

U.S. Army Center for Health Promotion and Preventive Medicine

Guide for Deployed Preventive Medicine Personnel on Health Risk Management

Technical Guide 248

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Chapter 1

Introduction

1-1. Purpose and Scope

Occupational and environmental health and endemic disease (OEH/ED) threats can seriously impact a commander's mission and affect short- and long-term military operations. Traditionally, they have been both separately assessed and independently managed. As a result, they can be misunderstood as unrelated aspects of the battlefield – both in doctrine and policy. This document considers these hazards to be integrally related and attempts to manage them consistently. However, in order to be consistent with current policy, OEH and ED will be referred to throughout using combined OEH/ED terminology.

This technical guide (TG) introduces the processes and tools that can be used to make appropriate decisions based on the medical threat. It is written for preventive medicine personnel who are assigned the task of providing health risk assessments to the commander based on OEH/ED surveillance for deployments. It is directed at the Corps/Joint Task Force (JTF) medical staff-level personnel who will be identifying, assessing, and communicating OEH/ED hazards in the operational risk management (ORM) process. The objectives of the Army OEH/ED surveillance and risk assessment process are to—

- a. Document OEH/ED hazards and exposures to soldiers and the force.
- b. Characterize the risks of OEH/ED hazards during all phases of deployment.
- c. Communicate risks in understandable terms to the commander and operational planners.
- d. Allow the commander's staff to develop courses of action (COA) that consider and/or minimize OEH/ED risks to the force.
- e. Provide OEH/ED data to assist in post-deployment health assessments and evaluations of OEH/ED ORM processes.

This TG will provide a general overview of how these hazards can be evaluated within the context of Field Manual (FM) 100-14, *Risk Management*, and how to communicate these risks to the commander. For the convenience of the reader, required and related publications are listed in Appendix A.

1-2. Background

When evaluating these OEH/ED risks, commanders must balance the effects of casualties, impact on civilians, the damage to the environment, the loss of equipment, and the level of public reaction against the value of [their] objectives (see FM 100-14). Presidential Review Directive (PRD)-5, *Force Health Protection Concept of Operations*, directs the Department of Defense (DOD) to “identify and minimize or eliminate the short- and long-term effects of military service, especially

during deployments (including war), on the physical and mental health of veterans.” OEH/ED hazards may include the following:

- a. Chemical hazards include toxic industrial chemicals (TIC) and toxic industrial materials (TIM).
- b. Radiological contamination.
- c. Physical.
- d. Endemic disease.

DOD Instruction (DODI) 6055.1, *DOD Safety and Occupational Health Program*, describes the risk management process that should be incorporated into all military operations to address safety and OEH/ED risks. This process is similar to that described in FM 100-14. DODI 6055.1 requires that the assessment of OEH/ED hazards when U.S. forces are deployed outside the continental United States (OCONUS). Assessments are performed to support DODI 6050.5, *DOD Hazard Communication Program*, and DODI 6490.3, *Implementation and Application of Joint Medical Surveillance for Deployments*.

Under the current Force Health Protection (FHP) paradigm, military responsibilities include the monitoring and surveillance of all environmental exposures, and the assessment and management of the associated health risks. Managing the health risks associated with these OEH/ED hazards is important in conserving combat power and resources, thereby promoting FHP. This TG attempts to identify those preventive medicine tasks that support OEH/ED surveillance and the responsibilities for various assets within the preventive medicine hierarchy. (See Appendix B, Operational and Occupational and Environmental Health and Endemic Disease Surveillance Responsibilities.)

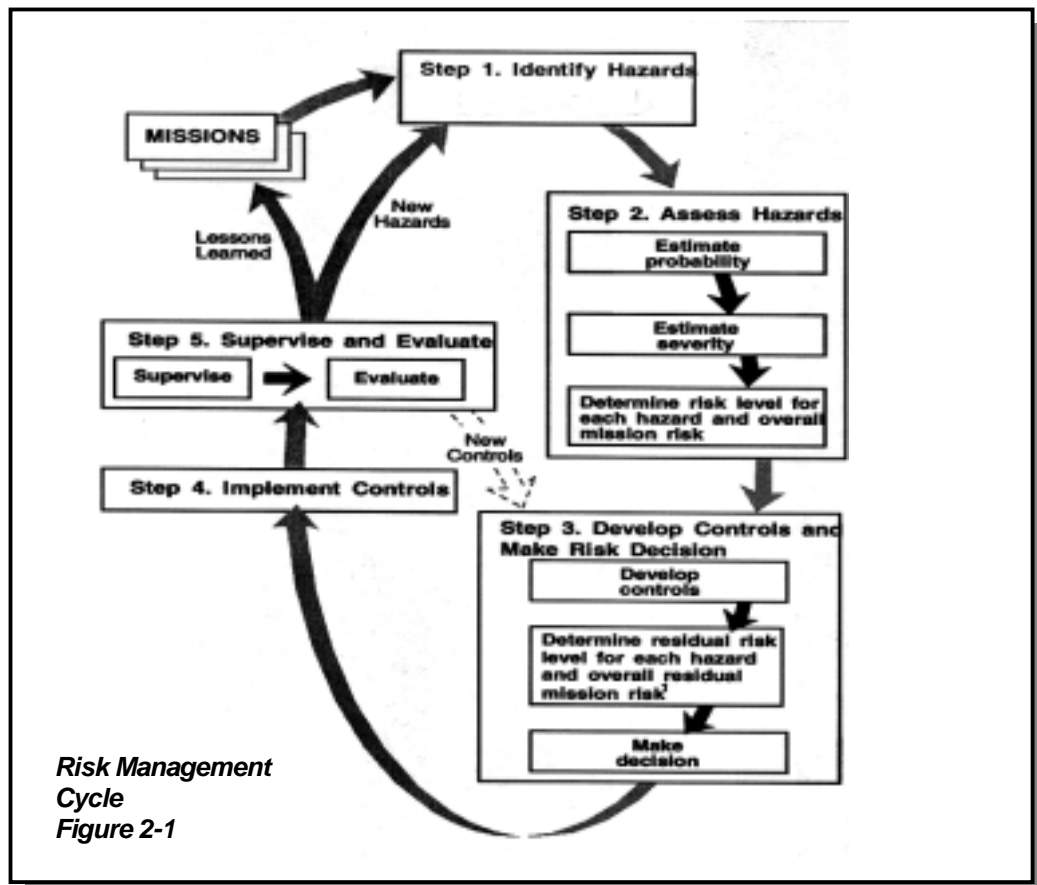
Deployment of military personnel, under any conditions, will result in exposure to hazards other than those resulting from combatant operations. These personnel can be incidentally or deliberately exposed to harmful levels of environmental contaminants such as toxic chemicals, radiation, or biological agents. “Harmful levels” include high-level exposures that result in immediate health effects and/or significant impacts to mission capabilities. It also may include low-level exposures that may result in delayed and/or long-term health effects that would not ordinarily have a significant, immediate impact on the specific deployment mission.

Chapter 2

Preventive Medicine Risk Management Concepts

2-1. Doctrine

Army risk management doctrine, as detailed in FM 100-14, provides commanders with methods to evaluate and manage the risks posed by operational hazards to the force. In addition, FM 3-100.4, *Environmental Considerations in Military Operations*, provides doctrine for managing environmental risks. These two documents provide an initial framework for characterizing environmental hazards. This framework is an iterative process that is integrated into operational planning and decision-making at all levels. Leaders manage risk by evaluating hazards and implementing ORM options during COA development (see Figure 2-1).



