CHAPTER 5

COMBAT HEALTH SUPPORT IN SPECIFIC ENVIRONMENTS

5-1. General

a. Combat health support is limited to the same degree as combat effectiveness when operating in areas of extreme weather or terrain hazards. In these environments, medical units may require special purpose equipment, which is not normally included in their TOE, or additional quantities of authorized equipment. This equipment can include, but is not limited to, such items as—

- Mountain climbing gear.
- Cold weather bags for the protection of patients.
- Additional tentage.
- Modified transportation platforms.
- Bed nets.

b. Of equal importance, special handling techniques, increased maintenance, and protection from the elements or hazards may be required for supplies and equipment.

c. This chapter discusses CHS operations, including ground ambulance operations, in specific operations; only slight reference is made to air ambulance operations. For an in-depth discussion of air and ground ambulance operations in these environments, refer to FM 8-10-6. For additional information on aviation-specific topics, refer to FM 1-202 and FM 1-400.

5-2. Jungle Operations

a. Difficult terrain, widely dispersed combat units, inadequate road networks, and unsecured LOCs all have a direct effect on CHS in jungle operations. The jungle environment degrades the ability to maneuver. The manner in which CHS is provided in this environment depends on how the tactical units are employed. Wide variations may be expected, but the genera! principles of providing CHS apply.

b. Jungle combat operations are characterized by ambushes and other guerrilla-type operations. The security threat caused by infiltrators requires that LOCs be patrolled often and that convoys be escorted. It is, therefore, essential that CHS be performed as far forward as the tactical situation permits. Deploying assets forward—

- Improves response time.
- Reduces road movement.

- Allows the CHS elements to take advantage of the security offered by combat units.

c. Special planning considerations for operations in the jungle environment include the following:

- *Evacuation.* Thick and remote jungles often require that evacuation be accomplished by litter. In the jungle, even slightly wounded soldiers may find it impossible to walk through the dense undergrowth. This requires that they be evacuated on a litter until easier terrain is reached. This, in effect, raises the number of patients who require evacuation by litter. Litter evacuation is a labor-intensive activity that quickly exhausts the litter bearers. At best, litter teams can carry patients only a few hundred yards over rough terrain before becoming exhausted and requiring rest or relief. Litter hauls should be kept as short as possible, and maximum use of air ambulances equipped with rescue hoists and jungle penetrators should be made.

- *Water.* Water is vital in the jungle; it is also plentiful. Water from natural sources, however, should be considered contaminated. *Water purification procedures must be taught to all soldiers.* The high humidity and heat present in the jungle environment requires all leaders to ensure that a water discipline program is established and enforced. The consumption of inadequate amounts of water leads to dehydration and heat injuries. The human body cannot adjust to less water; hydration must be continuous.

- *Clothing and personal protective equipment and supplies.* Because of the tropical climate, units should pack hot weather clothing when deploying to jungle areas. Jungle fatigues and boots are recommended. The bed net, insect (arthropod) repellent, and sunscreen should be issued to all soldiers operating in this environment.

- *Disease and nonbattle injuries.* The jungle environment is ideal for the transmission of large numbers of diseases. The rate of DNBI casualties is potentially the highest in this climate. The heat, humidity, and terrain place the troops at a high risk for dehydration, heat injury, skin diseases, endemic diseases, and immersion syndrome. Cold injuries are a risk in cool (night) times because wet hot-weather clothing loses its insulating value. Small wounds can rapidly become infected and lead to the loss of effectiveness and possibly require evacuation. High standards of personal hygiene must be taught, encouraged, and maintained by the command. Mosquitoes and other arthropods that carry disease flourish under jungle conditions. Use of all personal protective measures must be ensured. Poisonous plants, animals, arthropods, large predators, and reptiles can cause casualties. Foodborne and waterborne diseases leading to diarrhea or other symptoms abound. Food service sanitation measures must be strictly followed. For additional information on PVNTMED measures, refer to FM 21-10 and FM 21-10-1.

- *Stress and battle fatigue.* The jungle restricts vision and hearing, causes discomfort and poor hygiene, and evokes a sense of threat from poisonous plants, animals, reptiles, enemy ambush, and the fear of becoming lost. Battle fatigue rates are high until troops gain jungle fighting and survival skills.

- Training. Personnel (especially CHS personnel) deployed to a jungle environment should be trained in survival and support techniques. Training (both initial and refresher) should be conducted on—
  - Hot weather acclimatization and survival.
  - Self-aid, buddy aid, and combat lifesaver skills for nonmedical personnel.
  - Prevention, early detection, and treatment of arthropodborne, foodborne, and waterborne diseases.
  - Land navigation.
  - Field sanitation and other PVNTMED measures.
  - Care and maintenance of equipment and supplies.
  - Local plants, animals, reptiles, and arthropods which pose a medical threat.
- *Equipment and supplies.* Due to the increased heat and humidity, vehicles and equipment require additional maintenance. Equipment tends to rust quickly and must be cleaned and oiled more frequently. Canvas items rot, and rubber deteriorates much faster than in more temperate climates. Class VIII supplies (to include blood) are both environmental and time sensitive. These supplies must be correctly stored at the appropriate temperature and used before their expiration date. Improper storage and handling result in these supplies becoming unusable.

d. For additional information on jungle operations, refer to FM 8-10-4, FM 8-10-6, and FM 90-5.

