

CHAPTER 9

DENTAL OPERATIONS IN A NUCLEAR, BIOLOGICAL, CHEMICAL, OR DIRECTED-ENERGY ENVIRONMENT

Section I. INTRODUCTION

9-1. General

The NBC and rapidly emerging DE dimensions of the integrated battlefield present a special challenge in the provision of dental service operations. The utility of NBC weapons against area targets, as well as their long range and flexible means of delivery, ideally suit them for use against CSS concentrations and MSRs. Generally located within or near these lucrative area targets, dental units are at no less risk to NBC weapons than any other unit in the CZ and COMMZ. Defense against NBC weapons and DE sources must be incorporated into the dental unit's TSOP, and specified individual and collective tasks must be intensely trained on a regular basis.

9-2. Mission in a Nuclear, Biological, and Chemical Environment

The overall mission of dental units to provide dental services is greatly affected in the aftermath of an NBC attack. First, the unit must survive the attack and rapidly recover from its effects. Second, in the event of mass casualties, the patient care effort must be redirected from dental treatment to the alternate wartime role of augmenting adjacent MTFs as discussed in Chapter 8. Provision of dental services in an NBC environment will generally be limited to treatment of maxillofacial emergencies requiring immediate attention.

9-3. Technical Guidance

There are many sources of technical guidance for dental units on NBC- and DE-related matters. The most specific guidance, however, on preparation for and response to an NBC attack should be contained in the TSOP of the parent headquarters.

a. Doctrinal References. Field Manual 8-10-7 is the basic tactics, techniques, and procedures manual applicable to dental and other HSS units

operating in an NBC environment. Field Manuals 8-9, 8-33, 8-285, and the Emergency War Surgery NATO Handbook provide guidance on patient treatment in the NBC environment. The FM 3-series provides doctrinal guidance on individual and collective NBC tasks common to all Army units.

b. Unit Chemical Operations Specialists. Both the HHD of the medical battalion (dental service) and medical company (dental service) have organic NBC NCOs (54B, chemical operations specialist). In the medical company (dental service), the NBC NCO (E5) provides training, advice, and supervision regarding proper use and maintenance procedures for NBC equipment. He also advises and assists the commander and unit NBC officer in planning and conducting unit decontamination and other unit NBC operations. In the HHD of the medical battalion (dental service), the NBC NCO (E7) serves as the senior advisor to the commander and his staff on NBC-related matters, coordinates NBC operations within the battalion, and monitors the NBC readiness of subordinate units. In addition, he serves as the NBC NCO for the HHD, performing the same unit functions as those listed above for the medical company (dental service) NBC NCO. Neither the medical detachment (dental service) nor the medical team (prosthodontics) have an organic NBC specialist. They must rely on either the medical battalion (dental service) HHD or the medical company (dental service) to which assigned or attached for technical expertise.

c. Unit Nuclear, Biological, and Chemical Personnel. Each dental unit details an officer on orders to act as the unit's NBC officer. In the medical battalion (dental service) and medical company (dental service) the medical service (MS) executive officer is usually designated the unit NBC officer. Other personnel are appointed to assist the unit NBC NCO in reconnaissance, decontamination, and other NBC-related operations as specified in the FM 3-series.

Section II. NUCLEAR, BIOLOGICAL, AND CHEMICAL ENVIRONMENT

9-4. General

An NBC environment has an extremely adverse effect on the conduct of dental operations. Potentially high casualty rates, materiel loss through unprotected exposure, and the creation of obstacles to movement and mobility serve to degrade mission performance. Contamination, whether nuclear, biological, or chemical, is a major impediment to operations even for a well protected force. Directed energy does not produce contamination, but requires special precautions just the same.

9-5. Nuclear Environment

Nuclear weapons produce three categories of damaging effects: blast, thermal radiation (heat and light), and nuclear radiation (principally, gamma rays and neutron particles). The effects of nuclear radiation are spread by both the detonation blast and the wind, effectively producing widespread areas of contamination.

a. Casualties generated in a nuclear attack will likely suffer concurrent injuries from the combination effects of blast, thermal burns, and radiation. These casualties fall into three categories:

(1) *Irradiated casualty.* The irradiated casualty is one who has been exposed to ionizing radiation, but is not contaminated. They are not radioactive and pose no radiation threat to health care providers. Casualties who have suffered exposure to initial nuclear radiation fit into this category.

