio is recommended?
1. 1:100
  2. 1:200
  3. 1:300
  4. 1:10
- 5-58. Protective attire, smocks, and towels are considered to be what type of laundry?
1. Non-contaminated
  2. Contaminated
  3. Non-ordinary
  4. Ordinary
- 5-59. Regulated waste must have what type of label on the container or bag?
1. Biowaste
  2. Biohazard
  3. Biodegradable
  4. Yellow and red warning label
- 5-60. The purpose of handwashing is to remove micro-organisms from what area of the skin?
1. Hard to reach areas
  2. Cracks and crevices
  3. Folds and grooves
  4. Deep epidermis

5-61. The skins harbors what two types of flora?

1. Residential and transport
2. Water-based and waterless
3. Resident and transport
4. Resident and transient

5-62. What type of flora are not firmly attached to the skin?

1. Resident
2. Transient
3. Waterbased
4. Residential

5-63. What are the two most common water-based cleaning agents used?

1. Iodophors and chlorhexidine gluconate
2. Aqueous quaternary ammonium and iodophors
3. Iodophors and 4 percent isopropyl alcohol
4. Chlorhexidine and 70 percent isopropyl alcohol

5-64. Waterless handwashing agents that contain 70 percent isopropyl alcohol virtually disinfect the skin in how many seconds?

1. 10
2. 20
3. 30
4. 40

5-65. What type of actuated soap dispenser control is preferable?

1. Sterile dispenser
2. Hand operated
3. No touch
4. No reach

5-66. What length should fingernails be to avoid puncturing gloves?

1. Below the cuticle
2. Even on both hands
3. Longer than finger tips
4. No longer than finger tips

5-67. If a sink does not have an electronic elbow, foot, or knee action faucet control, what material, if any, should you use to turn off the faucet?

1. Patient napkin
2. Dry surgery wrap
3. Dry paper towel
4. None

# ASSIGNMENT 6

Textbook Assignment: "Sterilization and Disinfection," chapter 10, pages 10-1 through 10-21.

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- 6-1. What process allows for the highest level of contamination control?
1. Chemical
  2. Ultrasonic
  3. Disinfection
  4. Sterilization
- 6-2. Which of the following sterilization methods is preferable for all equipment and materials?
1. Gas
  2. Heat
  3. Ethylene oxide
  4. Chemical vapor
- 6-3. What area of the DTF is designed for receiving, cleaning, processing, sterilizing, storing, and issuing instruments and equipment?
1. CRS
  2. SRC
  3. CSR
  4. CPR
- 6-4. Which chart tells CSR personnel the specific order equipment, instruments, and materials are to be processed?
1. Figure eight
  2. Functional area
  3. Functional flow
  4. Functional system
- 6-5. In what area of the CSR will the disinfection, cleaning, and lubrication of dental handpieces take place?
1. Receiving and cleaning
  2. Sterilization
  3. Processing
  4. Issue
- 6-6. In what area of the CSR will a dental assistant take contaminated instruments after completion of a patient's treatment?
1. Issue
  2. Receiving
  3. Processing
  4. Sterile storage
- 6-7. What type of gloves, if any, should you wear when handling all potentially contaminated items?
1. Latex
  2. Surgical
  3. Heavy duty, puncture-resistant
  4. None; all contaminated items are disposed of as hazardous materials
- 6-8. Disinfectant used to decontaminate items before handling will be approved by what agency?
1. CDA
  2. AAA
  3. ADA
  4. EPA
- 6-9. What cleaning process is safer and more effective than manual scrubbing?
1. Dip tank only
  2. Ultrasonic only
  3. Both 1 and 2 above
  4. Automated processor
- 6-10. How many sinks allow personnel to perform the manual scrubbing method?
1. One
  2. Two
  3. Three
  4. Four
- 6-11. What type of an effect does an ultrasonic cleaner provide?
1. Cavitation
  2. Positive
  3. Gravity
  4. Ion

