

CHAPTER 6

HOSPITALIZATION**6-1. General**

Many factors must be considered when planning for hospitalization on the integrated battlefield. The hospital staff must be able to defend against a Level 1 threat and survive NBC strikes while continuing their mission. Level 1 threats include sabotage and associated threats by individuals or small groups (two or three) of infiltrators. This threat may include the introduction of chemical or biological agents to the hospital area, the water supply, or food supplies; the destruction of equipment and/or supplies; and gathering intelligence information. On the larger scale of surviving NBC strikes and continuing to support the mission, operating in a contaminated environment will present many problems for hospital personnel. The use of NBC weapons or systems will create large numbers of casualties in short periods; compromise both the quality and quantity of health care delivered by posing a serious contamination threat to medical personnel; constrain mobility and evacuation; and contaminate the logistical supply base. These factors have the potential of severely degrading health care delivery. In the delivery of hospital support, consider the following assumptions:

a. Although health care facilities are not targeted, their location close to other combat support (CS) and combat service support assets make them vulnerable to NBC strikes for several reasons—

- The use of persistent chemical agents, high yield nuclear weapons, or biological agents in these areas is highly likely.
- Delivery systems for these weapons are characterized by poor accuracy and wide area coverage. Chemical and biological agents may present a hazard some distance downwind from the area of attack; also, residual radiation may extend for hundreds of kilometers from ground zero.
- The large size of hospital units, 12 acres or more, makes them extremely vulnerable to intentional or accidental targeting.
- Hospitals located near road networks and airfields for access to evacuation increases their exposure to tactical strikes of NBC weapons.
- There are ever increasing numbers of countries and individuals with the ability to manufacture and delivery NBC weapons/agents. This activity increases their use potential at all levels of conflict.

b. Large numbers of casualties are produced in a short period of time. Many of these casualties may have injuries that are unfamiliar to hospital personnel. These injuries may include—

- Heat stress casualties due to the use of MOPP Level 4 for extended periods.
- Psychological stress casualties due to isolation in MOPP and the impact of the NBC weapons. (Twenty-five percent of casualties may be in this category.)
- Chemical casualties.
- Chemical agent antidote overdose casualties.
- Biological casualties.

- Radiation casualties.
- Combined conventional and NBC injuries.

c. In addition to the wounding effects of NBC weapons on troops, their use will have other effects upon the delivery of patient care.

- Treatment may have to be delayed due to the need for decontamination.
- The arrival of contaminated patients at the hospital will require hospital personnel to perform triage; administer EMT procedures in the patient decontamination area; supervise augmentation personnel performing patient decontamination; and constantly monitor the hospital for contamination. A 20-man table of organization and equipment (TOE) augmentation team or 20 personnel from units within the geographic area/base cluster of the hospital will be required for patient decontamination. Augmentation personnel will operate in 4-man teams. See Appendix C for patient decontamination procedures.
- Patients may have been triaged at a lower HSS echelon. However, due to contamination or the mass casualty situation, triage must be performed for all patients as they arrive at the hospital. Triage ensures patients receive life- or limb-saving care in a timely manner.
- Conditions may mandate the use of nonmedical vehicles to evacuate patients. The use of these vehicles may limit en route medical care and complicate patient unloading procedures, but may be the only way to clear the battlefield and ensure timely care of patients at the hospital.
- Mission-oriented protective posture reduces the efficiency of all personnel:
 - Fine motor skills—wearing gloves reduces the ability to grasp and manipulate small items.
 - Gross motor skills—MOPP impedes the ability to move about.
 - Visual skills—the mask reduces visual fields and acuity,
 - Auditory skills—the mask and hood greatly reduces vocalization and hearing abilities.
 - Stamina—MOPP creates significant heat and mental stress. Heat injuries can occur in a very short period of time.
- At MOPP Level 3 or 4, all but the most basic patient care procedures have to be suspended.

d. Without CPS systems, hospitals may operate for a limited time in a nonpersistent agent environment, but are incapable of operating in a persistent agent environment.