5-3. Mountain Operations

a. In the past, armies have experienced great difficulty in evacuating patients from mountainous areas. Mountain environments are extremely diverse in nature. Some mountains are dry and barren with temperatures ranging from extreme heat in the summer to extreme cold in the winter. In tropical regions, mountains are frequently covered by lush jungles, and heavy seasonal rains may occur. Many areas display high rocky crags with glaciated peaks and year-round snow cover. Elevations can also vary from as little as 1,000 feet above sea level to over 16,000 feet above sea level with drastic and rapidly occurring weather changes.

b. In order to effectively support the tactical plan, the CHS plan must provide maximum flexibility. The CHS planner should consider using all methods of evacuation. Because of the rough terrain, the medical companies may not be able to reach the BASs by ground ambulances. An ambulance shuttle system established with an AXP for aeromedical evacuation assets to meet litter bearers may be required. Litter bearers and beasts of burden, however, may be the only means of

evacuation. The tactical commander determines what soldiers will serve as litter bearers. Close coordination between the medical companies and BASs in establishing patient collecting points and AXPs is necessary to—

- Reduce distance traveled by litter bearers.
- Reduce evacuation time.
- Conserve personnel.
- Locate potential landing sites for air ambulances.

c. Mountain operations require CHS personnel to carry additional equipment. Items such as ropes, pitons, piton hammers, and snap links are all necessary for evacuation of patients and the establishment of MTFs. Unnecessary equipment (especially that which is heavy or bulky [for example, extra tentage], or that for which substitutes are available) should be left behind. If stored, this equipment and supplies should be readily available for airdrop or other means of transport.

d. Survival training is essential in this environment. Combat health support personnel should be trained in survival skills encompassing the following areas:

- Traversing mountainous terrain (to include mountain [rock] climbing and the use of ropes and vertical rescue techniques).
- Exposure to extreme cold and snow (to include cold injury prevention).
- Land navigation.
- Preparation of field expedient, shelters.
- Individual and unit movement at high altitudes.
- Care and treatment of patients suffering from high altitude illness and cold weather injuries.

e. Combat health support personnel will see an increase in patients suffering from—

- Fractures, sprains, and dislocation injuries.
- Acute mountain sickness, high-altitude pulmonary edema, and cerebral edema caused by the rapid ascent to heights over 7,500 feet above sea level.
- Cold weather injuries and hypothermia.
- Dehydration and heat exhaustion.

- Sunburns and snow blindness.

- Aggravated sickle cell anemia. (Although not considered a mountain illness, personnel with sickle cell traits can be seriously affected by the decrease in the barometric pressure and lower oxygen levels found at higher altitudes.)

- Stress and battle fatigue. Mountains confer a psychological advantage to those who hold the high ground with good fields of vision and fire. Those who are confined to the valleys or roads or who must struggle up hill against snipers or indirect fire tend to have higher BF rates.

f. For additional information on mountain operations, refer to FM 90-6. For additional information and techniques for the extraction and evacuation of personnel deployed in mountainous terrain, refer to FM 8-10-4 and FM 8-10-6.

5-4. Desert Operations

a. Deserts are arid, barren regions of the earth incapable of supporting normal life because of the lack of fresh water. Although deserts are often thought of as hot climates, it is important to note that temperatures range from over 136 degrees Fahrenheit (F) in some deserts to bitter cold in others. Day-to-night fluctuations in temperature can exceed 70°F. Desert terrain can have mountains, rocky plateaus, or sandy dunes; some desert areas may contain all of these characteristics. Rain, when it falls, often causes flooding in low-lying areas. Winds can have a devastating effect upon CHS operations by destroying equipment and supplies and causing dust storms. Dust storms make navigation and patient acquisition and treatment difficult. Since deserts vary considerably in their epidemiological characteristics, current and specific medical intelligence should be obtained prior to deploying to a desert environment.

b. The CHS planner must consider the numerous environmental effects to personnel, equipment, and supplies when constructing the CHS plan for this environment. These factors include, but are not limited to—

(1) *Acclimatization.* To be effective, soldiers must be properly acclimatized to the desert. Two weeks are usually required to satisfactorily acclimatize troops to a hot environment, using progressive degrees of heat exposure and physical exertion. Other potential acclimatization problems that may be encountered are the effects of dry air and altitude on the respiratory system. Since many desert areas are located in mountainous terrain, soldiers may require becoming acclimatized to the cold, in addition to the altitude.

(2) *Discipline.* Units deployed in desert areas typically have long LOCs and are widely dispersed. This necessitates a greater reliance on the junior leaders since commanders are required to decentralize operations. For a unit to be effective, a high level of discipline must exist at all levels of the organization.

(3) *Water.* Water is the most basic need in a desert. Without it, soldiers cannot function effectively for more than a few hours.

- Thirst is not an adequate indicator for the need for water. **It is necessary for each commander to establish and enforce a supervised drinking program.** Experience has shown that soldiers do not drink enough fluids unless forced to do so. It is important to cool the water to make it more appealing if at all possible. Water supplies should be carefully guarded against accidental loss, sabotage, or contamination.