- 6-12. What maximum amount of minutes should instruments be processed in the ultrasonic cleaner to prevent damage?
1. Seven
  2. Two
  3. Three
  4. Five
- 6-13. For proper operation, the ultrasonic reservoir should be filled to what level with an ultrasonic solution?
1. 2" from the bottom
  2. 2" from the top
  3. 1/4 to 3/4's full
  4. 1/2 to 3/4's full
- 6-14. How often must ultrasonic solutions be changed?
1. Daily only
  2. When visibly contaminated only
  3. Both 1 or 2 above
  4. Monthly
- 6-15. You should remove instruments from the ultrasonic unit by which of the following means?
1. Your hands
  2. Mesh basket
  3. Instrument tongs
  4. Ultrasonic retriever
- 6-16. Before drying the instrument, what is the next step in the sterilization process?
1. Inspection
  2. Packaging
  3. Wrapping
  4. Storing
- 6-17. What wrapping material is suitable for both steam and dry heat sterilization?
1. Polypropylene
  2. Cellophane
  3. Peel packs
  4. Muslin
- 6-18. How are hinged instruments arranged during packaging?
1. Top to bottom
  2. Open
  3. Closed
  4. Sideways
- 6-19. To allow steam to circulate freely, how should packs be wrapped?
1. Open
  2. Tight
  3. Loosely
  4. Together
- 6-20. The sterilizer's identification numbers, preparer's initials, dates of sterilization, the expiration date, and the identification number are labeled on packs, instruments and supplies after wrapping with which, if any, of the following materials?
1. Preprinted parameter tape
  2. Preprinted indicator tape
  3. Preprinted stickers
  4. None of the above
- 6-21. The period during which sterilized items are considered safe for use is known by which of the following terms?
1. Safe zone
  2. Shelf-life only
  3. Expiration date only
  4. Both 2 and 3 above
- 6-22. What type of related shelf-life presumes continued sterility until the package is damaged, wet, or torn?
1. Pack
  2. Time
  3. Event
  4. Damaged
- 6-23. What type of related shelf life presumes that after the expiration date the item is considered outdated and should not be used?
1. Pack
  2. Time
  3. Event
  4. Damaged
- 6-24. When using the event-related method, how often are sterilizers biologically monitored?
1. Weekly
  2. Bi-weekly
  3. Monthly
  4. Quarterly

- 6-25. What is the shelf life for nonwoven blue wrap using the time-related method?
1. Indefinite
  2. 635 days
  3. 365 days
  4. 30 days
- 6-26. What occurs when freshly sterilized items are placed on metal or cold surfaces?
1. Contamination
  2. Become oily
  3. Nothing
  4. Stick
- 6-27. When storing sterilized items, how should they be arranged?
1. Alphabetically
  2. Expiration, with later dates toward the front
  3. Expiration, with later dates toward the rear
  4. Contents only, with later dates toward the front
- 6-28. At what temperature are all known organisms killed?
1. 150°F
  2. 121°F
  3. 220°F
  4. 250°F
- 6-29. A steam sterilizer may be referred to by what other name?
1. Old rusty
  2. Autoclave
  3. Autosteam
  4. Dry heat
- 6-30. What is a typical standard cycle for steam sterilization using gravity displacement?
1. 121°C, 20 minutes, 30 psi
  2. 121°C, 30 minutes, 20 psi
  3. 121°C, 25 minutes, 15 psi
  4. 121°C, 15 minutes, 15 psi
- 6-31. When placing packages in a sterilizer, how are they placed?
1. On the edges
  2. On top
  3. In middle
  4. On bottom
- 6-32. What type of sterilizer was designed to overcome the trapping of air in the chamber?
1. Air-free
  2. Dry heat
  3. Chemical vapor
  4. Prevacuum steam
- 6-33. What is the least expensive form of heat sterilization?
1. Air free
  2. Dry heat
  3. Chemical
  4. Gravity displacement
- 6-34. To sterilize wrapped instruments in a prevacuum steam sterilizer, what is the operating time and temperature for sterilizing?
1. 4 minutes at 131°F
  2. 4 minutes at 270°C
  3. 4 minutes at 270°F
  4. 4 minutes at 320°C
- 6-35. All Navy prevacuum sterilizers will be tested how often using a Bowie- Dick type test?
1. Quarterly
  2. Monthly
  3. Weekly
  4. Daily
- 6-36. How often is the interior of a steam sterilizer cleaned before heating?
1. After each use
  2. Daily
  3. Monthly
  4. After every 5 cycles
- 6-37. What is the typical dry heat cycle?
1. 90 minutes at 320 - 345°F
  2. 90 minutes at 345°C
  3. 90 minutes at 300°F
  4. 90 minutes at 375°F
- 6-38. How often is biological monitoring performed on a dry heat convection unit?
1. Quarterly
  2. Monthly
  3. Weekly
  4. Daily