*FM 100-14

Preventive medicine personnel will participate in the ORM process by identifying OEH/ED hazards, assessing the threat associated with these hazards, characterizing the risks in context of the proposed COA, effectively transmitting the risk assessments, and recommending appropriate control measure options to the commander. Commanders will then be able to make informed decisions by evaluating the OEH/ED risks with other operational risks against mission expectations.

2-2. Health Threats and Medical Threats

The distinction between the terms health threat and medical threat is very important to operational risk assessment and management of OEH/ED hazards. The significant difference in these terms lies with the effects on the capability of a military unit to successfully execute its mission. These terms are defined in FM 4-02.17, *Preventive Medicine Services*, as follows:

a. Health threat refers to an individual soldier's health. The term can include hereditary conditions that manifest themselves in adulthood, individual exposure to an industrial chemical or toxin where others are not exposed, or [conditions that can result in] other injuries and traumas that affect an individual's health but may not affect the health of the unit. On the other hand, if 40 to 50 percent of the personnel in a unit exhibit a debilitating condition (e.g., salmonella poisoning), the unit can no longer complete its mission.

b. Medical threat refers to all "potential or continuing enemy actions and environmental situations that could adversely affect the combat effectiveness of friendly forces, to include wounds, injuries, or sickness incurred while engaged in a joint operation" (see Joint Publication 4-02, *Doctrine for Health Services Support in Joint Operations*). In Army and multi-service publications, the term is defined as a composite of all ongoing potential enemy actions and environmental conditions and disease and non-battle injuries [DNBI] that may degrade a unit's combat effectiveness. Commanders and unit leaders are responsible for protecting and preserving Army personnel and equipment against injury, damage, or loss that may result from food-, water-, and arthropod-borne diseases, as well as environmental injuries (e.g., heat and cold injuries) and occupational hazards.

Medical threats are a sub-set of health threats that have the potential to degrade a unit's combat (or mission) effectiveness.

EXAMPLE

During a mission lasting two weeks at most, a health threat to the unit exists that will result in illness to a portion of the unit if the unit is exposed. The etiology of the illness is such that symptoms do not begin to occur until 20-30 days after exposure. In this case, the latency period of the health threat might not be classified as a medical threat.

The design of the ORM framework intends to consider both kinds of threats; however, medical threats are more important to possible mission failure than non-medical threats. On the other hand, controlling unit health threats *in toto* would be the focus of FHP and maintaining unit readiness.

The risk management approach, as described in FM 100-14 and FM 3-100.4, is a process for identifying, assessing, and controlling risks as well as evaluating the effectiveness of risk control measures. This TG addresses OEH/ED hazards that pose health threats to individual troops. These can ultimately be expressed as medical threats to the force and the mission. The components of the risk management process have been translated into operational principles for assessing medical and health threats arising from OEH/ED hazards. The Army OEH/ED surveillance and risk assessment

system is designed to identify, assess, and recommend control measures for health and medical threats to deployed U.S. forces from OEH/ED hazards. The goal of the surveillance and risk assessment mission is to assist field commanders in making informed ORM decisions that consider OEH/ED hazards.

As shown in Figure 2-1, the Risk Management Cycle is an iterative five-step process. This approach complements the military decision-making process (MDMP) described in FM 101-5, *Staff Organization and Operations*, Appendix J. The integration of the ORM process with the MDMP is illustrated in Table 2-1.

Table 2-1. Complementary Aspects of the Operational Risk Management and the Military Decision-Making Process

| MDMP | ORM Steps | | | | |
|--------------------------|------------------|----------------|--|--------------------|------------------------|
| | Identify Hazards | Assess Hazards | Develop Controls and Make Risk Decisions | Implement Controls | Supervise and Evaluate |
| Mission Receipt | x | | | | |
| Mission Analysis | x | x | | | |
| COA Development | x | x | x | | |
| COA Analysis | x | x | x | | |
| COA Comparison | | | x | | |
| COA Approval | | | x | | |
| Orders Production | | | | x | |
| Rehearsal | | | | x | x |
| Execution and Assessment | | | | x | x |

*FM 100-14

While FM 3-100.4 provides some very useful discussions on general environmental considerations, current doctrine for managing OEH/ED hazards within the context of FM 100-14 and the MDMP is limited. This TG provides an expanded framework that can be used for this purpose. The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) guides are currently available for assisting preventive medicine personnel in the application of this framework for ambient chemicals (USACHPPM TG 230, *Chemical Exposure Guidelines for Deployed Military Personnel (Draft)*) and radiological hazards (USACHPPM TG 238, *Radiological Sources of Potential Exposure and/or Contamination*) in the environment.

Chapter 3

Occupational and Environmental Health and Endemic Disease Surveillance and Risk Assessment During Operational Planning

During mission analysis, the commander defines the tactical problem and begins the process of determining feasible solutions. The staff then brings their expertise to the analysis. They begin to define those things that will affect their particular support mission, the mission of the other staff sections, and the mission of the subordinate units. This occurs during the Intelligence Preparation of the Battlefield (IPB) process of developing an operations order (OPORD). Information and requirements to support the mission are cross-leveled between staff sections at this time.

OEH/ED hazards are systematically identified, located, and assessed as a result of the information from other staff sections and an analysis of the specific missions, implied missions, and the COA. Appendix C contains a list of public information sources that can be used to identify and describe potential OEH/ED hazards. OEH/ED hazards are identified during the medical planning phase of the IPB. Documentation begins during the preparation of the initial preventive medicine estimate. (See Appendix D, *Sample Preventive Medicine Estimate*.)

3-1. Step 1 - Identify Hazards

a. Background.

OEH/ED hazards are identified during the first four steps of the MDMP: mission receipt, mission analysis, COA development, and COA analysis (see Table 2-1).

Specific OEH/ED hazards can be classified as: no health threat, health threats, health threats of concern by the command, and medical threats. These hazards are any harmful occupational or environmental condition that may cause injury, illness, disease, adverse health conditions, or death for personnel (a health threat). Such conditions may also affect the overall health status of the command (a medical threat).

Deployed personnel may be exposed to such harmful conditions in the ambient environment as a result of uncontrolled industrial releases, sabotage, or from the intentional or unintentional actions of enemy or friendly forces. They may also be exposed to these materials during the routine daily operations associated with their jobs. Exposure will occur from air, water, soil, or a combination of these sources. Exposure can also occur through single (e.g., inhalation from air) or multiple routes of exposure (e.g., both dermal absorption from soil, inhalation exposure from air and whole-body irradiation). The degree with which exposure to one or more materials will result in harm to the soldier and/or the mission will depend on many things, but primary considerations include—

- (1) Types of hazard (chemical, radiological, physical, or endemic disease).
- (2) Sources of exposure (air, water, soil).
- (3) Source concentrations.

(4) Frequency and duration of exposure.

(5) Natural human variability in susceptibility to these conditions.

b. Identification of OEH/ED Hazards.

The assessment begins with the identification of a “hazard” through presumption or detection of a harmful portion. This is refined through the second step of the ORM process (by assessing the severity and probability of the hazard). Increasing the level of information about the five primary considerations listed above results in an increasingly accurate/defensible estimate of the severity of the health risk posed. OEH/ED hazards are defined as—

(1) Chemical hazards are any non-radioactive chemical or material to which exposure may cause an adverse reaction. These hazards arise from excessive airborne concentrations of mists, vapors, gases or solids (fumes or dusts), as well as from contaminated soil or direct exposure to liquid chemicals. Exposure routes include inhalation, injection, ingestion, or dermal exposure through the skin and mucous membranes.