- Extra water must be carried by medical vehicles and be available in MTFs. The additional quantities of water are required for patient consumption, treatment of heat casualties, and routine operation of the MTF.

(4) *Endemic disease and environmental injuries.* Soldiers deployed in the desert are susceptible to endemic and epidemic diseases and environmental injuries.

- Water discipline, vaccines, prophylactic measures, field sanitation, personal hygiene, and other PVNTMED measures can reduce the risk of disease.

- Proper clothing, equipment, and a water discipline program to protect against environmental injuries must have command emphasis.

(5) *Stress.* The desolate, often wide-open spaces of many deserts can cause uneasiness, disorientation, and fear of being observed or becoming lost. These circumstances may result in high stress and BF rates until troops learn to navigate, move, camouflage, and use other survival skills in this environment.

(6) *Winds, dust, and sand.* Winds may very easily damage equipment and supplies. Equipment is protected by using covers, tie-downs, and shelters. Terrain helps shield equipment from the wind if the site selection is done carefully. In some cases, special tools (such as extra long metal tent stakes) are necessary. Supplies must be carefully stored and protected from the effects of the wind and sand.

- The effects of wind and sand are interrelated. Desert sand starts to become airborne when the wind reaches about 20 knots. Sandstorrns—

  - Restrict visibility.
  - Pose a hazard to eyes (especially for soldiers wearing contact lenses).
  - Contaminate water supplies (if they are not protected)
  - Make navigation difficult.

- Dust presents one of the greatest dangers to the proper functioning of equipment. Sand mixed with lubricants forms an abrasive paste. Lubrication fittings, bearings, and filters should be inspected frequently and changed when required.

- Communications equipment may be adversely affected by dust and sand. Over a period of time, electrical insulation is damaged by wind-blown sand. Special care should be taken to brush dust off radio equipment and to keep ventilating ports and channels clear.

- Sand can accumulate in airframes, on the bottom of armored vehicles, and in bearings on all types of equipment. This accumulation, combined with oil and condensation, adds extra weight to aircraft and may also jam its control linkages. Sand and grease buildups must be removed from bearings to ensure safe operation and control of aircraft and vehicles.

- Dust trails created by hovering aircraft or ground vehicles can be seen in excess of 10 miles on a relatively flat desert. This exposes these assets to direct and indirect enemy fires. If the tactical situation permits, ground vehicles should reduce their speed to the point that they do not create a dust signature.

(7) *Terrain*. Trafficability varies with the type of terrain covered. Open, flat, and rocky terrain affords higher trafficability than does mountainous areas, lava beds, or salt marshes. Drivers must be well trained in judging the terrain over which they are driving to select the best route.

- Tracked vehicles are best suited for desert operations. They can, however, throw tracks when traversing a rocky area. Their use is also limited in rough terrain with steep slopes.

- Wheeled vehicles may be used in desert operations; however, they normally have a lower average speed than tracked vehicles and a higher incidence of damage and malfunction. Wheeled vehicles often bog down in sandy areas and cannot traverse many of the rougher areas.

- Vehicles should carry extra repair parts (fan belts, tires, and other items apt to malfunction).

(8) *Heat*. Excessive heat causes vehicles to overheat, leading to greater than normal wear. The frequency of leaks on vehicles and aircraft is greater than in other environments. Engine and transmission seals tend to dry out and crack; fuel lines wear out quickly; and water requirements for cooling vehicle engines are greater. Loss of water through evaporation must ‘be considered in logistical planning.

- Batteries do not hold their charge efficiently in intense heat. Dry battery supplies should be increased to compensate for a higher usage rate.

e. Communications equipment must be protected from the heat. Dust covers are used on this type of equipment. If the equipment has ventilating ports, these should be cleaned regularly to avoid clogging.

- Medical supplies (to include blood) must be protected from the heat to prevent deterioration. The shelf life of some medical supplies decreases when stored in hot climates.

(9) *Radiant light.* The sun burns unprotected skin, and it may damage unprotected eyes. Soldiers should dress in loosely fitting clothing, use sunscreen to protect exposed skin, and wear sunglasses or goggles to protect their eyes. Soldiers should remain fully clothed. Removing clothing increases direct exposure of the skin to the sun and eliminates the beneficial cooling effects of the moisture trapped in clothing. Radiant light or its heat effects may be detrimental to plastics, lubricants, pressurized gases, rubber, and other fluids. All vehicles and aircraft should be kept well ventilated. When parked, windshields should be covered to reduce heat buildup inside. Supplies of all types should be stored in well-ventilated, shady areas. Placing supplies in covered holes in the ground may reduce the heat effects.

(10) *Humidity.* Humidity is a factor in some desert areas of the world, especially in the Middle East. Humidity can become a problem for short periods of time in other desert areas. Light coats of lubrication can help prevent rust; however, these benefits should be weighed against the dust gathering qualities of oil. Demisting equipment is used on optics and night vision equipment to combat the effects of humidity.