- 6-39. What percent of water content, if any, occurs with chemical vapor sterilization?
1. 10
  2. 15
  3. 30
  4. None of the above
- 6-40. During ethylene oxide sterilization, using a heated unit, how many hours is sterilization achieved if the temperature is 120°?
1. One
  2. Two only
  3. Three only
  4. Both 2 and 3 above
- 6-41. If using a salt sterilizer, what type of material is used to line the well of the sterilizer to prevent corrosion?
1. Lead foil
  2. Waxed paper
  3. Aluminum foil
  4. Metal protector
- 6-42. What agency classifies chemical disinfectants and sterilants?
1. ADA
  2. ATF
  3. FDA
  4. FCC
- 6-43. What is the most effective and preferred method of sterilization for autoclavable handpieces?
1. Dry heat
  2. Chemical
  3. Ethylene oxide
  4. Steam autoclave
- 6-44. What is the most effective and preferred method of sterilization for plastic impression trays?
1. Dry heat
  2. Ethylene oxide
  3. Steam autoclave
  4. Chemical disinfectants
- 6-45. What type of sterilization monitor will change color upon short exposure to sterilizing conditions?
1. Internal
  2. External
  3. Biological
  4. Incubator type
- 6-46. What type of sterilization monitor will change color when exposed to steam, dry heat, or chemical vapor?
1. Internal
  2. External
  3. Universal
  4. Biological
- 6-47. What type of sterilization monitor will assess whether sterilization actually occurred?
1. Internal
  2. External
  3. Universal
  4. Biological
- 6-48. At a minimum, how often will biological monitoring be performed?
1. Monthly
  2. Weekly
  3. Daily
  4. Both 2 and 3 above
- 6-49. Within what area of a sterilizer should biological spore strips or ampules be placed?
1. Top rack
  2. Bottom rack
  3. Most accessible
  4. Least accessible
- 6-50. What is the first step to be performed when positive biological monitoring occurs?
1. Notify dental repair personnel
  2. Notify commanding officer
  3. Notify ICO
  4. Notify COI
- 6-51. What type of sterilization monitor, if any, is used for liquid sterilants?
1. Internal
  2. External
  3. Biological
  4. None of the above



- 6-52. Disinfection is a more lethal process than sterilization.
1. True
  2. False
- 6-53. Which of the following levels of disinfectants are classified by the EPA?
1. Low, middle, and high
  2. Low, high, and medium
  3. Maximum, low, and high
  4. Intermediate, high, and low
- 6-54. What two types of micro-organisms are killed by all three levels of disinfection?
1. Bacterial spores and non lipid viruses
  2. Tubercle bacillus and lipid viruses
  3. Lipid viruses and vegetative spores
  4. Lipid viruses and vegetative bacteria
- 6-55. What are the three factors that influence germicidal procedures?
1. Bioburden, nature of the material, and organic debris present
  2. Organic debris present, type of sterilizer, and bioburden
  3. Nature of the material, bioburden, and packaging
  4. Bioburden, packaging, and type of sterilizer
- 6-56. What effect on time, if any, does high levels of a chemical agent have when a chemical disinfection is used?
1. Four hours
  2. Six hours
  3. Longer
  4. Shorter
- 6-57. What level of a disinfectant and sterilant are glutaraldehyde-based solutions classified?
1. Medium
  2. High
  3. Low
  4. Both 2 and 3 above
- 6-58. Which of the following is a disadvantage when using chlorine dioxide-based solutions?
1. Has a 24-day use life as a sterilant
  2. Does not readily penetrate inorganic debris
  3. Must be discarded daily
  4. All of the above
- 6-59. Protective eyewear and gloves are not required when using chemical agents.
1. True
  2. False
- 6-60. The biocidal activity of iodophors is accomplished with how many minutes of exposure?
1. 1 to 25
  2. 10 to 25
  3. 15 to 25
  4. 20 to 25
- 6-61. What level of disinfection are iodophors and phenolics classified?
1. Intermediate
  2. High
  3. Middle
  4. Low
- 6-62. All semicritical category items should receive what level of disinfection?
1. Intermediate
  2. High
  3. Middle
  4. Low
- 6-63. All noncritical category items require at least what level of disinfection?
1. Intermediate
  2. Middle
  3. High
  4. Low

# ASSIGNMENT 7

Textbook Assignment: "Dental Safety and Equipment Safety," chapter 11, pages 11-1 through 11-18; and "Shipboard, Fleet Marine Force, and Naval Mobile Construction," chapter 12, pages 120 1 through 12-16.