(2) *Externally contaminated casualty.* The externally contaminated casualty has radioactive dust and debris on his clothing, skin, or hair. He presents a “housekeeping” problem. The externally contaminated casualty should be decontaminated at the earliest time consistent with required care. Life-saving care is always rendered, when necessary, before decontamination is accomplished. Radioactive contamination can be monitored with a radiation detection instrument such as the AN/PDR-27 or AN/VDR-2. Removal of the outer clothing will result in greater than 90 percent decontamination. Soap and

water can be used to further reduce the contamination levels. A contaminated patient—or even several contaminated patients—is unlikely to present a radiation hazard to attending medical personnel.

(3) *Internally contaminated casualty.* The internally contaminated casualty is one who has ingested or inhaled radioactive materials, or has had radioactive material injected into the body through an open wound. The radioactive material continues to irradiate the casualty internally until the material decays, is biologically eliminated, or is removed by surgical debridement. Attending health care personnel are shielded, to some degree, by the patient’s body. Inhalation, ingestion, or injection of quantities of radioactive material sufficient to present a threat to medical care providers is highly unlikely.

b. Dental units operating in a contaminated environment created as a result of residual radiation (fallout) will face three basic problems—

(1) Immersion of the unit area in fallout, causing contamination of shelter, unprotected supplies and equipment, vehicles, personnel, and personal equipment.

(2) Casualties among unit personnel as a result of direct exposure to radiation.

(3) Contamination of supply routes and other areas required for movement.

9-6. Biological Environment

A biological attack (using bomblets, rockets, or spray/vapor dispersal, release of arthropod vectors, and terrorist/insurgent contamination of food and water, frequently without immediate effects on exposed personnel) may be difficult to recognize. Biological warfare indicators include—

- Increases in disease incidence or fatality rates.
- Sudden presentation of an exotic disease.
- Other sequential epidemiological events.

9-7. Chemical Environment

Description of the chemical environment is complicated by the increasing number of known agents, variety of damaging effects, varying degrees of persistence and volatility, and multiple means of delivery. The environment is further complicated by employment of chemical agents in combination or chemical agents combined with conventional ordnance. As with nuclear weapons, in addition to casualties among unprotected soldiers, the varying degrees of contamination produced in the aftermath of a chemical attack severely degrade unit capability until decontamination is accomplished and the contaminated area is vacated. Detailed background information contained in FMs 3-3, 3-4, and 8-9 concerning the chemical as well as nuclear and

biological environment must be clearly understood by dental commanders and their subordinates.

9-8. Directed-Energy Environment

Directed-energy sources are becoming more prevalent on the modern battlefield and their presence will undoubtedly increase in the future. This will produce yet another dimension in the integrated battlefield. Directed-energy sources include laser, microwave, or radio frequency systems. Directed-energy sources are nondiscriminatory. Adverse effects on dental units may result from inadvertent exposure to friendly use as well as enemy employment. Field Manual 8-50 provides additional information on prevention and medical management of laser injuries.

Section III. DENTAL UNIT SURVIVAL IN A NUCLEAR, BIOLOGICAL, AND CHEMICAL ENVIRONMENT

9-9. General

Dental units and their personnel must be able to survive an NBC attack, recover from its effects, and then continue the dental care mission. To survive and recover, a number of individual and collective tasks derived from the principles of NBC defense must be accomplished. Dental units are suitably equipped to perform these tasks.

9-10. Principles of Nuclear, Biological, and Chemical Defense

The principles of NBC defense are discussed in Chapter 4 of FM 3-100. These principles, briefly discussed below, apply to all dental units regardless of their location in the theater.

a. Avoidance. Avoidance measures consist of both active and protective measures.

(1) Passive avoidance measures:

- Training.
- Camouflage and concealment.

- Use of hardened positions.
- Dispersion.

(2) Active avoidance measures:

- Contamination detection.
- Contamination marking.
- Alarms and signals.
- Warning and reporting system.
- Contamination control.

b. Protection.