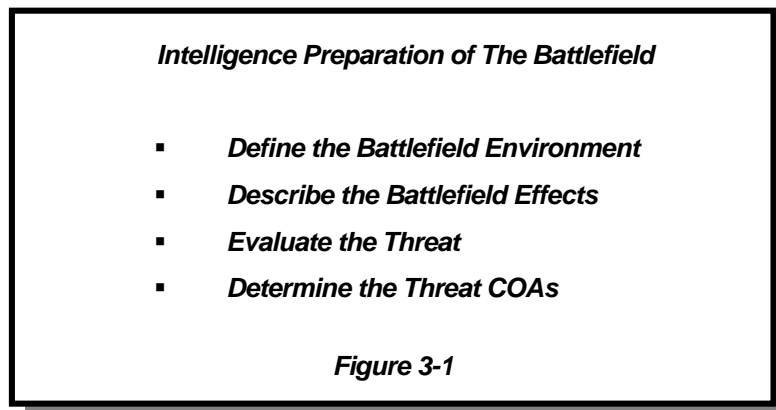
(2) Radiological hazards are those materials that emit energy in the form of waves or particles. This includes ionizing and non-ionizing radiation and excessive infrared or ultraviolet light.

(3) Physical hazards include excessive noise, vibration, temperature extremes, excessive infrared or ultraviolet light (e.g., welding arc), ergonomic hazards, etc.

(4) Endemic disease hazards are defined as any living organism that, upon exposure, may cause adverse reactions in humans.

c. Intelligence Preparation of the Battlefield (IPB).

Hazards are evaluated during the initial phases of the development of the OPORD. During this time, the preventive medicine staff must dissect each COA as it is being developed and, using both intelligence information and reconnaissance data (when available), should look for potential hazards within each COA. This process should be framed in the context of the mission, enemy, terrain, troops, time, and civilian (METT-TC) analysis performed during the medical IPB process. Figure 3-1 outlines the IPB process.

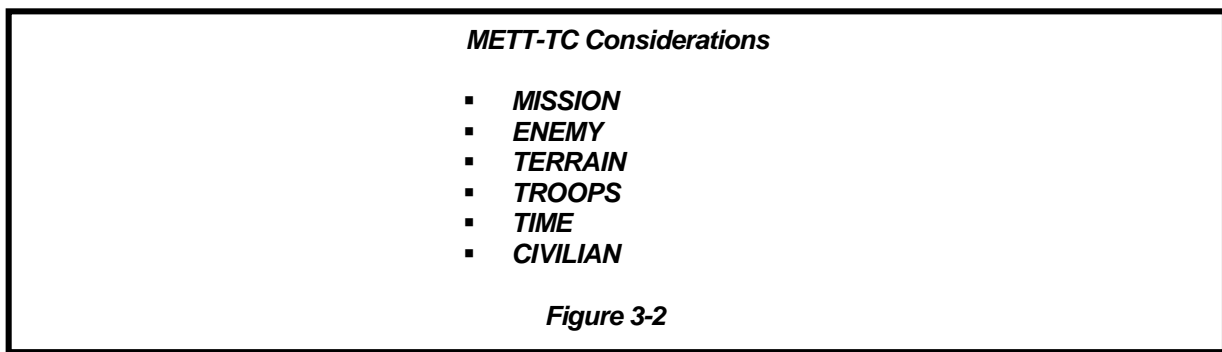


The factors of METT-TC provide a framework for identifying hazards when planning, preparing, and executing operations. When performing the METT-TC and during mission planning, leaders and staffs should look for hazards that affect both tactical and accidental risks. Later discussions in this TG will identify and expand on the METT-TC analysis of these hazards within the IPB process.

The required information to further evaluate the hazard (and ultimately determine risk) must be gathered from the METT-TC analysis. The following is a discussion of these steps.

During the battlefield environment definition process, all members of the staff evaluate the proposed area of operation (AO) and the area of interest (AI). The AO is the geographical area where the commander conducts the operation, while the AI is the area from which information and intelligence are required to permit planning and to conduct the operation. The preventive medicine personnel focus on those things in the AO and the AI that may pose a health threat to the deployed forces. The preventive medicine observations and input are an integral part of the IPB process for other staff sections, as well as for the medical section. Early identification and communication of hazards to other staff sections result in the integration of preventive medicine countermeasures during the planning stages of the operation.

This guide will assist the staff in identifying hazards during this process. The preventive medicine staff identifies hazards by analyzing the METT-TC considerations (see Figure 3-2) as a part of the IPB process.



Information concerning the battlefield environment comes from strategic assets, experience, and reconnaissance. This becomes another layer of information that provides the preventive medicine planner with operationally relevant information, resulting in better, health-informed decisions. An analysis of the battlefield environment allows planners to identify health-related battlefield effects on friendly and threat capabilities. Because the operations plan (OPLAN) has not been produced yet, the risk may not be self-evident. However, as the staff develops the COA, the variables are quantified, and the risk estimate is refined for each option.

Once hazards are identified during pre-deployment planning, they should be evaluated to identify the risk level associated with the hazards present. These risk levels will depend upon several factors that must be identified during the COA development process.

During a deployment, hazards are further identified during follow-on mission planning and normal operations. Hazards identified during mission planning are identified in much the same way as during pre-deployment planning, although there is a greater chance for reconnaissance to occur.

d. METT-TC and Hazards Identification in the IPB Process.

The IPB process analyzes the battlefield environment in order to identify friendly and threat capabilities that may influence the operations. Identification of hazards and solutions is an integral part of the process regardless of whether they are tactical, accidental, medical, occupational, or environmental. For operational risks, FM 100-14 recommends using the normal METT-TC analysis process. The METT-TC process focuses on the specific areas defined in Figure 3-2. It uses the information to clarify potential hazards and threat COA. Discussion of METT-TC considerations for OEH/ED surveillance in hazard identification follows. These sections are not all-inclusive and should be tailored to the situation before being used as a complete checklist.

e. Mission.

The mission statement will dictate the scenario requiring evaluation. Unit leaders and staff officers typically break the mission down into specified and implied tasks. These specified and implied tasks give information on—

- (1) Who will be involved in the task; what will they be doing?
- (2) What will be the overall expectations of the command?
- (3) When will the operation occur, and how long will it last?
- (4) Where will the operation occur?
- (5) Why is the operation being conducted and what level of risk is the commander willing to accept?
 - (a) As the plan develops—
 - What tasks will be performed?
 - How many personnel will perform the task?
 - Will the task be continuous or intermittent?
 - (b) Will the task be conducted—
 - Indoors or outdoors?
 - Under nuclear, biological, and chemical (NBC)-protective conditions (mission-oriented protective posture gear, NBC-protective shelter, or in a vehicle with NBC-protective capability)?

- Where climate is a factor (extreme heat or cold, high elevation)?
- In or around a confined space?

(c) Can disease be a factor?

- Under what conditions or in what types of areas are personnel likely to encounter the vectors?
- What are the potential communicable diseases and vectors associated with the operational area? (See Section 4.1 for more information.)
- What is the prevalence of disease?
- Under what conditions or habitats are personnel likely to encounter the vectors?

f. Enemy.

An evaluation of the enemy forces' composition, organization, tactical doctrine, weapons, equipment, and supporting systems allows preventive medicine personnel to draw conclusions about enemy capabilities, limitations, and potential actions. It is very important to evaluate probable or historical enemy actions. When evaluating the enemy threat, the ability of the enemy to use existing OEH/ED conditions to his advantage must be considered. This analysis must occur with input from the G/J/S-2. Intelligence and preventive medicine personnel must consider five questions—

- (1) What is the most likely type of operation?
- (2) When is the action likely to cause the most damage?
- (3) Where will the actions occur?
- (4) How can the enemy accomplish the task?
- (5) Why is the objective or end state important to the enemy? This should include—
 - (a) Terrorist/enemy special operation target information—
 - Potential targets such as a TIC manufacturing facilities, water treatment facilities, laboratories or research facilities.
 - Residual contamination from historical enemy or industrial activity.
 - Potential targeting of civilians to influence battlefield events or operations.