- Chemical/biological filters for fixed site hospital ventilation systems will be a critical item of supply.
- Liquid chemical agents can penetrate either the TEMPER in about six hours, or the GP tentage in a shorter period of time. These agents will penetrate the wrappings on sterilized

equipment and supplies, medical supplies, and medications/solutions. They can also contaminate water/food supplies.

- Without a CPS system, treatment procedures involving an open wound or the respiratory tract in the presence of a chemical or biological agent hazard is limited. Exposing open wounds and the respiratory tract to the agent increases the effects of these agents on the patient.
- Without hardened protection, the hospital, staff, and patients are susceptible to the blast, heat, and missiling effects of nuclear weapons.
- Hospital biomedical equipment is vulnerable to the effects of the EMP produced by nuclear weapons. The EMP is not harmful to humans, animals, or plants, but is very damaging to electronic equipment.
- It is very difficult to decontaminate most hospital equipment. Decontamination may only be possible by aging (allowing the agent to off-gas).
- Hospitals are not kept in reserve. All personnel and equipment losses due to contamination or radiation will have to be replaced by out-of-theater resources.

6-2. Protection

a. Protection of hospital assets requires intensive use of intelligence data and careful planning. The limited mobility of hospitals (except the mobile army surgical hospital) makes their site selection vital to minimize collateral damage from attacks on other units.

(1) Hospitals must be located as close to the combat troops as possible to provide responsive care in support of the tactical commander's plan. However, their limited mobility and a lack of CPS systems must be considered when selecting their locations.

(2) Protective factors (distance from other CS/CSS units and interposed terrain features) must be balanced against the operational factors (accessibility and time required for patient transport).

(3) Regardless of the weapon systems used, relatively large portions of any tactical area will remain uncontaminated. Hospitals should avoid movement through or operation in contaminated areas.

b. Many defensive measures will either impede or preclude performance of the hospital mission. Successful hospital defense operations against an NBC threat is dependent upon accurate, timely receipt of information via the NBC 3 report. This warning data will allow hospital units to operate longer without the limitations and problems associated with MOPP use, then adopt a defensive posture when absolutely necessary. The detailed information on the areas affected and the types of agents used (provided in the NBC 5 and 6 reports respectively) allows the hospital staff to—

- Project the number and types of patients to be expected.
- Establish a patient decontamination area.
- Request patient decontamination assistance.

(1) Protective procedures.

(a) Because most hospital sections operate in sheltered areas (tentage or metal shelter), some protection is provided against vapor, liquid, and particulate (fallout) hazards. Locating equipment, such as trucks, under trees or other cover provides similar effects. Setting up hospitals in existing structures (concrete or steel buildings) will provide the maximum protection from hazards and eliminate many decontamination problems.

(b) Concealment and good operation security (OPSEC) will help prevent identification of a unit. Camouflaging the hospital may add to the NBC protection, but this effect must be weighed against the loss of Geneva Conventions protection.

(c) Dispersion is a defensive measure employed by tactical commanders; however, hospital operations limit the value of this technique. One technique that may be used is locating sections of the hospital, such as the motor pool, personnel billets, laundry, and logistical storage, further from the hospital complex than normal. This would increase dispersion without severely compromising the hospital mission.

(d) The MOPP does not protect against all effects of radiation from nuclear weapons. However, it provides some protection in preventing beta burns. By covering all body surfaces, especially hairy areas, MOPP greatly expedites the decontamination process.

(2) Nuclear.

(a) Most protective measures against nuclear attack require engineer and/or intensive logistic support. This support includes placing sandbag walls around tents; digging trenches for patient occupation; or constructing earthen berms. Occupying existing structures, depending upon their strength and potential flammability, may be the best protection against the effects of a nuclear strike. The remainder of this section presents a variety of factors to be considered when selecting the protective posture for the hospital. Leaving equipment packed and loaded until actually needed for operations will help protect materiel in an NBC environment.

(b) Personnel and patient protection requirements will depend upon the threat. Is it fallout or the direct effects of the detonation?

- If the threat is nuclear fallout, the hospital structure provides protection; the fallout can be brushed or washed off. This allows protection while permitting patient care to continue virtually uninterrupted. A need to relocate the hospital will depend upon the degree of contamination; the amount of decontamination possible; and the projected stay before a normal move in support of tactical operations.

