CHAPTER 5

MEDICAL ASPECTS OF BATTLEFIELD NUCLEAR WARFARE

This chapter provides guidance to commanders and staffs on the medical effects of BNW on the soldier. The problems of flash, blast, thermal, nuclear radiation, and acute combat stress reaction were provided earlier in the manual. Specific medical problems associated with BNW are similar to those caused during conventional warfare except that these injuries are complicated by exposure to ionizing radiation. However, most injuries will be more severe and will affect more of the unit. Commanders and staffs should be familiar with these injuries and the treatment and triage of those most severely injured.

MEDICAL PROBLEMS

With small-yield tactical nuclear weapons there will be comparatively large numbers of casualties due to initial radiation, possibly combined with the effects of blast. Burn injuries will become more common as the weapon yield increases. The types of injuries most associated during BNW are:

- **Flash injury.** Injury from the intense light from a nuclear fireball is likely to take the form of temporary “flash blindness.” The duration of this will depend on the length of exposure and the preexisting light. It is unlikely to last more than a few minutes. No treatment is required other than reassurance. Retinal burns, leading in severe cases to permanent blindness, are more likely to be found in undisciplined, poorly trained soldiers. No treatment is possible.

- **Blast injury.** There are two main types of injury. Primary blast injuries are ruptured eardrums and air containing organs in the body; for example, lungs and guts. Secondary blast injuries are lacerations and puncture wounds from flying debris. Identical injuries may also be obtained by the individual being thrown into an object.

- **Thermal injury.** Nuclear weapons will cause a far larger number of burn casualties than are normally encountered on a conventional battlefield. These burn casualties will constitute the most serious medical problem because of the large manpower and logistic requirements associated with adequate treatment.

- **Radiation injury.** Casualties produced by ionizing radiation alone or in conjunction with other injuries or disease will result from nuclear warfare. When combined with other injuries, radiation injury will complicate the treatment of injured soldiers and may increase the number of casualties. Radiation injury can occur as a result of single nuclear attack. The effect on soldiers will depend on how prepared the unit is for the attack. Because radiation injury may have a latent period where there is an apparent (but only temporary) recovery, commanders and soldiers must account for this and not estimate their combat efficiency by how they feel at the moment. The figure on the next page presents an initial medical assessment of radiation injuries organized into four injury groups (IGs). Additionally, it lists medical treatment and return-to-duty classes. Explanations of IG-I to IG-IV are discussed below.

  — Initial symptoms. Low doses (IG-I) of radiation are not life threatening and will produce limited combat ineffectiveness, usually for only brief periods. Severe (IG-II) to lethal doses of radiation, up to 500 cGy, are initially disabling for transient periods. Most soldiers should be able to perform limited work and buddy aid between these attacks and during the long, latent period. For doses greater than 500 cGy (IG-III and IG-IV), the initial symptoms can be quite severe and, though disabling, do not immediately threaten life. Casualties require extensive prolonged medical treatment if they are to have any significant chance of survival.
Reduced resistance to injury and disease. As radiation injury is increased, general health deteriorates and the damaged immune system loses its ability to protect the body. Radiation injury and the harsh combat environment combine to produce a reduced state of health in the soldiers. This weakened condition leads to a significant increase in the number of disease and infection casualties.

— Delayed healing and medical complications. Soldiers injured after severe radiation exposure (IG-II and IG-III) will face increased mortality and a lengthened course of recovery. If the injury to the immune system has been severe, patients probably will not be able to resist infections. After radiation exposure, wound healing will be delayed and the duration of medical treatment and mortality will be increased compared to a similar wound without radiation exposure. Severely exposed soldiers should be assigned work that minimizes the risk of further injury until the immune system has recovered.

- **Acute combat reaction.** Some of the characteristics associated with a soldier’s psychological reaction to BNW were discussed in Chapter 2. Acute combat reaction can be characterized by its abrupt onset, brief duration (minutes to hours), high potential for life threatening behaviors, and the ease at which the symptom can be reversed.
SYMPTOMS AND TREATMENT OF NUCLEAR CASUALTIES

The treatment of soldiers injured from the immediate effects of flash, blast, and thermal caused by a nuclear detonation is no different than that which is prescribed for injuries caused on the conventional battlefield although the severity of the injuries may increase. The treatment of personnel with lacerations, broken bones, and burns at the unit level should be performed as prescribed in FM 21-11 and FM 8-320.