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- 7-1. The rights of employees to know the potential dangers associated with hazardous chemicals in the workplace are established by what organization?
1. OHSA
  2. OSHA
  3. OSAH
  4. FDA
- 7-2. What must the manufacturer supply to a buyer of products that contains a hazardous chemical?
1. Leak proof shipping container
  2. Local poison control phone number
  3. Material Safety Data Sheets
  4. All of the above
- 7-3. Accidental contact with radiographic chemicals is washed off with water and what other material?
1. Salt
  2. Baking soda
  3. Neutralizer
  4. pH-balanced soap
- 7-4. In what BUMED instruction can mercury control procedures be found?
1. 6000.30
  2. 6160.30
  3. 6260.30
  4. 6660.30
- 7-5. What technique should personnel use when handling amalgam?
1. Bass
  2. No-touch
  3. No-hands
  4. No-fingers
- 7-6. How often are amalgamators inspected for mercury globules and cleaning?
1. Daily
  2. Weekly
  3. Monthly
  4. Annually
- 7-7. In what condition is dental amalgam scrap stored?
1. Dry
  2. Wet
  3. Moist
  4. Frozen
- 7-8. When mercury contamination occurs, what type of decontamination kit is used for the cleanup?
1. HXG
  2. Amalgam
  3. Mercury
  4. All of the above
- 7-9. When aboard a ship, how is mercury-contaminated waste packaged?
1. Dark brown bottles
  2. Vapor locks
  3. Single boundary
  4. Double boundary
- 7-10. What is the treatment for chemical burns?
1. Neutralizer
  2. Baking soda
  3. Reverser
  4. Bleach
- 7-11. What safety protection is worn when using a visible curing light?
1. Heavy duty rubber gloves
  2. Filtering scrubs
  3. Filtering lenses
  4. Lead screen
- 7-12. What is the first rule for operating and performing user maintenance on equipment?
1. PQS signed off
  2. Ensure power source is off
  3. Ensure tools and materials are available
  4. Read manufacturer's instructions

7-13. Most dental equipment items are classified under what Federal Supply Classification?

1. 6600
2. 6500
3. 6400
4. 6000

- |   |
|---|
| <p>A. Preventive maintenance (PM)</p> <p>B. Unscheduled maintenance (UM)</p> <p>C. No maintenance required (NMR)</p> <p>D. Level I</p> <p>E. Level II</p> <p>F. Level III</p> |
|---|

Figure 7A.—Maintenance requirements and levels.

IN ANSWERING QUESTIONS 7-14 THROUGH 7-19, SELECT FROM FIGURE 7A THE MAINTENANCE REQUIREMENT OR LEVEL THAT BEST DESCRIBES THE DEFINITION GIVEN IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

7-14. Intermediate maintenance, performed by a DET or contracted service.

1. c
2. D
3. E
4. F

7-15. Often called scheduled maintenance.

1. A
2. B
3. c
4. D

7-16. Maintenance requires complete overhaul.

1. B
2. c
3. D
4. F

7-17. Applies to equipment that normally requires no scheduled maintenance.

1. B
2. C
3. D
4. E

7-18. Basic maintenance required to keep equipment operating on a daily basis.

1. A
2. B
3. D
4. F

7-19. Often referred to as corrective maintenance.

1. A
2. B
3. C
4. D

7-20. What NAVMED form is used to determine workload and assign priorities for DETs?

1. 6700/4
2. 6700/3
3. 6700/2
4. 6600/4

7-21. What type of system consists of a dental chair, unit, and light?

1. Direct delivery
2. Patient delivery
3. Treatment delivery
4. Dental delivery

7-22. What are the two styles of headrests?

1. Horsetail and articulating
2. Horseshoe and articulating
3. Horseshoe and adjustable
4. Towns and waters

7-23. When securing the dental chair, in what position should you place it?

1. Highest
2. Middle
3. Lowest
4. Inclined

- 7-24. What type of water system is being used with dental units to assist with infection control?
1. In-line pressure system
  2. Water disinfection
  3. Anti-bacterial
  4. Self-contained
- 7-25. At least how often should the strainer of the central vacuum system be removed and cleaned?
1. Daily
  2. Weekly
  3. Monthly
  4. Annually
- 7-26. What is the most efficient way to remove debris from a patient's mouth?
1. High-volume evacuator
  2. High-volume ejector
  3. Saliva ejector
  4. Cuspidor
- 7-27. What color dot is the international symbol for air control on the dental unit?
1. Red
  2. Blue
  3. Yellow
  4. Black
- 7-28. What color dot is the international symbol for the water control on the dental unit?
1. Red
  2. Blue
  3. Yellow
  4. Black
- 7-29. The temperature of water supplied from a three-way syringe should be set at approximately which of the following temperatures?
1. 115°C
  2. 115°F
  3. 130°C
  4. 130°F
- 7-30. When you are replacing a dental light, what substance would you use to clean the bulb if you touched it by mistake?
1. Sterile water
  2. Bulb cleaner
  3. Rubbing alcohol
  4. Ethyl alcohol
- 7-31. A high-speed handpiece can be operated at what maximum rpm?
1. 400,000
  2. 380,000
  3. 180,000
  4. 80,000
- 7-32. What type of accessory provides the operator with a source of artificial illumination through the dental handpiece?
1. Miniature flashlight
  2. Transillumination
  3. Fiber optics
  4. Dental light
- 7-33. What type of substance is used to clean the fiber optic surfaces of the dental handpiece?
1. Baking soda
  2. Ethyl alcohol
  3. Isopropyl alcohol
  4. Hydrogen peroxide
- 7-34. What type of rotary instrument is used in the high-speed handpiece?
1. High-speed grip
  2. Friction grip
  3. Straight grip
  4. Latch angle
- 7-35. What type of bur is used in a high-speed handpiece?
1. Steel
  2. Copper
  3. Carbon
  4. Carbide
- 7-36. In what motion does the forked prongs of an amalgamator move?
1. Circle
  2. Up and down
  3. Side to side
  4. Figure eight