- Hospital tentage alone offers little protection against blast and missileing effects. If the patients are to remain in the tents, they are placed on the floor. Place all equipment on the ground or as low as possible, and secure all loose objects. In GP tents, sandbags can be piled around the base of the tent poles to add stability. The tent poles and patient beds should keep the canvas off the ground enough (if the tent collapses) to continue minimal patient care and evacuation; however, be aware of possible tent pole breakage.

- Hospital units are very susceptible to the thermal effect of a nuclear detonation. Tents will not provide protection against the thermal pulse. If the thermal effect (fires)

is an impending threat, patients and personnel in tentage must move to trenches or other nonflammable areas.

(3) Biological. The most likely use of a biological agent (such as anthrax) is spreading the agent by the pneumonic or airborne route. While such agents may produce large numbers of casualties, initially patients will be seen at the MTF in ones and twos. When a trend is identified, the use of a biological agent will be suspected. General protective measures are the same as for any infectious disease; specific protective measures are used once the vector or method of transmission has been identified. Designating a single hospital to care for these patients (from a patient care or disease transmission standpoint) may not be necessary. However, if there area limited number of cases, consolidating them all at one facility maximizes the use of limited diagnostic laboratory and personnel assets. Biological attack protective measures are the same as those for chemical agents when bombs, sprays, or gases are used. The difficulty in rapidly identifying biological agents may force the use of higher levels of MOPP for longer periods of time. Faced with this situation, a careful evaluation of the mask-only posture is necessary before implementing any level of MOPP.

(4) Chemical.

(a) *Individual protection.* When CPS systems are not available, using the correct MOPP level is essential in hospital mission performance. The level of MOPP assumed depends upon the level of threat. When employing MOPP, the following facts must be considered:

- MOPP 0. At this level, the mask must be carried and all other MOPP gear readily available. Because of space constraints in the hospital, even this level may hinder performance of tasks and increase the probability of accidents. Hospital personnel must ensure that patient's masks are available at their bedside. (For further information on patient protection, refer to (c) below.)
- MOPP 1. Overgarment worn. Since most hospital personnel remain in the same general area while performing their duties, all other MOPP equipment need not be carried, but must be readily available. The major consideration at this level is the addition of the heat stress factor.
- MOPP 2. Addition of the overboots will result in increased chances of falls. The overboots may catch on items around the patient's bed or other hospital equipment, causing personnel to trip and fall.
- MOPP 3. This level will severely alter the proficiency of all hospitalization personnel (decreased visual fields and acuity and reduced communication abilities while wearing the protective mask). The vapor hazard may limit surgery or other procedures which expose circulatory or respiratory systems to the open air.
- MOPP 4. The addition of the protective gloves further limits the procedures that can be performed. At this level, clinical patient care will essentially be reduced to first aid level.
- An alternative approach for the hospital commander is the use of the mask-only posture. This posture is acceptable when the hazard is from vapor only (except mustard). Patients and personnel intents and expandable shelters are protected from solid or liquid contamination (transfer hazards for a limited time). Personnel can work much more efficiently and for longer periods with mask-only posture instead of MOPP Level 3 or 4. However, the commander must weigh these

factors against the potential contamination transfer risk. This risk should be small, except in areas where patients or materiel are received from the outside. Individuals returning to, or bringing materiel from the outside must be extremely careful not to bring contamination into the mask-only area. When considering this alternative, remember that, except those patients in PPW, the patients must also be at mask-only posture.

- The hospital must have a warning system that alerts all personnel of impending or present hazards. This system must include visual and auditory signals; the signals must operate inside and outside the hospital complex. There are numerous problems associated with warning personnel; they include—

- The wide area covered by the hospital operations.
- Some personnel will be asleep at all times of the day or night.
- The considerable noise from the power generation and environmental control equipment.
- Tentage and equipment which interrupts the line of sight.

- When the NBC alarm is activated, all personnel (including off duty personnel) report to their duty stations as soon as they are in MOPP. This allows for 100 percent personnel accounting and provides additional personnel to secure patients and materiel.