(11) *Temperature variations.*

- Temperature variations can cause condensation in humid desert areas affecting optics, fuel lines, air tanks, and weapons.

- Expansion and contraction of air and fluids may cause vehicle and equipment, problems. Vehicle and equipment operators must ensure that the effects of temperature variations do not become a significant problem. Temperature variations may cause—

  - Tires to overinflate during the day and underinflate at night.

  - Fuel tanks to overflow during the day causing a fire hazard.

  - Oil fluid levels to become overfull and cause leaks during the day, or to provide insufficient lubrication at night when the oil cools.

(12) *Static electricity.* Static electricity is a factor in the desert. During refueling operations and when oxygen or other flammable substances are being used on board vehicles, it is important to remember that it presents a real hazard. Proper refueling procedures must be followed. Static electricity also causes severe shocks to ground personnel in sling-loading and hoist operations. (Refer to FM 8-10-6 for additional information on sling-loading and hoist operations.)

c. To ensure success in desert operations, detailed planning is required. Factors to consider include the following:

- **Water is as mission essential as any piece of unit equipment.** Additional quantities of water are required for CHS operations for the survival of both medical personnel and patients. Load plans for all vehicles and aircraft must include water.

- Prescribed load lists are expanded to carry sufficient quantities of repair parts easily degraded by the environment.

- Covers should be fabricated (prior to deployment, if possible) for equipment (especially communications and electronic), supplies, and vehicles.

- Fuel usage and consumption are critical due to the extended ranges between supported units and increased vulnerability for refueling sites in the open desert terrain.

- Appropriate clothing for both hot and cold weather is required.

- Petroleum, oils, and lubricants must be of the proper viscosity for desert operations. Maintenance services are also performed more frequently.

- Small packages/amounts of Class III packaged products should be used to avoid contamination by blowing sand.

- Filters of all types are consumed at a higher rate.

d. Training for desert operations is not significantly different than training for operations in other areas except for the following:

(1) *Mountain training.* Because many desert areas are in mountainous terrain, procedures and techniques for evacuation in mountainous terrain must be practiced by all CHS personnel. Special equipment requirements must also be planned for (paragraph 5-3).

(2) *Navigation.* Navigation in desert terrain varies from relatively simple to extremely difficult.

- Factors affecting navigation are—
  - Type of desert.
  - Scale and quality of available maps.
  - Other navigational guides which are available.
- Ground vehicles must have compasses available as they may have to rely on compass headings and odometer readings to navigate.

- Use of convoys is a viable technique to ensure that ground vehicles do not get lost and to improve security.

e. For additional information on desert operations, refer to FM 8-10-4, FM 8-10-6, and FM 90-3.

5-5. Extreme Cold Weather Operations

a. Operations in the extreme cold are adversely impacted by severe environmental conditions and rugged terrain. The tundra and glacial areas are harsh, arid, and barren. Temperatures may reach lows of -80°F to -100°F which, combined with gale force winds, make exposure unsurvivable. The greatest environmental detriment to operations is blowing snow, which reduces visibility to zero. This results in the loss of depth perception from total white conditions.

b. Other environmental considerations are as extreme but easier to circumvent. Solid footing is suspect in both the dead of winter and in the summer. Snow and ice covers crevasses, holes, and otherwise unstable ground. In traversing suspect ground situations, consider linking soldiers by rope. During the summer, ground transportation is more restricted than in any other environment due to the marsh and muskeg composition of the arctic tundra. In CHS operations, patients must be sustained for a longer duration due to terrain delays and the lack of direct evacuation routes.

c. Combat health support personnel may see an increase in the following types of DNBIs:

- Cold injuries (ranging from minor frostnip to severe frostbite, especially of the feet, to hypothermia).

- Dehydration and heat exhaustion.

- Stress and battle fatigue. (The similarity of arctic and desert terrain may also cause disorientation and a sense of exposure.) Extreme cold can psychologically paralyze the inexperienced troop and reduce him to a budding “survival first and only” mentality.

d. Factors to consider when conducting CHS activities in extreme cold operations include the following:

- Patients must be kept warm as the effects of the extreme cold can hasten and/or deepen shock.

- Improvised shelters may be required for patient holding (due to unexpected snow storms or vehicle breakdowns); the shelters must be able to be heated (such as in a cave). The longer the period the patient must be held in the improvised shelter, the more important it is to fortify it against the effects of the cold.

- Blood and IV fluids must be protected from freezing, both when in use and when stored.

- Establishing an ambulance shuttle system (FM 8-10-6) or patient collecting points is useful when operating in extended battle zones, or when evacuation distance and time required are increased.

- Augmentation of air and ground ambulances from higher echelon CHS elements and/or use of nonmedical transportation assets may also be required to meet the extended evacuation needs.

- Additional supplies of water should be carried by ambulances and maintained at patient collecting points, AXPs (if manned), and MTFs.

- Due to the decreased temperature and frozen environment, vehicle maintenance requirements are increased. Lubricants must be of the correct viscosity for the temperature. In extreme cold, batteries perform less efficiently. Batteries may have to be removed from the vehicles and kept in a warm place to ensure prompt starting. Engines may also have to be kept running to avoid freeze-ups or long warm-up periods. **All ambulances are considered deadlined without a functional heater in the patient compartment.**

- The proper storage of medical supplies is essential to prevent loss from freezing.