- 7-37. The high intensity light radiation emitted from the VLC is capable of causing what type of an injury from chronic exposure?
1. Renal
  2. Retinal
  3. Radioactive
  4. Brain tumors
- 7-38. What dental classification(s) is/are considered as being dental ready?
1. One
  2. Two
  3. Both 1 and 2 above
  4. Three
- 7-39. What dental classification(s) is/are considered likely to compromise combat effectiveness or deployability?
1. Two
  2. Three
  3. Four
  4. Both 2 and 3 above
- 7-40. Which dental officer has the ultimate authority, responsibility, and accountability for dental care provided to each fleet?
1. Fleet
  2. Force
  3. Surface
  4. All of the above
- 7-41. How many dental officers are appointed to the position of a force dental officer?
1. One
  2. Two
  3. Six
  4. Four
- 7-42. Which title is given to the head of the dental department on board a ship?
1. Doc
  2. Dental Officer
  3. Administrative Dental Officer
  4. Dental Division Officer
- 7-43. Generally, how many total Dental Technicians are assigned as permanent ship's company on board a USNS?
1. 1
  2. 3
  3. 8
  4. 11
- 7-44. When manning is required for mobilization on board a USNS, how are personnel assigned from shore-based facilities?
1. PCS
  2. TCS
  3. TAD
  4. TEMDU
- 7-45. Which of the following reading material is/are required when checking on board a ship?
1. MANMED
  2. Shipboard Dental Procedures Manual
  3. Dental Departments Organization and Instruction Manual
  4. All of the above
- 7-46. Collateral duties build what type of spirit to accomplish the ship's mission?
1. Individual
  2. Department
  3. Team
  4. Poor
- 7-47. Who has the responsibility of correctly assigning dental department personnel to the Watch, Quarter, and Station Bill?
1. Medical Officer
  2. Dental Officer
  3. First LT
  4. XO
- 7-48. Who has the responsibility of assigning duties and responsibilities to dental personnel during general quarters?
1. Medical Officer
  2. Dental Officer
  3. First ET
  4. XO

- 7-49. When at sea, how is medical waste disposed?
1. 100 miles off shore
  2. 200 miles off shore
  3. Stored in designated areas
  4. Brought up to the mess deck and disposed along with ship's waste
- 7-50. On what NAVSUP form are dental supplies and equipment inventoried?
1. 6700/1
  2. 6700/2
  3. 6700/3
  4. 1114
- 7-51. Supply procedures can be found in what NAVSUP manual?
1. 455
  2. 485
  3. 495
  4. 1114
- 7-52. Which document specifically lists dental material requirements for each type and class of ship?
1. P-485
  2. AMAL
  3. ADAL
  4. Master dental list
- 7-53. Who is responsible for performing preventive maintenance on equipment before, during, and after operation?
1. Dental Equipment Technician
  2. Electronic Technician
  3. Equipment operators
  4. Dental Technicians
- 7-54. Stock objectives for extended deployments should be ADAL, plus how many additional days of supplies?
1. 90
  2. 60
  3. 30
  4. 15
- 7-55. What does 3-M stand for?
1. Maintenance, material, and manual
  2. Maintenance, material, and management
  3. Maintenance, material, and managing
  4. Maintenance, material, and mobilization
- 7-56. What OPNAVINST. series provides instructions and guidance for the Navy's 3-M Program?
1. 4790.1
  2. 4790.2
  3. 4790.3
  4. 4790.4
- 7-57. What work center manual contains the LOEP, MIP, and MRC's for system equipment assigned to that work center?
1. Shipboard dental guide
  2. OPNAVINST. 4790.4
  3. PMS
  4. DDS
- 7-58. Who serves as the ESWS/EAWS coordinator for PQS?
1. CO
  2. XO
  3. Both 1 and 2 above
  4. CMC
- 7-59. Which two combined units make up the Fleet Marine Force?
1. MARFORLANT and MARFORWEST
  2. MARFORLANT and MARFORPAC
  3. MARFOREAST and MARFORPAC
  4. MARFOREAST and MARFORWEST
- 7-60. Who is the staff dental officer to the Commandant of the Marine Corps?
1. DENCO Officer
  2. H&S Officer
  3. DDP
  4. DPP
- 7-61. How many Marine and Navy personnel make up an MEF?
1. 10,000
  2. 20,000
  3. 30,000
  4. 40,000
- 7-62. How many total dental battalions support the FMF?
1. Six
  2. Two
  3. Eight
  4. Four