(b) Information about the enemy capabilities—

- Is the threat credible?
- Do they have the means to precipitate an environmental event?

(3) Historical information about enemy's willingness to create environmental hazards.

g. Terrain and Weather.

The terrain and weather will also affect the identification of potential hazards as they will affect the location of employed units; this will also affect how, when, and where exposures may occur.

(1) Location of employed units. The location of the units will affect their physical relationship with a potential hazard contamination.

(2) Geography. In addition to topographical factors that may impact environmental conditions, geography will be important. Military units often require suitable facilities located in urban areas to accomplish their missions (maintenance, transportation and storage of equipment). Soldiers who are located next to urban/industrial areas may be exposed to more hazards because of the current or previous uses of the AO. The following are some things to consider when identifying hazards associated with an area:

(a) Pollution sources. What type and quantity of potential pollution sources exist in or adjacent to living or work areas?

(b) Pollution transport. How will the terrain or weather affect pollutant transport in air, soil, and water?

(c) What is the past land use?

- Will it be industrial land uses involving chemical, biological or nuclear contaminants?
- Will it be farmland where pesticides might have been used?

(d) What is the current land use?

(e) What are the potential sources of radiation?

(f) What is the entomologic history?

- How prevalent will the endemic diseases be?
- What will be the associated competent vectors?

- What type of terrain or habitat do the vectors inhabit?
- Where is this terrain in relationship to U.S. personnel?

(3) Exposure Considerations.

(a) Precipitation patterns. How will precipitation affect exposure?

(b) Heat/humidity—

- Will hot weather increase soldier water intake, require modification of the work uniform, or require modification of work hours?

- Will weather conditions increase exposure (e.g., will inversions and night-time conditions increase the potential effects from releases of TICs)?

(c) Cold. What cold weather conditions will increase the likelihood of exposure?

- Will inadequate ventilation of tent heaters result in carbon monoxide exposure?

- Will sleeping facilities have adequate ventilation to reduce the spread of common cold and upper respiratory disorders?

- Could contaminated soil, when heated, become an inhalation hazard?

(d) Specific local climate conditions. Will the local climate be conducive to vector-borne disease (e.g., adequate rainfall for mosquitoes or tall grass, brush for ticks)?

(e) Logistics. Will local purchase issues result in unforeseen occupational exposures? (How will the logistics of any local purchase plan affect the types of chemicals soldiers will use, as well as any personal protection equipment (PPE) obtained locally?)

(f) Water conditions. What harmful agents (chemical/biological) exist in the water that could increase exposure due to the operations (e.g., vehicle washing, laundry, or showers)?

h. Troops.

The type of unit and its activities will also be important when conducting the hazard identification.

(1) Types. The type of unit is important in considering hazards because different types of soldiers will have different exposure patterns. Administrative duties do not require that soldiers spend as much time in contact with soil as a dismounted infantry soldier. Different types of soldiers will experience different exposure frequency and duration considerations.

(2) Condition. The condition of soldiers will also affect—

(a) Water-intake requirements.

(b) Susceptibility to some disease and chemicals.

(c) Ability to sustain health through prolonged exposure.

(3) Training. Examples of troop preparation prior to deployment—

(a) Will the soldiers be prepared for entomologic hazards? Will uniforms be treated? Will field sanitation teams be trained and equipped?

(b) Will commanders be aware of the need for the following?

- Engineering controls for routine operations (e.g., ventilation systems, shielding, isolation, etc.)?

- Administrative controls in place for routine operations (limited work shifts, shifts worked only during warmer or cooler parts of the day, etc.)?

(c) Have personnel been trained on—

- How to conduct the operation safely?

- How to safely handle any hazardous materials associated with the operation?

- How to use any PPE correctly and safely?

(4) Operational activities to consider—

(a) Will hazardous materials be used or generated as part of the operation?

- Will material safety data sheets be available for all chemicals being used on-site?

- How toxic will the materials be that are being used?

- Will there be a published exposure limit such as Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL); American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV[®]); or Chemical Exposure Guidelines (USACHPPM TG 230).

TLV[®] is a registered trademark of the American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio. Use of the trademarked name does not imply endorsement by the U.S. Army but is intended only to assist in identification of a specific product.

- How and where will hazardous materials be stored?
- What physical form will they be in (solid, liquid, vapor, compressed gas)?
- Will the containers have warning labels (i.e., corrosive, flammable, poison, etc.)?
- Will personnel be dealing with compressed gas cylinders?
- Will personnel conduct any sampling of that chemical or by-product? If so, what are the results?
- Are engineering controls present to help minimize exposure to the chemicals?
 - If engineering controls are not present (or are inadequate), do personnel have proper PPE issued and fitted? Are there adequate replacement supplies of PPE available in theater (especially if disposable PPE is used)?

(b) Will there be physical hazards that can be quantified with equipment on-hand (i.e., noise, heat stress, ionizing radiation, etc.)?

i. Time.

The health risk from any of the hazards discussed in this document is integrally related to the frequency and duration of exposure. Soldiers exposed above a threshold level to an identified hazard are generally at increased risk for an adverse outcome as the period of exposure becomes longer, and the frequency of exposure increases. Exposure to most chemicals and radiation for a longer duration as well as exposures that are more frequent are associated with increased risk, particularly if the hazard accumulates in the body.

With regard to OEH/ED exposure, duration will be a key factor as risks will depend upon the duration of the work shift. However, frequency will be key in that the number of shifts worked in a hazardous environment will also increase the probability of overexposure or contamination. Detrimental effects will then depend upon—

- (1) Exposure Duration (i.e., how long will this exposure occur?).
- (2) Exposure Frequency (i.e., how frequently will the exposure occur?).
 - (a) Number of shifts per week.
 - (b) Duty day length.

j. Civilian

This analysis will include an in-depth evaluation of how the local population and its dynamics will indicate whether hazards are present. Civilians are identified as non-governmental organizations,

private voluntary organizations, U.S. Government civilians, foreign national civilians, the media, and dislocated civilians put at risk by military operations. OEH/ED threats are associated with the population density, the countries' developmental status, and the attitudes of the population toward OEH/ED sanitation in general. The following categories are specific items that will be investigated during the hazard identification process:

(1) Local Population Information—

(a) Demographics—

- Population density.
- Urbanization level.
- Educational level.
- Relative income level.

(b) Sanitation standards—

- Waste disposal practices.
- Sanitation infrastructure condition.

(c) Lifestyle—

- Mobile/non-mobile.
- Traffic density.
- Home owners/squatters.

(d) Pollution attitudes—

- Public awareness of hazards.
- Public use of sanitation structure.
- Risk perception (cultural priorities – an oil-burning car is better than not driving).

(e) Health of the population—

- Communicable diseases endemic to the area/population.

- Control measures for these diseases present.

- Vaccination programs.

(f) Relative income level.

(g) Religious or political factions and boundaries.

(h) Organization and stability of the government.

(i) Public communication systems.

(2) Industry Information—

(a) The types of industry present will govern what type of environmental hazards will be present.

(b) The relationship of industry to geography may indicate potential contamination locations and hazards.

(c) Industry attitudes toward contamination may indicate probability and extent of pollution.

(d) Will there be any pollution controls or maintenance of pollution controls?

3-2. Step 2 - Assess Hazards

This ORM step examines each OEH/ED hazard in terms of probability and severity to characterize risks of health threats and medical threats posed by OEH/ED hazards. Risk characterization is the process for estimating risk levels and describing their role in context with mission attributes. This step is conducted during mission analysis, COA development, and COA analysis of the MDMP process, both before and after hazard controls are developed. The following are substeps of this task—

a. OEH/ED Hazard Classification (Preliminary Threat Analysis).