If the unit has mass casualties as the result of a nuclear attack, proper management of soldier evacuation and triage will be essential. Triage should be the first priority of a commander and his staff in the treatment of nuclear weapon casualties. A mass casualty situation exists when there are more personnel injured in the unit than personnel qualified to treat them. Triage is any sorting process regardless of the number of casualties (even a few) in a conventional or any other situation. Triage is performed to ensure the maximum benefit is provided to the largest number of casualties in a timely fashion and to conserve medical resources at the same time. This process is based on the injuries and symptoms the casualty exhibits to include radiation dose information if it is available. The figure below provides the triage priorities for both radiation injury and combined injury patients.

<table>
<thead>
<tr>
<th>Serial</th>
<th>Starting Priority</th>
<th>Final Priority</th>
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<tr>
<td></td>
<td></td>
<td>Less than 150 cGy</td>
</tr>
<tr>
<td>1</td>
<td>Radiation Only</td>
<td>Duty or T3</td>
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<tr>
<td>2</td>
<td>T1</td>
<td>T1</td>
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<tr>
<td>3</td>
<td>T2</td>
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<td>4</td>
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<td>5</td>
<td>T4</td>
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**T1** - Immediate treatment group. Those requiring immediate life-saving surgery. Procedures should not be time-consuming and concern only those with a high chance of survival, such as respiratory obstruction and accessible hemorrhage.

**T2** - Delayed treatment group. Those needing surgery but where conditions permit delay without unduly endangering safety. Life sustaining treatment, such as intravenous fluids, antibiotics, splinting, catheterization, and relief of pain may be required in this group. Examples are fractured limbs, spinal injuries, and uncomplicated burns.

**T3** - Minimal treatment group. Those with relatively minor injuries who can be helped by untrained personnel or can look after themselves, such as minor fractures or lacerations. Buddy care is particularly important in this situation.

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

*In the case of full or partial-thickness burns covering more than 18 percent of the body surface of trauma which would either result in significant infection or be categorized as severe but not immediately life threatening, such as a fractured femur. This is a clinical decision and not necessarily subjectively reproducible.

**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.
Acute combat stress will present a challenge for the commander and his staff to control and treat. The figure below provides signs and symptoms of this reaction, from early to late in the disorder. Early aspects of this type stress are common to all men facing battle, especially when nuclear weapons are used. One early sign is a notable reluctance of a soldier to leave a secure setting. This was evident when SGT Downs, the tank commander, noticed one of his soldiers sitting on the turret of his M1 tank in a daze a couple minutes after a nuclear detonation. This soldier was experiencing acute combat stress to the point that he could not comprehend or react to orders. A soldier who reacts like this will often be one of the last in a line of soldiers proceeding toward danger and will always look back toward the area of safety. He may unnecessarily check and recheck his equipment, displaying body movement representing a displacement of his anxiety. The soldier may also show a marked difficulty in understanding instructions and carrying out even simple tasks.

As an acute combat reaction worsens, the affected soldier may not take cover during an assault, or he may remain hidden in a bunker and be unable to care for a buddy in trouble. In its most severe form, affected individuals may show an “overflow” of undirected motor activity which may mimic tics or seizures. Conversely, hyperarousal can also lead to a “freezing” of motor function, which may resemble paralysis.

An acute combat reaction can develop, and resolve, in a matter of minutes. As recovery from this entity can be very rapid, the soldier may show a dramatic transition from gross panic one minute to rational thought and behavior a few minutes later.

### Acute combat reaction

<table>
<thead>
<tr>
<th>SIGNS AND SYMPTOMS</th>
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<tbody>
<tr>
<td>• Reluctance to leave a secure setting.</td>
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<td>• Adventital body movements.</td>
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<tr>
<td>• Difficulty comprehending and following instructions.</td>
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<tr>
<td>• Sympathetic nervous system hyperarousal.</td>
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<td>• Life-threatening behaviors.</td>
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<tr>
<td>• Possible “overflow” of motor activity.</td>
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<td>• Possible paralysis.</td>
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<tr>
<td>• Overwhelming fear.</td>
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<tr>
<td>• Confusion.</td>
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<td>• Support assignment versus front line.</td>
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**Personal**

- Age.
- Inexperience.
- Lack of commitment to battle.
- Witnessing death for the first time.

**Environmental**

- Fatigue, hunger, cold, heat, and sleep deprivation.
- Intensity of the battle.
- Disorientation.
- Surprise!

**Interpersonal**

- Lack of unit cohesion and esprit.
- Lack of leadership.