- 7-63. Who is responsible to the CO for all elements of the DENBN for coordination of administration and logistical support?
1. H&S Company
  2. MARDIV
  3. FSSG
  4. MAW
- 7-64. How many dental companies are in a DENBN?
1. Five
  2. Two
  3. Three
  4. Four
- 7-65. All Navy personnel who serve with the FMF are eligible to earn which of the following awards?
1. Marine Force Ribbon
  2. Marine Force Medal
  3. Enlisted Marine Force Ribbon
  4. Navy Fleet Marine Force Ribbon
- 7-66. How many total NMCBs are there?
1. 10
  2. 8
  3. 12
  4. 14
- 7-67. How many total dental personnel are assigned to each battalion?
1. One
  2. Two
  3. Three
  4. Four
- 7-68. Enlisted personnel permanently assigned to an NMCB have an opportunity to earn which of the following designations?
1. SCW
  2. CWS
  3. SWS
  4. ESCW

# ASSIGNMENT 8

Textbook Assignment: "Casualty Care and CBR Warfare," chapter 13, pages 13-1 through 13-39.

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8-1. What is the first step taken before administration of emergency treatment during a mass casualty?

1. Triage
2. Site assessment
3. Casualty assessment
4. Determine life-threatening injuries

8-2. What is first determined when performing a preliminary casualty assessment?

1. Site assessment
2. Medical supplies needed
3. Transportation required to evacuate patient
4. Determine life-threatening injuries

8-3. The sorting and allocation of treatment to patients is referred to by what term?

1. Emergency treatment
2. Field medicine
3. Triage
4. BCLS

8-4. When transporting a casualty on a litter, in what position are the feet carried?

1. Backward
2. Forward
3. Sideways
4. Reverse

- |            |
|------------|
| A. Group 1 |
| B. Group 2 |
| C. Group 3 |
| D. Group 4 |

Figure 8-A.—Triage groups.

IN ANSWERING QUESTIONS 8-5 THROUGH 8-8, SELECT FROM FIGURE 8-A THE TRIAGE GROUP THAT BEST DESCRIBES THE DEFINITION GIVEN IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

8-5. Injuries demand surgical attention immediately, after resuscitation, or as soon as practical.

1. A
2. B
3. C
4. D

8-6. Injuries are managed by self-help or buddy care.

1. A
2. B
3. C
4. D

8-7. Hopelessly wounded or dead on arrival.

1. A
2. B
3. C
4. D

8-8. Wounds are so slight they can be managed at a battalion aid station.

1. A
2. B
3. C
4. D

8-9. What type of bleeding is described as oozing?

1. Circulatory
2. Hemorrhage
3. Capillary
4. Arterial

8-10. What type of bleeding is dark red in color and comes from the wound in a steady stream?

1. Venous
2. Arterial
3. Capillary
4. Hemorrhage



- 8-11. What type of bleeding is bright red in color and spurts each time the heart beats?
1. Venous
  2. Arterial
  3. Capillary
  4. Hemorrhage
- 8-12. What is the purpose of a bandage?
1. To stop the bleeding
  2. To prevent further injury to the wound
  3. To prevent further injury contamination
  4. All of the above
- 8-13. Which of the following steps should be used with direct pressure to help control bleeding?
1. Elevation
  2. Splinting
  3. Tourniquet
  4. Pressure point
- 8-14. What total number of principal pressure points are there on each side of the body?
1. 11
  2. 22
  3. 32
  4. 42

- A. Superficial temporal artery
- B. Facial artery
- C. Carotid artery
- D. Subclavian artery
- E. Upper portion of brachial artery
- F. Lower portion of brachial artery

Figure 8-B.—Arterial pressure points.