- There are few terrain features or road networks; therefore, evacuation routes must be surveyed and marked over open terrain. At extreme latitudes, operations during the winter months are conducted in extended hours of darkness. The use of night vision goggles (NVGs) may be required. Compass accuracy is inconsistent due to geomagnetic phenomenon.

- Landing zones must be chosen with extreme care in both winter and summer. Blowing snow mandates instrument-assisted takeoffs and running landings. Landing zones must be correspondingly larger.

e. The CHS planner must ensure that comprehensive plans are developed for extreme cold weather operations. Further, thorough preparation is required to ensure survival and mission accomplishment in this environment. Factors to consider include, but are not limited to, the following:

- Mud obstacles at noon may become an avenue of approach at night.

- Snow complicates all work. Snow-covered terrain—

  - Hampers reinforcements.

  - Muffles noise.

- Makes cross-country driving hazardous.
- Creates different camouflage requirements.
- A complete reappraisal of concealment requirements is necessitated by the use of thermal sights.
- Tracks in the snow destroy concealment.
- No soldier is assigned to any job alone. The buddy system is used at all times.
- Maintenance tasks take twice as long as they do in more temperate climates.
- Bare metal can stick to skin or wet garments in subfreezing temperatures.
- Fuel spilled on skin or garments increases the freezing factor; it is one of the greatest causes of injury in winter operations.
- Petroleum, oils, and lubricants requirements are increased in this environment.
- Every effort must be made to warm gear boxes and engines before starting the vehicle..
- The first consideration in the AO is heat; followed by shelter for sustained work.
- Soldiers need to stand clear of taut cables; steel tends to be brittle and breaks in extremely cold temperatures.
- Fire extinguishers are winterized by adding 15 percent nitrogen to the carbon dioxide (CO_2).
- Radio sets must be warmed up prior to transmission. The sets may be turned on but should not transmit for at least one-half hour.
- Frost shields (such as using the plastic bag in which the batteries are packed) should be placed over microphones.
- Grounding rods have to be buried horizontally instead of pounded vertically. Recovery of stakes and rods placed in the ground is significantly more difficult.
- Flooring is needed in heated areas because the heat will thaw the tundra.
- Soldiers must take breaks for water and warmth.
- Static electricity presents a serious hazard especially around flammable products.

5-6. Nuclear, Biological, Chemical, or Directed-Energy Environment

On future battlefields, the enemy may employ NBC weapons and DE weapons/devices. Nuclear, biological, chemical, and DE protective measures and procedures to mitigate their effects must be included in the medical company training programs and daily operations. Nuclear, biological, chemical, and DE actions create high casualty rates, materiel losses, obstacles to maneuver, and contamination.

- Mission-oriented protective posture (MOPP) Levels 3 and 4 result in body heat buildup, reduction of mobility, and degradation of vision, touch, and hearing senses.

- Laser protective eyewear may degrade vision, especially at night.

- Contamination is a major problem in providing CHS in an NBC environment. To increase survivability, as well as supportability, the medical company must take necessary action to avoid NBC contamination. Maximum use must be made of—

  - Alarm and detection equipment.

  - Unit dispersion.

  - Overhead cover, shielding materiels, and collective protection shelters (CPS), when available.

  - Chemical agent resistant coatings.

- Generally, a biological aerosol attack will not significantly impact materiel, terrain, or personnel in the short term, although toxins can be an exception.

- Field Manual 3-3, FM 3-4, FM 3-5, FM 3-100, FM 8-10-4, FM 8-10-7, FM 8-50, FM 8-250, and FM 8-285 contain detailed information on—

  - Characteristics and soldier dimensions of the nuclear battlefield.

  - Nuclear, biological, and chemical operations.

  - Extended operations in contaminated areas.

  - Contamination avoidance.

  - Nuclear, biological, chemical, and DE protection.

  - Mission-oriented protective posture levels.

- Patient decontamination.
- Prevention and medical management of laser injuries.

a. Medical Planning Factors. Combat health support planning for the integrated battlefield must be comprehensive and thoroughly coordinated. In addition to the traditional CHS provided combat units, planning for EMT for civilian casualties, consistent with the military situation, must be included. The medical company commander should forecast the expected number of casualties, institute triage, and provide EMT. For additional information on CHS planning in this environment, refer to FM 8-10-4, FM 8-10-6, FM 8-10-7, FM 8-55, and FM 8-285.

b. Logistical Considerations. The medical company is organized and equipped to provide support in a conventional environment. However, it must be trained and prepared to operate in all battlefield situations. Employment in an NBC environment will necessitate the issue of MESs, chemical patient treatment, and chemical patient decontamination.

- The DMSO maintains a 48-hour contingency stock level of Class VIII supplies. These medical supplies and equipment must be protected from contamination. Class VIII stocks are dispersed throughout the unit area to prevent or reduce damage and contamination caused by NBC weapons. Combat, health support plans include the protection (NBC hardening) of stocks and the rapid resupply of affected units. Contaminated items are decontaminated prior to issue to using units.