- Hardening of positions and protecting personnel.
- Assuming mission-oriented protective posture (MOPP).
- Reacting to attack.
- Using collective protection.

c. *Decontamination.*

- Hasty decontamination.
- Deliberate decontamination.

9-11. Nuclear-, Biological-, and Chemical-Related Clothing and Equipment

The TOEs and appropriate CTAs for dental units provide suitable NBC equipment for the accomplishment of both individual and collective NBC survival tasks.

a. *Individual Protective Equipment.* All dental TOEs provide protective masks for each soldier in the unit. Two sets of MOPP clothing (trousers, jacket, overboots, mask with hood, and gloves) are allocated by CTA 50-900 for each soldier. Other NBC items intended for individual use such as VGH ABC-M8 Detector Paper, M258A1 Skin Decontamination Kit (being replaced by M291), nerve agent antidote autoinjectors (MARK I) and pyridostigmine bromide (PB) pretreatment tablets are maintained in sufficient quantities by the unit to ensure initial and resupply issue for each soldier. A convulsant antidote for nerve agent (CANNA) is under development. Field Manual 8-285 will prescribe its use when fielded.

b. *Nuclear-, Biological-, and Chemical-Related Equipment.* Current dental TOEs provide the following common items of NBC-related equipment:

- Chemical agent alarm.
- RadiacSet AN/PDR-27 or AN/VDR2.
- Radiacmeter: IM-93/UD.
- Radiacmeter: IM-174/PD.
- Radiacmeter: IM-9/PD (used by x-ray personnel).
- Radiacmeter: DT 235.
- Charger radiac detector: PP-1578/PD.
- Charger battery: PP-34/MSM.

c. *Common Use Nuclear, Biological and Chemical Items Not Prescribed by TOE.* Various FM 3-series NBC publications require that units also have on hand the following common use NBC-related items:

- VGH ABC-M8 detector paper.
- M9 detector paper.
- M11, decontamination apparatus mounted on each vehicle.
- Standard NATO NBC hazard marking kit.
- Decontaminating solution No. 2 (DS2).
- Supertropical bleach (STB).

d. *Nuclear-, Biological-, and Chemical-Related Repair Parts and Replenishment Supplies.* The unit must maintain stocks of NBC-related repair parts and replenishment supplies IAW the technical publications for the various items of equipment. Of particular importance among these items are replacement filters, hoods, carriers, and other items for the protective mask. The unit's NBC NCO manages unit NBC supplies in coordination with the unit supply NCO and supervises maintenance on NBC equipment.

e. *Eyeglass Inserts for the Protective Mask.* Soldiers who require eyeglasses for vision correction are required to have one pair of prescription optical inserts for use with their protective mask. Optical inserts are stored and maintained as part of that soldier's mask.

9-12. Individual Tasks

a. Individual NBC-related survival tasks are common to all soldiers. Successful application of each task is essential to personal as well as collective dental unit survival. These tasks must be drilled constantly and incorporated into broader scale training. The following NBC-related tasks, along with necessary training information, are covered in Soldier Training Publication (STP) 21-1 -SMCT.

- Put on, wear, remove, and store your M17-series protective mask with hood.

- Maintain your M17-series protective mask with hood.

- Decontaminate your skin and personal equipment.

- Put on and wear MOPP gear.

- Recognize and react to chemical or biological hazard.

- React to nuclear hazard.

- Use M8 detector paper to identify chemical agent.

- Use M9 detector paper to detect chemical agent.

- Exchange MOPP gear.

- Prepare the chemical agent monitor for operation.

- Put the chemical agent monitor into operation.

- Prepare the chemical agent monitor for movement or storage.

- Drink from canteen while wearing your protective mask.

- Use the latrine while wearing MOPP 4.

b. The following are NBC-related first-aid tasks:

- Administer nerve agent antidote to self (self-aid).

- Administer first aid to a nerve-agent casualty (buddy aid).

9-13. Collective Unit Tasks

Collective NBC tasks are generally accomplished by members of the unit organized into specific teams or by designated members of the unit's headquarters. Successful performance of those individual tasks listed above is also necessary for accomplishment of the various collective tasks, and ultimately, unit survival. Collective tasks which dental units must be prepared to perform in an NBC environment are derived from the principles of NBC defense:

- Establish a unit alarm and warning system.