IN ANSWERING QUESTIONS 8-15 THROUGH 8-20, SELECT FROM FIGURE 8-B, THE ARTERIAL PRESSURE POINT THAT WILL CONTROL THE AREA OF BLEEDING DESCRIBED IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

- 8-15. Bleeding of the cheeks, lips, or chin.
1. A
  2. B
  3. C
  4. D
- 8-16. Bleeding of the upper part of the arm.
1. D
  2. E
  3. F
  4. B
- 8-17. Bleeding of the scalp.
1. A
  2. B
  3. C
  4. D
- 8-18. Bleeding of the lower arm.
1. C
  2. E
  3. F
  4. I
- 8-19. Bleeding of the neck.
1. C
  2. D
  3. E
  4. F
- 8-20. Bleeding between the middle of the upper arm and the elbow.
1. C
  2. E
  3. D
  4. A

- A. Radial and ulnar arteries
- B. Iliac artery
- C. Femoral artery
- D. Popliteal artery
- E. Anterior and posterior tibial artery

Figure 8-C.—Arterial pressure points.

IN ANSWERING QUESTIONS 8-21 THROUGH 8-25, SELECT FROM FIGURE 8-C, THE ARTERIAL PRESSURE POINT THAT WILL CONTROL THE AREA OF BLEEDING DESCRIBED IN THE QUESTION. USE EACH ANSWER ONLY ONCE.

- 8-21. Bleeding of the lower leg.
- 1. B
  - 2. C
  - 3. D
  - 4. E
- 8-22. Bleeding of the foot.
- 1. B
  - 2. C
  - 3. D
  - 4. E
- 8-23. Bleeding of the hand.
- 1. B
  - 2. C
  - 3. A
  - 4. D
- 8-24. Bleeding at the thigh.
- 1. B
  - 2. C
  - 3. D
  - 4. E
- 8-25. For more effective control of bleeding if the iliac artery does not control hemorrhage.
- 1. A
  - 2. D
  - 3. B
  - 4. c
- 8-26. What area of the body, if any, is a tourniquet placed?
- 1. Three inches above the wound
  - 2. Three inches below the wound
  - 3. As close to the wound as possible
  - 4. None of the above
- 8-27. After applying a tourniquet, what information is written on the casualty's forehead?
- 1. TQ-0830
  - 2. M-0830
  - 3. t-0830
  - 4. T-0930
- 8-28. How many inches are the feet elevated for the standard shock position?
- 1. 4 to 6
  - 2. 6 to 12
  - 3. 12 to 15
  - 4. 15 to 20
- 8-29. How often should you examine a splinted part of the body?
- 1. Every 10 minutes
  - 2. Every 20 minutes
  - 3. Every 30 minutes
  - 4. Every 60 minutes
- 8-30. What are the two main types of fractures?
- 1. Fixed and closed
  - 2. Partial and closed
  - 3. Open and closed
  - 4. Greenstick and closed
- 8-31. What type of fracture has an open wound in the tissue where the bone has broken through?
- 1. Compound
  - 2. Closed
  - 3. Both 1 and 2 above
  - 4. Compound greenstick
- 8-32. What is the most serious part of a sprain?
- 1. Severe pain
  - 2. Ruptured blood vessels
  - 3. Tearing of soft tissue
  - 4. Tearing of supporting ligaments

- 8-33. What type of wound is least likely to become infected?
1. Lacerations
  2. Incisions
  3. Abrasions
  4. Punctures
- 8-34. In what position would you place a casualty with a skull fracture?
1. Trendelenburg
  2. Lying down, head lower than feet
  3. Lying down, head slightly elevated
  4. Lying down, head even with feet
- 8-35. Which of the following treatments should NOT be given to a casualty who has a chest wound?
1. Give plenty of fluids
  2. Administer oxygen
  3. Watch for shock
  4. All of the above
- 8-36. A casualty who has intestines exposed may be more comfortable in what position?
1. Sitting up
  2. Fetal position
  3. Lying on the back with knees flat
  4. Lying on the back with knees drawn up
- 8-37. What is the FIRST step taken in treating a wound?
1. Use direct pressure
  2. Use pressure points
  3. Apply a tourniquet
  4. Elevate the wound
- 8-38. Which of the following measures is performed during a secondary examination?
1. Examination of life threatening injuries
  2. Full-body assessment
  3. Site evaluation
  4. All of the above
- 8-39. What muscle is the best injection site to administer morphine in a mass casualty situation?
1. Thigh
  2. Stomach
  3. Buttock
  4. Back of upper arm
- 8-40. How many hours must pass before you can administer a second syrette of morphine?
1. 1
  2. 2
  3. 3
  4. 4
- 8-41. What part of the circulatory system are intravenous fluids introduced?
1. Capillaries
  2. Artery
  3. Vein
  4. All of the above
- 8-42. An IV solution bag should be raised at least how many inches above a casualty's head?
1. 30
  2. 24
  3. 21
  4. 16
- 8-43. When performing a venipuncture, in what direction is the beveled side of the needle pointing?
1. Up-side down
  2. Side-ways
  3. Down
  4. u p
- 8-44. When performing a venipuncture, what degree angle range should the needle be in relationship to the skin?
1. 5 to 10
  2. 10 to 20
  3. 20 to 25
  4. 25 to 30
- 8-45. Usually, what is the minimum and maximum drops per minute IV solution is administered?
1. 0 to 20
  2. 20 to 40
  3. 40 to 60
  4. 60 to 80
- 8-46. When moving a casualty over rough terrain, how many minutes, if necessary, can you stop an IV drip?
1. 10
  2. 8
  3. 5
  4. 3