- With all openings secured and the ventilation system turned off, the hospital is at its best posture. For nonpersistent agents (vapor hazards), personnel and patients stay at the designated MOPP level until the all clear signal is given; then normal operations are resumed.

NOTE

Patients with injuries that prevent them from assuming a protective posture must be evacuated immediately to a clean treatment facility.

(b) Environmental protection. As noted previously, hospital complexes offer some protection against liquid or fallout contamination, but little against vapor hazards.

- When MOPP Level 1 posture must be assumed, close and secure all tent flaps, vents, and doors to prevent the entrance of liquids or particles. All hospital personnel outside of shelters assume MOPP Level 4. Cover or move all equipment and supplies into shelters (tents and trees), if possible. The best policy is to keep all equipment and supplies not immediately needed covered or in closed containers.

- When MOPP Level 3 or mask-only posture is assumed, shut down the hospital's ventilation system to prevent drawing vapors or fallout contamination into the hospital. This measure also provides some protection of the internal environment during the time required for the vapor to penetrate the tentage.

(c) Patient protection.

- Patient protection depends upon prior planning and timely warning of the chemical threat. Each patient's protective mask must be available and serviceable. If the patient came from a contaminated area, the mask must be decontaminated and the filters changed. The mask decontamination and filter change may have to be performed by hospital personnel. If ambulatory patients' medical conditions permit, they may be able to perform this task. Check all masks for serviceability as soon as the mission permits, but always before they are needed. Do not wait until the warning has been received to begin checking the mask. Each area must have an established plan for operations (to include assisting patients assuming MOPP or other protective posture) in the NBC environment. Appendix D provides additional information on patient protection.

CAUTION

Remember, personnel must be protected from exposure to the chemical agent on the mask; they assume MOPP Level 4 before beginning any decontamination process.

- Hospital staff always mask themselves first, then assist patients in masking. On convalescent and minimal care wards, most patients can put on their masks. For those who cannot, other patients can assist them after putting on their own masks. On the intermediate care wards, some patients will be able to put on their masks, but many will require assistance. Patients should assist each other put on their mask; especially on the minimal care wards. Intensive care and emergency room staff will have to assist their patients in masking.

- Many patients with head and neck wounds, or who are on life-support devices will be unable to wear their individual protective masks; these patients must be placed in PPW. While the PPWS have two ports for intravenous or blood infusion lines, the staff may have to adapt for other devices (Foley catheters, traction, and cardiac monitor) by using tape and other means to seal the gaps created in the seal around the edge of the PPW. Patients requiring assisted ventilation are at extreme risk, unless their air supply is protected. The sequence of protecting everyone is mask yourself first; assist those patients who can wear their protective masks; and then place patients in the PPW.

(d) Materiel protection. Protection of materiel, especially expendable supplies, requires covers and barriers. All materiel not required for immediate use is kept in shipping containers, medical chests, or under cover (tentage, plastic sheeting, and tarpaulin) for protection against particulate or liquid hazard. Protection against vapor hazard may require multiple barriers through which the vapor must penetrate. For example, intravenous solutions are in their individual plastic bags, in the cardboard shipping box, on a covered pallet, in a MILVAN. This presents four barriers against the vapor hazard. These principles should be used to the maximum extent practical.

6-3. Decontamination

a. Decontamination of nuclear-contaminated personnel, equipment, and the operational site is as follows:

(1) Monitoring equipment is used to detect contamination; the contamination is then removed by brushing or scraping with brooms, brushes, branches, and so forth. Flushing contaminated areas with water is also effective in removing nuclear contamination. However, there remains

problems of containing and removing the contaminated water. The best method of containment is to trench the area into a sump for collection of the contamination. This will reduce the area of contamination; however, the level of concentrated nuclear agent may be such that there is an increased hazard to personnel. The collection area must be clearly marked using the standard nuclear hazard signs.