- React to a chemical attack.

- React to a nuclear attack.

- React to a biological attack.

- Operate in a contaminated area.

- Conduct hasty decontamination of personnel and equipment.

- Conduct deliberate decontamination. (NOTE: Dental units require external support for conduct of deliberate decontamination.)

- Mark contaminated areas.

- Conduct NBC surveys and monitoring.

- Monitor exposure of unit personnel to radiation.

- Utilize NBC Warning and Reporting System (NBCWRS).

9-14. Decontamination

a. Decontamination is costly in terms of manpower, time, space, and materiel, and merits special discussion. Decontamination is essential for survival, but must be balanced with the requirement to continue the mission. Both categories of decontamination, hasty and deliberate, are based on four basic principles, as follows—

- *SPEED* — Decontaminate as soon as possible to restore full potential.
- *NEED* — Decontaminate only that which is necessary.
- *LIMIT* — Decontaminate as close to the site of contamination as possible.
- *PRIORITY* — Decontaminate items in order of importance to mission accomplishment.

b. Hasty Decontamination. Dental units are capable of conducting hasty decontamination using only organic resources. Field Manual 3-5 describes in detail the procedures for hasty decontamination, which include MOPP gear exchange and vehicle washdown.

c. Deliberate Decontamination. Deliberate decontamination is the most resource-intensive type of decontamination and requires external support from supporting decontamination units. Field Manual 3-5 describes in detail the procedures for deliberate decontamination, which include decontamination of troops and equipment. Keep in mind that the supporting decontamination unit is in charge of both the decontamination site and the decontamination operation.

9-15. Dental Support During Nuclear, Biological, and Chemical Operations

Dental support during NBC operations are orchestrated by the various levels of dental unit headquarters, based on the capability within the respective unit. The battalion HHD and the medical company (dental service) with their organic NBC NCOs have greater capability than the medical detachment (dental service) and the medical team (prosthodontics) which have no organic NBC NCOs. Nevertheless, the smaller units still must operate effectively in the NBC environment. The commander is ultimately responsible for unit dental activities during NBC operations; however, he will generally delegate planning and supervisory responsibility to an appointed NBC officer. When assigned, the unit NBC NCO provides technical advice to the commander and NBC officer and supervises support relative to NBC operations and training. A number of NBC-related tasks are executed by unit headquarters.

a. Establishment of Nuclear, Biological, and Chemical Policy. Nuclear, biological, and chemical policy is incorporated in the unit's TSOP. Key personnel such as the NBC officer are appointed on orders. Personnel requirements for various decontamination, survey, and monitoring teams are determined and designated personnel are appointed on orders.

b. Nuclear, Biological, and Chemical Warning and Reporting System. The unit headquarters coordinates implementation of the NBCWRS system--receiving, generating, or disseminating the various standard NBC reports. Field Manual 3-3 discusses the use and formats for these reports.

c. Maintain Records of Radiological Exposure. The unit headquarters maintains a record of exposure of its personnel to radiological hazards. This information is used in generating a radiation status report to higher headquarters. Exposure of x-ray personnel as indicated on their IM-9/PD radiacmeter must be included in this record.

d. Operational Planning and Intelligence. The HHD of the medical battalion (dental service), in particular, is responsible for disseminating NBC information to its subordinate units and incorporating that information into the overall operational planning for the battalion.

9-16. Mission-Oriented Protective Posture

The most important headquarters function for dental support during NBC operations is the establishment of MOPP level, a decision which rests solely with the commander. Mission-oriented protective posture is the flexible use of protective clothing and equipment that balances protection with performance degradation. The higher the MOPP level, the more protection it affords, but the more it degrades performance through generation of heat, stress, and reduced efficiency. Detailed guidance on individual NBC protection and MOPP is provided in FM 3-4. Keep in mind that MOPP is not a rigid policy, but must be applied with common sense and flexibility. To determine appropriate MOPP level, the commander conducts a MOPP analysis which weighs mission; work rate and duration; probable warning time; terrain, weather, and time of day; unit training and additional protection available; alarm placement; and automatic masking policy.