- 8-47. What type of card is definitive treatment documented on during combat or mass casualty situations?
1. U.S. Field Medical
  2. U.S. Medical Triage
  3. U.S. Field Triage
  4. U.S. First Aid
- 8-48. As a general rule, first and second-degree burns are regarded as serious when they cover at least what percent of the casualty's body?
1. 10
  2. 15
  3. 20
  4. 25
- 8-49. A seriously burned casualty will have an overwhelming need for which of the following nutrients?
1. Food
  2. Potassium
  3. Starches
  4. Liquids
- 8-50. What condition will a casualty have if he/she is flushed, very dry and hot, pupils constricted and his/her pulse fast and strong?
1. Heat exhaustion
  2. Hypothermia
  3. Heat cramps
  4. Heat stroke
- 8-51. What condition will a casualty have if he/she appears ashen gray, skin is moist and clammy, and skin is cold and the pupils are dilated?
1. Heat exhaustion
  2. Heat stroke
  3. Heat cramps
  4. Hypothermia
- 8-52. What is your main objective when treating a casualty with heat stroke?
1. Reduce fluid intake
  2. Reduce body temperature
  3. Maintain vital signs
  4. Maintain airway
- 8-53. Death will result when the body core temperature approaches what degree Fahrenheit?
1. 90
  2. 85
  3. 83
  4. 80
- 8-54. What degree Fahrenheit is most effective when warming a casualty suffering from hypothermia?
1. 97
  2. 99
  3. 103
  4. 106
- 8-55. What type of stretcher is particularly valuable for transporting injured persons to and from ships?
1. Neil Robertson
  2. Stokes
  3. Army
  4. Navy
- 8-56. What type of stretcher is designed for removing an injured person from engine room spaces?
1. Neil Robertson
  2. Improvised
  3. Stokes
  4. Army
- 8-57. What is the treatment for liquid nerve agents?
1. 3 PAM Cl
  2. M291 skin decon kit
  3. M258A1 skin decon kit
  4. Both 2 and 3 above
- 8-58. When exposed to nerve agents, how many auto injectors of atropine and 2 PAM Cl are issued?
1. One
  2. Two
  3. Three
  4. Four
- 8-59. At least how many seconds are auto injectors of atropine or 2 PAM Cl held in the injection sight when administering the antidote?
1. 5
  2. 10
  3. 15
  4. 20

- 8-60. Giving yourself a second set of nerve agent antidote by injection may create what effect?
1. Allergic reaction
  2. Immediate relief
  3. Burning feeling
  4. Overdose
- 8-61. How many sets of nerve agent antidote, if any, will be given to a casualty who has severe signs of nerve agent poisoning?
1. One
  2. Two
  3. Three
  4. None of the above
- 8-62. Blister agents first affect what part of the body?
1. Armpits
  2. Feet
  3. Eyes
  4. All of the above
- 8-63. What maximum period of time may the effects of incapacitating agents last?
1. 6 hours
  2. 8 hours
  3. 1 day
  4. 4 days
- 8-64. Blister agents are usually released in what form?
1. Gas
  2. Solid
  3. Liquid
  4. Frozen
- 8-65. What medication is administered for blood agent exposure?
1. 2 PAM Cl
  2. Amyl nitrate
  3. Both 1 and 2 above
  4. M291 or 258A1 skin decon kit
- 8-66. Biological warfare (BW) agents are detected through which means?
1. Physical senses
  2. Chemical detectors
  3. Laboratory examination
  4. All of the above
- 8-67. What is the first line of defense against BW agents?
1. Immune system
  2. Clothing
  3. 2 PAM Cl
  4. Shoes
- 8-68. Which of the following, if any, are the self-aid measures for diseases caused by BW agents?
1. 2 PAM Cl
  2. Atropine
  3. Amyl nitrite
  4. None of the above
- 8-69. Radiation may be released by what type of particles?
1. Ions
  2. Protons
  3. Radioactive fallout
  4. Radioactive poisons