- The division PVNTMED section is responsible for testing the quality of water for the division. Water from local sources (lakes, ponds, wells, or public water systems) is subject to being contaminated. It is essential, therefore, to test the local sources for contaminants before use. Frequent retesting by water production personnel is recommended. Once a water source is contaminated, it is marked with the appropriate NBC contamination markers. The water is not used until a determination is made that it is safe for use, or water treatment equipment capable of removing the contaminants is employed. When water becomes contaminated, it is disposed of in a manner that prevents secondary contamination; then the area is appropriately marked. All water dispensing equipment is monitored frequently for possible contamination. Water supply on the NBC battlefield is provided on an area basis by elements of the MSB.

- Veterinary personnel supporting the division are responsible for inspecting Class I items. Inspection prior to issue or use of foods suspected to be contaminated is required at the user level.

c. Personnel Considerations. During NBC and DE actions, CHS requirements will increase and medical reinforcement may be necessary. Following an enemy NBC attack, or employment, of DE devices, medical personnel provide EMT. Nonmedical personnel should provide search and rescue of the injured or wounded, provide first aid, and perform decontamination procedures. Nonmedical personnel are required to support, patient decontamination efforts (FM 8-10-7 and FM 8-285).

d. Collective Protection. A minimum of eight medical personnel are required to operate a CPS system and provide medical care. One EMT NCO performs triage and EMT on patients before decontamination. One aidman monitors the patient's medical condition during the decontamination procedures. Two aidmen monitor the patient's condition and provide care to patients when they leave the decontamination site. These individuals care for patients awaiting admission to the CPS; they also provide care for RTD or other patients requiring evacuation without receiving treatment in the CPS. Two combat medics operate from the CPS airlock. They remove the patient's protective mask and monitor the patient prior to his entering the interior of the CPS. They assist the physician and PA with the treatment inside the CPS. They also place the patient in a patient protective wrap (PPW) for exit from the CPS.

e. Civilian Casualties. Civilian casualties may become a problem in populated and built-up areas; the division clearing station may be required to provide assistance when civilian medical resources cannot handle the patient work load. Aid to civilians, however, will not be undertaken at the expense of CHS to US personnel.

f. Nuclear Environment.

(1) The three damaging effects of a nuclear weapon are blast, thermal radiation (heat and light), and nuclear radiation (principally gamma rays and neutron particles). Well-constructed foxholes with overhead cover and expedient shelters (reinforced concrete structures, basements, railroad tunnels, *or* trenches) provide good protection from nuclear attacks. Armored vehicles also provide protection against blast, thermal, and radiation effects of nuclear weapons. Casualties generated in a nuclear attack will likely suffer concurrent injuries (a combination of blast, heat, and radiation injuries) which will complicate CHS. Nuclear radiation casualties fall into three categories:

- The irradiated casualty is one who is exposed to ionizing radiation, but is not contaminated. He is not radioactive and poses no radiation threat to health care providers. A casualty who has suffered exposure to initial nuclear radiation will fit into this category.

- The externally contaminated casualty has radioactive dust and debris on his clothing, skin, and hair. The externally contaminated casualty should be decontaminated at the earliest time consistent with required CHS. Lifesaving 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 the 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 level. A contaminated patient is unlikely to present a radiation hazard to attending medical personnel.

- The internally contaminated casualty is one that 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 radioactive decay and biological elimination removes the radioactive isotope. Attending medical personnel are shielded, to

some degree, by the patient's body. Inhalation, ingestion, or injection of quantities of radioactive material su~cient to present a threat to health care providers is highly unlikely.

(2) Medical units operating in a residual radiation environment face three problems:

- Immersion of the MTF in fallout, necessitating decontamination efforts and the evacuation of patients already suffering from radiation sickness.

- Casualty production due to gamma radiation.

- Hindrances to evacuation caused by the contaminated environment.

(3) Medical triage achieves the most orderly, timely, and efficient use of medical resources.

- The triage process for nuclear casualties is different than for conventional injuries. The four categories for triage of nuclear casualties are—

  - Immediate treatment group (T1)—those patients requiring immediate lifesaving surgery. Procedures should not be time-consuming and should concern only those with a high chance of survival, such as respiratory obstruction and accessible hemorrhage.

  - Delayed treatment group (T2)—those patients requiring surgery but whose conditions permit delay without unduly endangering safety. Life-sustaining treatment such as IV fluids, antibiotics, splinting, catheterization, and relief of pain may be required in this group. Examples are fractured limbs, spinal injuries, and uncomplicated burns.

  - Minimal treatment group (T3)—these patients with relatively minor injuries, such as minor fractures or lacerations, who can be helped by untrained personnel or who can look after themselves. Buddy care is particularly important in this category.

  - Expectant treatment group (T4)—those patients with serious or multiple injuries requiring intensive treatment, or with a poor chance of survival. These patients receive supportive treatment compatible with resources, which will include large doses of analgesics, as applicable. Examples are severe head and spinal injuries, widespread burns, or high doses of radiation; this is a temporary category.

- Stress and BF casualties are normally in the minimal treatment group. It is important to give immediate reassurance, remove them from the triage area, beg-in physical replenishment (food, hydration, hygiene), and get them to work performing easy tasks which are within their physical and mental capabilities.