**Treatment**

- Control breathing and pulse rate.
- Allow victim to tell what happened once, at most twice.
- Reorientation.
- Reestablish command structure.
- Reestablish priorities.
- Incorporate buddy into treatment.
- Consider rest and replenishment.
- Expect return to duty within 48 hours.
- Do not place victim with physically wounded patients.
HANDLING AND TREATMENT OF RADIOACTIVELY CONTAMINATED CASUALTIES

Soldiers who have been in fallout areas may have varying amounts of radioactive contamination on their skin and clothing. The contamination will be in the form of fission products which have become absorbed on the surfaces of dirt or dust particles of varying sizes. The soldier himself will not be radioactive, but he will suffer radiation injury (beta burns) from the contamination unless it is removed early. In addition, as the soldier is handled, much of the contamination will be scattered about, contaminating other people and the surroundings. The objective of proper decontamination is to control the removal of this hazardous material from soldiers, restricting it to defined areas. This will allow proper handling of contaminated equipment and clothing and will reduce the hazard to other personnel.

It is important to bear in mind the distinction between contaminated soldiers and radiation-injured soldiers. Soldiers who have received substantial doses of radiation and who subsequently exhibit symptoms of the acute radiation syndrome are radiation-injured soldiers. Mere exposure to radiation does not result in a contaminated casualty. Radiologically contaminated soldiers occur when substances emitting radiation are deposited on or become attached to the soldier or his clothing.

The presence of fallout contamination on a soldier represents by far a greater hazard to the soldier himself than it does to the personnel caring for him. The duration of the exposure, the quantity of contact contamination, and the distance between the source and those exposed, all combine to maximize the danger to the soldiers while minimizing that to those around. Further, if the battalion aid station which receives the contaminated soldiers is itself in a fallout area, the high gamma environment and its threat to all patients and medical personnel would far outweigh any hazards from handling contaminated patients.

Fear that the gathering of large numbers of heavily contaminated soldiers in or around a battalion aid station is hazardous is unfounded. The only hazard from radioactive contamination which can cause injury at any distance in air is gamma radiation. It would be very difficult to get enough soldiers crowded together to constitute a significant gamma hazard. If all the radioactive contamination from many heavily contaminated soldiers was collected in one small area of a few square meters, a minor hazard could result. But, the soldiers themselves will not present a gamma hazard.

The major hazard associated with handling contaminated soldiers is the possibility of beta burns caused by transfer of the radioactive material from the soldiers to the unprotected skin surfaces of other personnel. Though this hazard is not a lethal one, it could result in the incapacitation of medical personnel from the burns if the material is not removed from their skin.

In order to handle the radiologically contaminated soldier properly, it is first necessary to detect contaminated soldiers. The only way to detect radioactive contamination is by proper monitoring with radiac instruments. Since the levels of radiation to be dealt with are rather low and the governing hazard is beta radiation, a Geiger-Muller counter, such as the AN/PDR-27, should be used to monitor incoming soldiers for contamination. As a general rule, if the reading is twice current background radiation or higher, the patient should be considered contaminated.

Incoming soldiers should be monitored at any time there is any reason to believe that contaminated soldiers are arriving at the battalion or brigade aid station. (Possible indications: reports from company messages from another headquarters, sighting of a nuclear burst or cloud.) Otherwise, soldiers may be “spot checked” every 15 minutes or every five or six soldiers. This monitoring need not be carried out at a great distance from the aid station. It can be accomplished within or just outside the treatment area. The only requirement is that it be done if at all possible prior to admission of the soldier to the aid station. Once it has been confirmed that the soldier is contaminated, decontamination is easily accomplished. The simple removal of all outer clothing and a brief washing of the exposed skin surfaces will achieve a high degree of decontamination without subjecting the soldier to the trauma of vigorous bathing and showering. The radiological contamination of the patient should not be allowed to interfere
with immediate lifesaving treatment or the best possible medical care.

In summary, when planning for medical support following enemy nuclear attack, every effort must be made to conserve and achieve the best possible use of available medical personnel. Each individual should be trained to apply first aid to himself (self aid) and to others (buddy aid). Each physically capable individual is responsible for carrying out required decontamination of himself and his equipment from fallout as soon as possible. Trained medical personnel are used primarily to provide emergency medical care or, if time and resources permit, more detailed treatment. Nonmedical personnel provide for search and rescue of the injured and wounded, immediate first aid, and decontamination. Nonmedical vehicles will likely be required to supplement the movement of patients to the initial medical treatment facility.