(1) Determine which of the identified OEH/ED hazards (which, by definition, are health threats) have a credible potential to become medical threats to the operation. In addition, identify non-medical threat OEH/ED hazards that are of importance to the command. Once additional data have been obtained and the risk assessment completed, this preliminary threat analysis should be reevaluated in as stated in Section 3.2, *d* (2), *Determine Threat Category*, in order to provide the commander with an accurate perspective of the type of impact the hazard poses to the unit and mission.

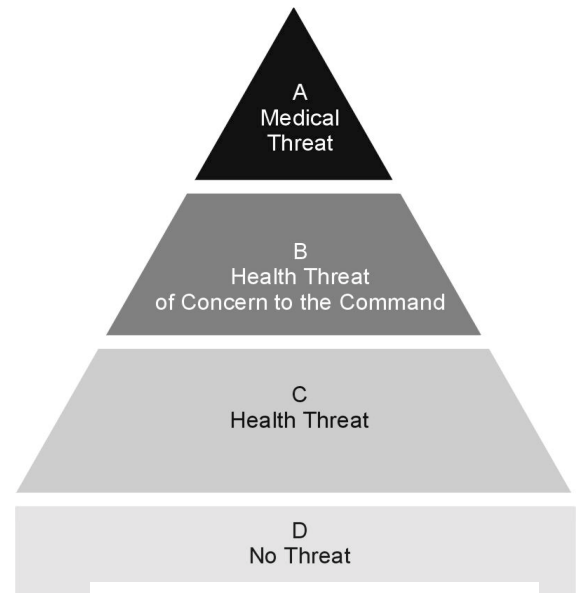
(2) An OEH/ED is any substance or organism that may cause injury, illness, disease, adverse health conditions, or death for personnel (health threats). Such conditions may also affect the health status of the command (medical threats). The four types of threat classifications for these health hazards are—

(a) No Health Threat. This classification can be assigned to a hazard only when there is no evidence to indicate its presence in the environment, if there is enough data to know that the concentration and extent of its presence would not pose a credible health threat.

(b) Health Threats. This classification consists of all identified hazards which, under the right circumstances, could result in adverse health effects to certain individuals but are not expected to have immediate medical impacts on overall mission effectiveness.

(c) Health Threats of Concern to the Command. This classification consists of those health threats that are of immediate importance to the commander based on the nature of the operation and/or related (i.e., political) considerations. For instance, some hazards may pose health effects with delayed onset (e.g., chronic diseases like cancer or impaired liver and kidney function) but no immediate, mission-impacting effect.

(d) Medical Threats. This classification is a subset of health threats that have the potential to render a field unit combat or mission ineffective. Depending on the mission, such hazards include those that can result in effects such as severe eye irritation/blurred vision, severe dizziness/confusion, seizures, death, or would otherwise result in sick calls or medical interventions.



**Hierarchy of Health Threats
Figure 3-3**

b. Evaluate Hazard Probabilities.

(1) Determine hazard probabilities for all selected OEH/ED hazards (FM 100-14, Substep A). The Army definition of hazard probability and the OEH/ED operational definition are—

(a) Hazard probability: The likelihood that a hazardous incident will occur. Probability levels estimated for each hazard may be based on the mission, COA being developed and analyzed, or frequency of a similar event.

(b) OEH/ED hazard probability: The magnitude, frequency, and duration of exposure of unit personnel to health threats integrated with the expected incidence of exposure within the unit relative to established exposure effect levels.

(2) Determining OEH/ED hazard probability is a subjective evaluation where information on unit and mission attributes (e.g., deployment duration and the unit’s exposure profile) and OEH/ED

information are assessed to determine the degree of exposure to the hazard. The estimation of hazard probability involves three primary considerations—

(a) Comparability of the field unit’s exposure profile (i.e., exposure factors, frequencies, and durations) to the standard exposure profile used in the derivation of the exposure guideline(s) of concern.

(b) Proportion of the field unit that is likely to experience exposures relative to the specific exposure guidelines.

(c) Confidence in the available data given the sources of uncertainty and variability.

When these determinations are made, a hazard probability category must be selected for each OEH/ED. FM 100-14 provides the following hazard probability categories; these categories should be evaluated within the context of the considerations as previously mentioned—

- FREQUENT - occurs very often, continuously experienced.
- LIKELY - occurs several times.
- OCCASIONAL - occurs sporadically.
- SELDOM - remotely possible; could occur at some time.
- UNLIKELY - can assume will not occur, but not impossible.

(3) A Probability Ranking Chart (Table 3-1) can be used to integrate this information to make a probability estimate for the hazard. The design of this chart is only a recommendation and should be altered as the situation dictates. It is expected that additional investigation into hazard probability ranking methods will occur on a routine basis.

Table 3-1. Hazard Probability Ranking Chart for Military Deployments

| Percent of Field Unit Exposed | Percent of Exposed Personnel with Exposures Estimated to be Greater Than Specified Effect Level | | | | |
|-------------------------------|---|------------|------------|------------|------------|
| | < 20 % | 20 – 50 % | 51 – 70 % | 71 – 90 % | > 90 % |
| > 90 % | Occasional | Occasional | Likely | Frequent | Frequent |
| 71 – 90 % | Seldom | Occasional | Likely | Likely | Frequent |
| 51 – 70 % | Unlikely | Occasional | Occasional | Likely | Likely |
| 20 – 50 % | Unlikely | Seldom | Occasional | Occasional | Occasional |
| < 20 % | Unlikely | Unlikely | Seldom | Seldom | Seldom |

*Select the proper row and then follow across until the proper column is reached. The qualitative probability categories correspond to FM 100-14.

c. Evaluate Hazard Severities.

(1) Determine hazard severities for all selected OEH/ED hazards (FM 100-14 Substep B). The Army definition of hazard severity and the OEH/ED operational definition are—

(a) Hazard severity: The expected consequence of an event (hazardous incident) in terms of degree of injury, property damage, or other mission-impairing factors (loss of combat power) that could occur.

(b) OEH/ED hazard severity: The potency of the hazard to cause injury, illness, disease, adverse health conditions, or death integrated with the significance of the health consequences for personnel relative to the ability of the field unit to complete the mission or maintain readiness.

(2) OEH/ED hazard severity is a function of the consequence of exposure (e.g., nature of probable effect) for any given soldier in the unit and the predicted distribution of that impact within the field unit. The estimation of the hazard severity involves three primary judgments—

(a) Proportion of the field unit that is likely to exhibit effects relative to the specific exposure guidelines.

(b) Nature of the health effect(s) associated with exposures at or above the guideline level.

(c) Confidence in the available data, given the sources of uncertainty and variability. When these determinations are made, a hazard severity category must be selected for each hazard. FM 100-14 provides the following hazard severity categories; they should be evaluated within the context of the considerations above:

- CATASTROPHIC - loss of ability to accomplish the mission or mission failure.
- CRITICAL - significantly (severely) degraded mission capability or unit readiness.
- MARGINAL - degraded mission capability or unit readiness.
- NEGLIGIBLE - little or no adverse impact on mission capability.

(3) A Severity Ranking Chart (Table 3-2) can be used to integrate this information to make a severity estimate for the hazard.