- The potential effect of radiation on triage of patients is shown in Table 5-1.

Table 5-1. Radiation Dosage and Degradation of Treatment Priorities

SERIAL	STARTING PRIORITY	FINAL PRIORITY LESS THAN 150 cGy	FINAL PRIORITY 150-550 cGy	FINAL PRIORITY OVER 550 cGy
1	RADIATION ONLY	DUTY OR T3	T3**	T4
2	T1	T1	T1 OR T4*	T4
3	T2	T2	T2 OR T4*	T4
4	T3	T3	T3**	T4
5	T4	T4	T4	T4

NOTES:
(1) * In the case of full or partial thickness burns covering more than 18 percent of the body surface or trauma which would either result in significant infection or be categorized as severe but not normally immediately life threatening, such as a fractured femur. This is a clinical decision and not necessarily subjectively reproducible.
(2) ** Includes the probable requirements for antibiotics and transfusion at a later time. This classification does not suggest that the patient is not in need of treatment, but rather that he does not need immediate specialized care.
(3) cGy—centigray.

g. Biological Environment.

(1) 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. The medical company must monitor biological warfare indicators such as—

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

(2) To mitigate the effects of most biological threats, soldiers should maximize the use of passive defense measures such as—

- Immunizations.
- Good personal hygiene.
- Physical conditioning.

- Arthropod repellents.
- Protective mask.
- Good field sanitation practices.

(3) Decontamination of most biologically contaminated patients can be accomplished by bathing with soap and water.

(4) Treatment of biological agent patients requires observation and evaluation of the individual to determine necessary medications.

h. Chemical Environment.

(1) Handling chemically contaminated patients may provide the greatest challenge to CHS units on the integrated battlefield. All casualties generated in a liquid chemical environment (are considered to be contaminated. Due to the vapor hazard associated with contaminated patients, medical personnel operating the division clearing station without a CPS system may be required to remain at MOPP Level 4 for long periods of time. When CPS systems are not available, clean areas must be located upwind from the contaminated area for treating patients.

(2) A patient-processing station for chemically contaminated patients must be established by the medical company to handle the influx of contaminated patients (Figure 5-l). Generally, the area is divided by a hotline into two major working areas: a contaminated working area situated downwind from a clean working area. Personnel on both sides of the hotline assume a MOPP level commensurate with the threat agent employed (usually MOPP Level 4). The patient-processing station should be established *in* a contamination-free area of the battle area. When CPS systems are not available, the clean treatment area is located 30 to 50 meters upwind of the contaminated work area. When personnel in the clean working area are away from the hotline, they may reduce their MOPP level. Chemical-monitoring equipment must be used on the clean side of the hotline to detect vapor hazards due to slight shifts in the wind current. If vapors invade the clean work area, medical personnel may have to remask to prevent low-level chemical agent exposure and minimize clinical effects (such as miosis).

(3) Initial triage, EMT, and decontamination are accomplished on the dirty side of the hotline. Life-sustaining care is rendered, as required, without regard to chemical contamination. Secondary triage, ATM, and patient disposition are accomplished on the clean side. When treatment must be provided in a contaminated environment, outside of CPS, the level of care may be reduced to first-aid procedures because treaters are in MOPP Levels 3 or 4.

(4) Medical companies require augmentation with nonmedical personnel to meet patient decontamination requirements created by a chemical attack. This augmentation must come from the supported units. See Appendix K for information on operating a patient decontamination station.

i. Directed-Energy Environment. A new dimension on future battlefields will be the employment of DE weapons/devices. These may be laser, microwave, or radio frequency generated

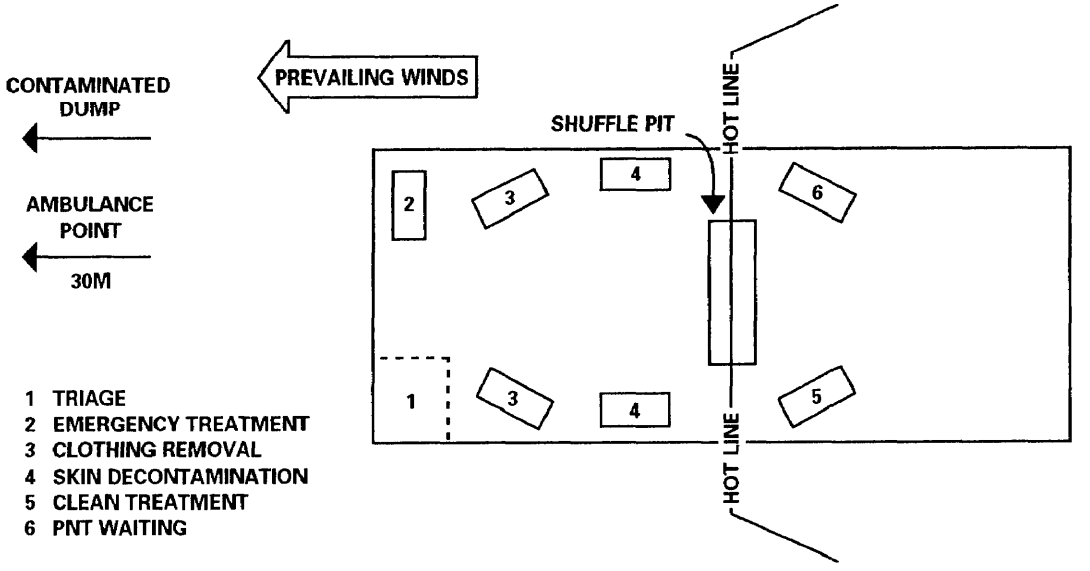

Figure 5-1. Division clearing station patient-processing station.