(2) Nuclear contamination of the site normally requires relocation of the hospital. Scraping the top 1 or 2 inches of soil from the area, or covering it with 1 or 2 inches of uncontaminated dirt will not be practical. The commander will determine the need to relocate after considering the contamination level, estimated radiation dose, and the mission.

b. Suspect biological agents should be removed from equipment as quickly as possible. In the absence of agent-specific guidance, clean exposed surfaces using a 5 percent chlorine solution, or copious quantities of soap and water (preferably hot). Liberally apply the hot, soapy water and scrub all surfaces with a brush. Then rinse the surfaces with hot water. As previously discussed, the water used is contaminated and must be controlled and removed to a safe area. Supertropical bleach (STB) and decontaminating solution number 2 (DS2) are effective against most known biological agents because of their caustic nature. If anthrax (or other spore formers) is suspected, repeat the entire decontamination process again to mechanically remove the spores. Other standard biological decontamination agents are described in FM 3-5.

c. Decontamination of chemical contamination is as follows:

(1) *Equipment.*

(*a*) Personnel use their soldier skills and their personal M258A1 kits to decontaminate their personal equipment. The M13, decontamination apparatus, portable, is used to decontaminate vehicles, trailers, and International Organization for Standardization (ISO) shelters. This apparatus uses DS2 (a highly caustic, flammable solution that cannot be used to decontaminate tentage). The DS2 must be washed off after sufficient time for decontamination has passed (see FM 3-5 for details). Water used for NBC decontamination purposes becomes contaminated; it must be drained off and contained in sumps. This will be difficult in hospital areas because relatively flat sites are needed for hospital complexing.

(*b*) When hospital tentage becomes contaminated, decontamination operations must be considered immediately. Spot decontamination may be effective for small areas; however, gross contamination of TEMPER and GP tentage is best decontaminated by aging. Without CPS and with persistent agent contamination that absorbs into the tentage and presents a continuing vapor hazard, the hospital stops receiving patients and evacuates all patients as quickly as possible. When large portions of the hospital are contaminated, personnel decontaminate all equipment possible and relocate to a new site, leaving the contaminated equipment to age or be decontaminated by a specialized unit. When small portions of the hospital are contaminated, the contaminated portions are removed to another location for decontamination; hospital operations are continued, but at a lower operational level. For detailed equipment decontamination procedures, see FM 3-5.

(2) Each hospital is issued MES, Chemical Agents Patient Decontamination, for use in decontaminating patients. These sets are accompanied by MES, Chemical Agents Patient Treatment, for treatment of chemical casualties. Each hospital must decontaminate and treat its personnel who become casualties; chemical casualties from units in its general area; or contaminated patients received from lower echelon MTFs. See Appendix C for patient decontamination procedures. See Appendix D for establishment of a patient decontamination and treatment station.

6-4. Emergency Services

- a.* Providing emergency services will be complicated by several factors:
- Varying levels of treatment received prior to arrival at the hospital.
 - Combined conventional wounds and NBC agent effects.
 - Heat-related complications associated with MOPP use.
 - Psychological effects due to chemical agents, the impact of NBC weapons, or the isolation of MOPP gear.
 - The need to have EMT personnel at the arrival point, decontamination site, and in the EMT area itself.
 - The potential of having to triage and provide patient care while in MOPP gear.
 - The need to provide supervision/guidance to the decontamination augmentation personnel from the supported units. These personnel may be of any military occupational specialty (MOS), except medical. They will use hospital equipment and supplies to decontaminate patients.
- b.* Contaminated patients must be triaged in the decontamination area that is established at the hospital. Contaminated patients **will not** be brought into the clean EMT area until decontaminated. All patients are screened for contamination. Based on the findings, the patient is routed to the contaminated triage station, or to the clean triage station. Contaminated patients are triaged, then routed to the decontamination area, or to the contaminated treatment area. Patient admission to the clean treatment area may be delayed; however, life- or limb-saving care is provided in the contaminated treatment area before decontamination.