Table 3-2. Hazard Severity Ranking Chart For Military Deployments

| Percent of Exposed Persons to Exhibit Symptoms (ATTACK RATE) | Nature of Individual's Health Effect(s) Associated with Exposures Near the Guideline | | | |
|--|--|---|---|-------------------------|
| | Symptoms occurring after the mission | Symptoms occurring during the mission | | |
| | Chronic/permanent injury or disease (e.g. Cancer) | Mild illness or temporary irritation (reversible, short-term, nuisance) | Injury or illness that impairs functional abilities | Incapacitation or Death |
| >50 % | Marginal | Critical | Catastrophic | Catastrophic |
| 31 – 50 % | Negligible | Marginal | Critical | Catastrophic |
| 10 – 30 % | Negligible | Marginal | Marginal | Critical |
| < 10 % | Negligible | Negligible | Marginal | Critical |

d. Risk Characterization.

Synthesize the estimates of hazard probabilities and severities. Risk levels for all OEH/ED hazards and the overall mission are determined and described in a mission-oriented context.

This step is continued for each hazard until risk levels are determined for all of the hazards. Risks are ranked, and preventive medicine personnel should communicate the risk level to the commander. The remaining steps are the follow-through actions to effectively manage risk through the COA development process. For a more detailed discussion see FM 100-14 and FM 101-5, Appendix J.

Preventive medicine personnel must characterize the risks of health threats and medical threats posed by OEH/ED hazards to the commander. Assessing hazards and characterizing risks involves estimating risk levels and describing the hazards and risks in context with mission attributes. The major emphasis here is the application of the Risk Assessment Matrix described in FM 100-14.

The risk of a health threat becoming a medical threat is a function of the probability of the hazard occurring and the severity (of exposure) to that hazard by the unit. OEH/ED hazards are characterized by determining the degree of exposure and the impact of the exposure on the unit. The determination of these variables is subjective, and the uncertainty in the assessment will be a function of the level of information available. Characterizing risks involves categorizing OEH/ED hazards as either health threats or medical threats; assigning hazard probability, severity, and risk estimates to specific threats of concern; and determining if those threats are medical threats to a mission or can be otherwise controlled.

Once the hazard probability and severity estimates are determined, they are synthesized in this step. Risk levels for all selected hazards and the overall risk for each COA are determined and described in a mission-oriented context. The risk level is defined using the probability and severity information

from the previous sections combined with command judgments regarding acceptable risk levels for the mission.

The primary objective is to apply the FM 100-14 Risk Assessment Matrix (see Table 3-3) in a way that is consistent with operational guidance so that risks can be put in the same context as other operational risks. This idea must remain central to the medical planning perspective that threats must be compared and communicated to the commander and the staff as transparently as possible. This must occur so that the commander will be able to make decisions based on credible information. The commander must give this information equal weight with the other risks present on the battlefield.

Table 3-3. Risk Assessment Matrix

| HAZARD SEVERITY | | HAZARD PROBABILITY | | | | |
|------------------|---|----------------------|----------------|----------------|------------|--------------|
| | | Frequent (A) | Likely (B) | Occasional (C) | Seldom (D) | Unlikely (E) |
| Catastrophic (I) | → | Extremely High | Extremely High | High | High | Moderate |
| Critical (II) | → | Extremely High | High | High | Moderate | Low |
| Marginal (III) | → | High | Moderate | Moderate | Low | Low |
| Negligible (IV) | → | Moderate | Low | Low | Low | Low |
| | | RISK ESTIMATE | | | | |

Risk characterization should be designed to facilitate the selection of risk control strategies that are associated with risk levels that are greater than a readiness- or mission-specified rate (most often expressed as a percent of the unit, and a decision of the commander).

Table 3-4 presents the ORM risk levels defined in FM 100-14 compared with unit status suggestions from FM 101-5-1, Appendix D. These sets of definitions were combined to create a risk characterization paradigm that is consistent with current operational guidance and the preventive medicine approach to assessing health and medical threat risks.

Table 3-4. Risk Level Definitions

| Risk Level | Defined Consequence (FM 100-14) | Unit Status (FM 101-5-1) |
|------------|---|---|
| Extreme | Expected loss of ability to accomplish the mission. | Black (Unit Requires Reconstitution). Unit below 50% strength. |
| High | Expected significant degradation of mission capabilities in terms of the required mission standard, inability to accomplish all parts of the mission, or inability to complete the mission to standard if hazards occur during the mission. | Red (Combat Ineffective). Unit at 50 – 69 % strength. |
| Moderate | Expected degraded mission capabilities in terms of the required mission standard will reduce mission capability if hazards occur during mission. | Amber (Mission Capable, with minor deficiencies). Unit at 70 - 84% strength. |
| Low | Expected losses have little or no impact on accomplishing the mission. | Green (Mission Capable). Unit at 85% strength or better. |

*The unit rates provided under unit status are to be determined by the commander. Charts similar to the example OEH/ED Hazard Probability and Severity Ranking Charts presented above earlier be aligned with the acceptable risk levels provided by the commander.

(1) Determine Confidence in Risk Estimate. A confidence level should be assigned following the derivation of the risk estimate. The degree of confidence in the risk estimate will be particularly important when determining a COA. Confidence levels should be simple categories that can be rationally explained (e.g., high, medium, low). The confidence level assigned to a risk estimate should integrate uncertainty associated with each of the elements of the risk assessment. Key areas of uncertainty that should be considered include—

- (a) Sampling or field data quality.
- (b) Actual exposures of field personnel.
- (c) Field unit attributes (e.g., demographics, activity patterns).
- (d) Comparability of standard guideline assumptions (e.g., exposure duration and frequency) to expected field exposure patterns.
- (e) Expected symptoms of exposure (i.e., hazard severity), including consideration of exposure to multiple hazards.
- (f) Other uncertain or missing information relevant to the process.

(g) Whether the predicted health outcome is plausible, given weight of evidence or real-world experiences.

Table 3-5 provides example criteria for determining a risk estimate confidence level. The final determination of confidence must be based on the well-reasoned judgment of the preventive medicine officer conducting the risk assessment.

Table 3-5. Example Criteria for Assigning Confidence Levels

| Confidence Level | Criteria |
|------------------|---|
| High | Sampling data quality is good. Field activity patterns are well known. True exposures are reasonably approximated. Knowledge of the symptoms of hazard exposure relative to guideline is well known. No important missing information. The predicted health outcome is plausible or already demonstrated. |
| Medium | Field data quality is good. Field exposures are likely to be overestimates of true exposures due to incomplete data coverage relative to actual exposure durations. Detailed information is lacking regarding true personnel activity patterns in the field. Symptoms are well known for each individual hazard, but some scientific evidence suggests that the combined effects of all hazards may exacerbate symptoms. Predicted health outcome is plausible. |
| Low | Important data gaps and/or inconsistencies exist. Exposure conditions are not well defined. Field personnel activity patterns are basically unknown. Predicted health outcome is not plausible because it is not consistent with real-world events/experience. |

(2) Determine Threat Category. During Step 1 (Hazard Identification), a preliminary threat analysis is conducted for each of the identified chemical hazards. The goal is to determine which have a credible potential to become “medical threats” or “health threats of concern to the command” in order to focus additional data collection and risk characterization efforts. At this point in the process, the preliminary analysis should be reevaluated based on the more complete assessment of the nature of the hazards and the conditions of exposure. The placement of the hazards into health threat categories (i.e., no threat, health threat, health threat of concern to the command, and medical threat) is the last step in risk characterization. It is important for the command to understand that some hazards pose a greater threat potential to operations than others, even though the risk estimates may be similar. The command will have a preference to control medical threats and other health threats of concern over other threats. This step is designed to provide the command with an accurate perspective of the type of impact the hazard poses to the unit and mission.

3-3. Step 3 - Develop Controls

Implementing this ORM task involves developing one or more controls to minimize or eliminate the risks of the evaluated health threats and medical threats posed by OEH/ED hazards. Risks are also compared and balanced against mission expectations. Determinations are made whether developed controls are sufficient and acceptable. Residual risks are characterized using the same process described previously.