sources. Medical management of casualties from these sources will compound the already overloaded medical treatment resources. Information on the prevention and medical management of laser injures is contained in FM 8-50.

j. Medical Evacuation. For information on the medical evacuation of patients in a contaminated environment, refer to FM 8-10-6.

5-7. Military Operations on Urbanized Terrain

Throughout history, battles have been fought on urbanized terrain. Some recent examples include Hue, Beirut, and Panama City. Military operations on urbanized terrain (MOUT) are those military actions planned and conducted on a terrain where man-made structures impact on the tactical options available to the commander. This terrain is characterized by a three-dimensional battlefield, having considerable rubble, ready-made fortified fighting positions, and an isolating effect on all combat, CS, and CSS units. Of concern to the CHS planner is the need to plan, train, prepare, and equip for CHS from under, above, and at ground Ievel.

a. The CHS plan must be flexible and capable of supporting unanticipated situations. Special equipment requirements for the provision of CHS include, but are not limited to—

- Axes, crowbars, and other tools used to break through barriers.
- Special harnesses; portable block and tackle equipment; grappling hooks; collapsible ladders; heavy gloves; and casualty blankets for shielding. This equipment is used to lower casualties from buildings or move them from one building to another at some distance above the ground.
- Equipment for the safe and quick retrieval from craters, basements, sewers, and subways. Casualties may have to be extracted from under rubble and debris.

b. Effective communications will be degraded in MOUT. The task-organized search and medical evacuation teams will have difficulty locating injured and wounded soldiers because of their isolation within buildings, or by their being hidden by rubble and debris. Once the area is secured, the wounded can display markers or panels, or other field expedients (fatigue jacket or T-shirts) to indicate where they may be found.

c. The anticipated increase in wounds and injuries requires increased supplies of IV fluids. Individual soldiers may carry these fluids to hasten their availability and shorten the time between wounding and initiation of vascular volume replacement.

d. Route markings to the division clearing station and the display of the Geneva Conventions Red Cross at the MTF must be approved by the tactical commander. (Not displaying the Geneva Red Cross can forfeit the protections afforded for both medical personnel and their patients under the Geneva Conventions. Refer to Appendix A and FM 8-10 for additional information.) The location of the MTF must be as accessible as possible, but well separated from fuel and ammunition depots, motor pools, reserve forces, or other lucrative enemy targets, as well as civilian hazards such as gas stations or chemical factories.

e. Patient collecting points, AXPs, BASs, and division clearing stations locations should be preplanned arid in relatively secure areas accessible to both air and ground ambulances. The location of these points should be indicated on the medical overlay to the OPLAN.

f. The medical company, in establishing the division clearing station, uses only the minimum number of resources required to successfully accomplish the mission. Suitable permanent facilities within the urban area may be used to house the MTF, if available.

NOTE

Construction standards vary between locations. Engineer personnel should inspect and upgrade local facilities prior to use as a medical facility.

g. For additional information on medical evacuation in MOUT, refer to FM 8-10-6.

5-8. Army Special Operations Forces

Combat health support for Army Special Operations Forces (ARSOF) is usually accomplished by unit-level organic CHS resources, special operations support battalion (SOSB) assets, and the theater Army medical command. A combination of organic, DS, and GS resources are required to effectively accomplish the CHS mission. Army Special Operations Forces often operate far removed from conventional CHS and must be more self-reliant and sustaining than conventional forces. Special Forces medical personnel receive enhanced medical training above that provided for a combat medic. The Special Operations Forces (SOF) medic is trained as an independent care practitioner and is qualified to provide ATM to combat casualties. When deployed on independent missions, the two SF medics are the sole source of medical care for the operational detachment and the indigenous forces that the detachment supports. When not deployed, the ARSOF depends upon the conventional CHS system for support.

a. The medical company would normally provide CHS on an area basis for those ARSOF operating within its AO. Due to the security classification of particular ARSOF missions, the medical company may be required to ensure that medical personnel selected to treat ARSOF patients have appropriate security clearances.

b. Due to the clandestine and covert nature of many ARSOF missions, conventional CHS resources may not be able to be used to support deployed ARSOF. For example, conventional ground and air ambulances cannot be used to evacuate sick, injured, or wounded ARSOF from covert operations as their use would compromise the ARSOF mission.

c. Although augmentation of ARSOF medical resources may be required for a number of types of missions, the most likely mission where medical company resources would be employed in DS or GS is the foreign internal defense mission.

d. For additional information on support of ARSOF, refer to Appendix M, FM 8-10-6, and FM 8-42.