Section IV. DENTAL TREATMENT OPERATIONS IN A NUCLEAR, BIOLOGICAL, AND CHEMICAL ENVIRONMENT

9-17. General

As a general rule, in the aftermath of an NBC attack, dental treatment operations cease until deliberate decontamination of the unit and its equipment has been accomplished. Only maxillofacial injuries of an immediate life-threatening nature should be considered for treatment. After an attack, the resources of the DTF are redirected toward decontamination and relocation to a noncontaminated area, or toward support of any mass casualty situation which may have been generated in adjacent MTFs. See Chapter 8 for information on alternate wartime roles.

9-18. Patient Treatment Considerations

The only category of dental treatment appropriate in an NBC environment is emergency; and then, only those emergencies of an extreme nature which demand immediate attention. The most likely condition requiring such attention would result from maxillofacial trauma and would be most likely to present at an MTF rather than a DTF. Though the likelihood of a requirement to treat dental patients in an NBC environment is extremely low, DTFs must have a plan in the event that such treatment is required.

a. Patient Decontamination. Decontamination of patients (dental patients included) must be accomplished before they enter a treatment facility for definitive care. Contaminated patients are triaged separately and decontaminated prior to treatment unless immediate life- or limb-saving care is required. The decontamination process may be interrupted to provide such care. Patient decontamination falls into the category of deliberate decontamination. Specific details of patient decontamination are contained in FMs 8-10-4, 8-10-7, and 3-5. Performance of patient decontamination is not an appropriate alternate wartime role for dental personnel. However, dental personnel may be called upon to assist in providing medical care in this environment. All personnel should be trained to handle contaminated casualties when necessary. Initial decontamination at the basic skill level is accomplished at the casualty's unit.

Detailed patient decontamination is accomplished by patient decontamination teams made up of personnel from the supported unit and supervised by medical personnel.

b. Patient Decontamination by Dental Treatment Facilities. Neither dental units nor their subordinate DTFs are equipped to support detailed patient decontamination. Those contaminated patients requiring urgent attention which may present at a DTF must be directed or evacuated to the nearest MTF with a patient decontamination capability prior to treatment.

9-19. Patient Protection

Dental treatment facilities must also consider the need to protect patients in their care in the event of NBC attack or when the threat of an attack is high. Special consideration must be made for maxillofacial patients whose condition prevents them from wearing a standard protective mask.

a. Immediate Response. In the event of an attack or when the alarm sounds, the dental treatment providers immediately cease work and mask. The patient should do likewise. After donning their own masks, dental treatment providers should assist the patient if necessary by removing materials which impede the patient's masking. Only those materials which impede masking or may compromise the airway (for example, rubber dam frames, impressions) are removed. The rest are left in place until the all clear is sounded. Special attention must be given to patients who may have been medicated into a less than fully conscious state or otherwise incapacitated.

b. Mission-Oriented Protective Posture Level Considerations. The MOPP level should be taken into account when determining the category and extent of dental treatment to be provided. Patients, including those seated in the dental chair, should be at the MOPP level prescribed for the DTF by its parent headquarters. Dental treatment at MOPP Levels 3 and 4 is of course rendered impossible by the requirement to wear the protective mask;

however, treatment is still possible at Levels 0-2. Treatment at Level 2 should be limited only to emergency category care requiring urgent attention. At MOPP Level 1, most types of dental emergencies can be accommodated; however, only minimum essential treatment should be undertaken to reduce risk of the patient being caught in a compromised state. The MOPP Level 0 generally does not limit the provision of dental treatment; however, the degree of the NBC threat forecast for the area should be considered before undertaking extensive treatment. Refer to FM 3-4 for additional information on MOPP levels.

c. Maxillofacial Injuries. Patients with maxillofacial injuries which prevent proper fit and seal of the individual protective mask must be placed in a patient protective wrap. Though patients with these types of injuries are most likely to be found only in MTF channels, DTFs should nevertheless be prepared. DTFs should maintain one or two protective wraps on hand for this purpose. Protective wraps are currently available only in the chemical warfare agent treatment sets organic to MTFs. Special arrangements for their procurement for dental use must be made with either adjacent MTFs or the servicing medical logistics (MEDLOG) battalion.