The information is communicated to the commander and risk decisions are then made. These tasks are completed as part of the MDMP process: COA development, COA analysis, COA comparison, and COA approval.

Risks are managed during the development of the OPLAN/OPORD by incorporating risk management controls and decisions into the plan. OEH/ED hazard control measures are described below.

a. Substep A – Develop Controls (from FM 100-14).

Hazard control measures, as specified in FM 100-14, fall into three basic categories: educational controls, physical controls, and avoidance. Specific control measures for OEH/ED threats include, but are not limited to—

(1) Educational controls—

- (a) Enforcing correct wear of the uniform to minimize heat.
- (b) Enforcing correct use of the DOD Arthropod Repellent System.
- (c) Enforcing good basic housekeeping.
- (d) Enforcing personal hygiene standards.

(2) Physical controls—

- (a) Completing active dust suppression measures.
- (b) Completing entomological measures.
- (c) Using less hazardous materials in place of more toxic ones.
- (d) Using ventilation to minimize the dispersion of airborne contaminants.
- (e) Isolating an operation by means of barriers or enclosures (such as welding screens).
- (f) Shielding a radiation source.

- (g) Ensuring pre-deployment vaccination and prophylaxis.
- (h) Ensuring moving operations (e.g., relocating a base camp).
- (i) Managing deployment length.
- (j) Managing work schedules and limiting shift duration.
- (k) Managing personnel rotation on high-risk missions.

(3) Avoidance. PPE is applicable when administrative and engineering controls are ineffective or not practicable. PPE is used as a last resort because it does not eliminate the hazard. These PPE devices include:

NOTE: The military protective mask (M-40, M-17, etc) is only officially approved for use against military NBC-warfare agents; it may not offer adequate protection against industrial chemicals. Decisions to use military protective masks for protection against toxic industrial chemicals (in a deployment situation only) must be made by competent OEH/ED surveillance personnel on a

- (a) Commercial respiratory protection.
- (b) Eye protection.
- (c) Hearing protection.
- (d) Gloves.
- (e) Chemical protective clothing.
- (f) Safety boots.
- (g) Permethrin impregnated clothing.

b. Substep B – Make Risk Decisions.

A key element of risk decision is determining if the risk is justified. The commander must compare and balance the risk against mission expectations. He alone decides if controls are sufficient and acceptable and whether to accept the resulting residual risk. If he determines the risk level is too high, he directs the development of additional controls or alternate controls, or he modifies, changes, or rejects the COA.

3-4. Step 4 - Implement Controls

Leaders, such as commanders, subordinate leaders, and their staff, ensure that controls are implemented at all levels, and as a result must be clear and simple enough to be understood and

executed by all subordinate units. They ensure that controls are integrated into standing operating procedures (SOPs), written and verbal orders, mission briefings, and staff estimates. The critical check for this step, with oversight, is to ensure that controls are converted into clear, simple execution orders that can be understood at all levels. Leaders must explain how supervisors will implement controls.

Leaders monitor controls and conduct surveillance for new hazards. The staff must continually revise their respective estimates and ensure that the risk management process was effective. (All levels of the command must understand the information and controls.) Constant surveillance of the situation ensures that overlooked hazards as well as new hazards are identified and controlled during the operation.

This step necessarily occurs during mission execution. As the OPORD is executed, the preventive medicine personnel observe and evaluate the risk management procedures set in place. This information further provides data to follow-on mission planning and the effectiveness of current procedures. This allows for constant evaluation of the risk level and the efficacy of the controls in place.

3-5. Step 5 - Supervise and Evaluate

During mission preparation and execution, leaders must ensure that their subordinates understand how to execute risk controls. Leaders continuously assess risks while conducting operations, especially during long-term missions. Leaders maintain situational awareness. They guard against complacency to ensure that risk control standards are not relaxed or violated. To gain insight into areas needing improvement, leaders must continuously evaluate their units' effectiveness in managing mission risks.

a. Supervise.

Leaders supervise mission rehearsal and execution to ensure standards and controls are enforced. Techniques may include spot checks, inspections, situation reports and brief-backs, buddy checks, and close supervision. During the mission, leaders continuously monitor controls to ensure they remain effective, and they modify them as necessary. Leaders and individuals anticipate, identify, and assess new hazards to implement controls. They continuously assess variable hazards such as fatigue, equipment serviceability, and the environment. Leaders modify controls to keep risks at an acceptable level. During sustained operations, leaders continue planning to ensure that controls emplaced at the beginning of the mission apply to changes in the operation's current situation and to hazardous conditions. Leaders must maintain an extraordinary degree of discipline. They must avoid complacency, which can result from boredom and overconfidence. Leaders must ensure that soldiers do not relax their vigilance due to performing repetitive tasks, despite changing roles and missions, unit turbulence and turnover, and declining skills. Leaders maintain a close watch over controls put in place to reduce risks over a prolonged period.

b. Evaluate.

After a mission, leaders and individuals evaluate how well the risk management process was executed. They will—

- (1) Determine how to ensure that successes are continued to the next mission.
- (2) Capture and disseminate lessons learned so that others may benefit from the experience.
- (3) Consider the effectiveness of the risk assessment in identifying and accurately assessing the probability and severity of hazards that results in mission degradation.
- (4) Determine whether the levels of residual risk of each hazard and of the overall mission were accurately estimated.
- (5) Evaluate the effectiveness of each control in reducing or removing risk, including whether controls were effectively communicated, implemented, and enforced.

Leaders and individuals determine why some controls were ineffective and what should be done when the hazard is encountered again. A control may be altered; the way it is implemented or supervised may be changed to make it effective; or a completely different control may be more effective. Leaders must energize the system to fix systemic problems that hinder combat effectiveness.

As can be seen in Figure 2-1, the Risk Management Process continues throughout a mission as well as from mission to mission. It is integral to the MDMP. Its application requires good judgment and intuitive analysis borne of confidence, experience, and situational awareness.

3-6. Tools and Pitfalls

Appendix A of FM 100-14 provides examples of risk management tools to help leaders assess identified hazards, develop controls, and make risk decisions. The tools should be tailored to meet particular situations and missions. Units train regardless of the degree of difficulty. To reduce risk, commanders identify their mission-essential task list and use the risk management process to assess the degree of risk related to each mission-essential task. However, problems arise when risk management tools are used without adapting the METT-TC factors. Using a checklist may be helpful during the initial mission analysis and COA development.

Chapter 4

Phases of Deployment

The following sections discuss some of the available guidance during the different phases of deployment. They are subdivided by the major types of OEH/ED hazards (i.e., chemical, radiological, physical and endemic disease), and generally discuss and identify references that allow for the planning, evaluation and management of these hazards.

4-1. Phase I - Pre-Deployment

For deploying soldiers, potential health hazards can come from many sources: those endemic to the deployment site where a unit will conduct operations (ambient), and those associated with the operations conducted by the unit such as vehicle maintenance, health care functions, or logistical supply and warehousing operations. Planners should use the tools presented here to anticipate potential hazardous exposures associated with specific deployment sites.

Military units should already be familiar with the OEH/ED hazards associated with their daily tasks as performed in garrison. However, they should anticipate and plan for changes in the severity and/or duration of exposures to those hazards when the tasks are performed in the field instead of in a controlled garrison environment.

a. Chemical Hazards.

For chemicals hazards, initial assessments and decisions will begin early in the deployment. As with any hazard that is identified, good decisions are made with good information (i.e., the better the information collected during pre-deployment reconnaissance about what chemicals may be encountered, the more confident planners will be in the actual risk level). The degree with which exposure to one or more chemicals will result in harm to the soldier and/or the mission will depend on many things. Primary considerations include—

- (1) Types of chemicals.
- (2) Sources of exposure.
- (3) Job- or task-related activities.
- (4) Concentrations of chemicals from sources.
- (5) Duration of exposure to the chemicals at specific concentration(s).