6-5. General Medical Services

- a.* The provision of general medical services in the hospital will be continued with minimal interruptions in the NBC environment. The noninvasive nature of these services allow their continuation at most MOPP levels.
- b.* General medical services will be constrained by MOPP Levels 3 and 4 and the mask-only posture. Most of these constraints will be—
- Communication limitations,
 - Loss of the oral route for administering medications to patients.
 - Limited ability to accurately evaluate the eyes, nose, and mouth of patients wearing a protective mask.
 - Reduced ability to perform examination/assessment of patients in PPW or MOPP Levels 3 and 4.
 - Inability to provide oxygen therapy or ventilator support to a patient in a vapor hazard environment, unless a CB filter mask is available.

- Logistical constraints based upon the fact that key areas such as dietetics, supply, and laundry are not in CPS. These three services may be reduced or delayed in the NBC environment.

6-6. Surgical Services

a. Surgical services will be severely limited in the NBC environment. At any level above MOPPO, surgical services are halted except for life-or limb-saving expedient procedures. Surgery cannot be safely performed outside a CPS due to a variety of factors including—

- Lack of protected ventilation for patients during and after surgery.
- Inability to maintain a sterile field while using MOPP gear.
- Direct access for agent through open wounds to the circulatory and respiratory systems.
- Decreased dexterity and vision resulting from MOPP gear use.
- Inability to quickly place the patient in a PPW should the need arise.

b. Due to the relatively high number of trauma cases, hospital services may be severely constrained by NBC contamination. The hospital location and the possible need for hasty relocation are two major planning considerations for the command staff.

c. Patient accounting and medical regulating are critical factors in the transfer of patients from a hospital without CPS that must move out of an NBC environment. Hospitals without CPS stop receiving patients when a persistent hazard is identified; patients on hand are transferred to a clean hospital.

6-7. Nursing Services

Providing nursing care is influenced by the amount of protective gear worn by the nursing staff and the patients. The patients may be in their MOPP gear, in a PPW, or wearing only their protective mask; any of which will interfere with care. Nursing personnel may be at any MOPP level, or in protective mask only.

a. Direct assessment of a patient's vital signs is extremely limited at MOPP Level 3 or 4; however, a carotid artery pulse can be taken by palpating the neck area. The patient's respiratory rate and level of consciousness may be assessed visually. Palpitation of the blood pressure through a PPW may be possible if it is relatively strong, or at least in the normal range. The patient's temperature cannot be monitored; this is an area of concern due to the possibility of heat stress.

b. Only gross neurological signs can be assessed through the PPW. However, even this assessment is complicated by the presence of miosis and by the health care providers mask. Cardiac and urinary output monitoring is continued uninterrupted for patients wearing a mask only, and for patients in the PPW.

c. Oral hygiene and bathing are postponed until a safe environment is available (MOPP Level 2 or less). All toileting will occur within the hospital complex using bedpans, urinals, a bucket, a container with a plastic liner, or a chemical toilet.

d. At MOPP Level 3 or 4, feeding must be postponed. A nutritional assessment is needed to determine how long each patient can tolerate a fasting state when the MOPP Level 3 or 4 remains for over 24 hours.

e. Intravenous (IV) medications are mixed in a CPS area, or in a clean area and then transported in a protective wrap (multilayers of plastic, medical chest, or layered cardboard) to the user. However, IV solutions, blood, and injections can be given to patients on an unprotected ward. Normally, oral medications are only given at MOPP Level 2 or lower.

f. Treatment procedures that have the potential of contaminating the patient's pulmonary or circulatory systems are conducted only at MOPP Level 2 or below. However, EMT procedures may have to be performed in the contaminated treatment area, or the patient decontamination area.

g. Continuous oxygen therapy requires a collective protection environment or a CB filter supported respirator.

h. Delivery of nursing care at MOPP Level 3 or 4 is limited due to the sensory restrictions of MOPP gear. Time is taken to reassure the patients on a personal basis, as much as possible, and by routinely monitoring the ward environment. Communications are difficult and identities are masked. Use of handwritten name tags for staff and patients (including patients in PPW) to ensure that the identity of all personnel is maintained.

i. As with all procedures, the time required for record keeping rises markedly at MOPP Level 3 or 4. Contaminated paperwork cannot be evacuated with the patient. Transcribe essential information onto uncontaminated documents for evacuation with the patient. A record of patient exposure time to a contaminated area is prepared to assess the cumulative risk to the patient.