Initially, identification of a chemical “hazard” involves the detection or presumption (e.g., through modeling) that a chemical exposure will occur. This identification will be refined through the second step of the ORM process where the hazard severity and probability are evaluated. This establishes the level of risk posed to deployed personnel by a chemical in the environment. Increasing one’s level of information about the primary considerations listed

above will result in an increasingly accurate/defensible estimate of the severity of the health risk posed. For instance, are there industries in the area that store raw chemical products? These chemicals/facilities could be the source of intentional or accidental releases of catastrophic levels of chemicals into the environment. On the other hand, poor sanitation and environmental laws in an AO could indicate that significant residual contamination is already in the environment. The fact that a residential population lives in proximity to such facilities should not lead to the assumption that potentially significant health effects are not caused by the existing environmental conditions. Therefore, all information related to the environmental and industrial status of a country or area of deployment is critical in deciding what type/degree of chemical hazards to anticipate. This information will also aid in deciding what resources are required, what risks may/will be accepted, what communication should occur, and what mitigations or controls are feasible.

Guidance on determining the risk from chemical exposures can be found in USACHPPM TG 230, *Chemical Exposure Guidelines for Deployed Military Personnel (Draft)*, and USACHPPM TG 231, *Soldiers Guide for Occupational Exposure Risk Assessment During Deployments (Draft)*. Both documents provide processes and exposure guidelines that allow for the evaluation of both long- and short-term (TG 230) and job-related (TG 231) chemical exposures.

b. Radiological Hazards.

In order to assess the risk from a potential radiological hazard, one must identify the hazard. USACHPPM TG 238, *Radiological Sources of Potential Exposure and/or Contamination*, is a good source to assist personnel in recognizing radiological sources of potential exposure and contamination from both civilian and military origins. It identifies potential radiological sources that may pose both high- and low-level radiation hazards. It also summarizes the sources of radiation exposure and contamination found in nature, in the nuclear fuel cycle, in the biomedical field, in Army commodities and foreign materiel, industry, in transportation of radioactive materials, and in the production and use of nuclear weapons.

Once the source has been identified, the risk assessment begins. The assessment of risk in pre-deployment operations often depends on intelligence information with regard to the presence of potential radiation sources. However, pre-deployment assessments can include environmental sampling for clearing a proposed operational area or for collecting background measurements.

The fundamental principles of safety from external radiation exposure are time (i.e., minimizing exposure time), distance (i.e., maximizing distance from a radiation source), and shielding (i.e., shielding the identified source). These are also applicable in pre-, during-, and post-deployment operations. The less time spent within a radiation field, the lower the dose. By having mock-ups and trial runs of jobs where the possibility of significant exposures exists, soldiers in pre-deployment operations can minimize their doses. Shielding makes use of the different penetration abilities of radiation. That is, to properly shield from a radioactive source, one must know the type of radiation emanating from the source and, thus, its penetration capabilities. USACHPPM TG 238 can be used as a quick reference for the appropriate identification of the potential radiological hazard and associated type of radiation in order to properly use the shielding principle.

USACPPM TG 244, *The Medical NBC Battlebook*, and USACHPPM TG 236A, *Basic Radiological Dose Estimation – A Field Guide (Draft)*, briefly illustrate how to handle risk from a radiological hazard and how it is commonly classified in the Army. USACHPPM TG 236A uses the principles in the Allied Command Europe (ACE) directive and Standardization Agreement (STANAG) North American Treaty Organization (NATO) documents to simply define risk based on cumulative doses from radiological sources. A more in-depth process is required to perform a radiological health-risk assessment.

c. Physical Hazards

Management of physical hazards generally includes planning for heat and cold weather extremes, as well as noise hazards both associated with the ambient environment (locations near airfields and generator farms) and job-related activities such as equipment or vehicle operations. The assessment and management of heat and cold injuries in the field are fairly well understood. FM 21-10, *Field Hygiene and Sanitation*, discusses planning and management issues for these hazards and should be used as the planning document for these hazards. TG 231, *Soldiers Guide for Occupational Exposure Risk Assessment During Deployments (Draft)*, provides a process and exposure guidelines that allow for the evaluation of these noise hazards and discusses various risk management options.

d. Endemic Disease.

Pre-deployment planning for biological/entomological hazards will, in addition to communicable diseases, encompass pesticide exposure, medically important arthropods (e.g., mosquitoes, sand flies, ticks, lice, fire ants, spiders, scorpions), medically important animals (e.g., rodents, birds, snakes), and poisonous plants (e.g., poison ivy). Communicable diseases are transmitted person-to-person (e.g., influenza, pneumonia, tuberculosis, sexually transmitted diseases, chickenpox (varicella), and smallpox (variola) among others). Vector-borne diseases include malaria, plague, yellow fever, dengue and other diseases. Arthropod vectors associated with specific diseases, food-, and water-borne diseases include those due to exposure to protozoa, bacteria and viruses and may result in diarrheas, typhoid and hepatitis A. (See FM 8-33, *Control of Communicable Disease Manual*.) Crowding and close contact with indigent people increase risks of acquiring person-to-person communicable diseases.

Person-to-person diseases are prevented or controlled by reducing crowding, and providing immunizations, medications, PPE, and blood-borne pathogen control techniques.

Vector-borne diseases are prevented or controlled by the proper wear of the field uniform, the DOD repellent system, the use of bed nets, pest control and, for select diseases, immunizations and chemoprophylaxis (e.g., malaria).

Food-borne/water-borne diseases are prevented or controlled by proper food and water selection, preparation and handling, immunizations (e.g., typhoid), and fully functional field sanitation teams. Training to standard is a pre-deployment requirement.

To identify biological hazards, planners must determine what potential and actual communicable diseases and other medical entomological hazards exist in the AO.

(1) Determine potential risks. This aspect considers the probability of the vector and disease being present at the same time and location. It also considers troop contact with the vector and historical data relevant to the disease presence. Historical data may provide great insight into the trends of the vector and disease in the deployment area. Planners should use this data to help determine if the same problems will occur during the time frame of the deployment. Planners should determine if the rodent population is at an acceptable level for long-term operations in the area and whether or not the increase in food and human activity attract these potential carriers of disease. If the AO has been subjected to pesticide applications in the past, there could be pesticide residues present. (See Appendix E, *Preventive Medicine Officer Planning Considerations*, and Appendix F, *Infectious Disease Information*.)

(2) Make decisions and implement solutions. Based upon preliminary information, planners should identify the resources required to protect soldiers. This may be in the form of assuring adequate ventilation, controlling crowding, chemoprophylaxis, immunizations, or ensuring that adequate supplies of repellents, permethrin-treated uniforms, and bed nets are available. Planners should develop a sampling plan to assess and confirm or discard the potential hazards identified. For preventive medicine staff, detachments, and sections, this may mean coordinating or bringing additional vector-control and surveillance equipment. For preventive medicine physicians, this may mean coordinating with logistical/medical channels to obtain required amounts of immunizations or prophylactic drugs. See the following website to complete Department of Defense Form 2795, *Pre-Deployment Health Assessment*: <http://web1.whs.osd.mil/forms/DD2795.PDF>

4-2. Phase II - During Deployment

Once the unit is deployed and conducting operations in the field, both leaders and preventive medicine personnel or other health professionals will need to monitor operations to manage the risks associated with OEH/ED hazards. This may require sampling for air, water and soil contaminants, taking noise measurements, or ensuring soldiers are properly implementing risk control measures (e.g. correctly using assigned PPE). As the deployment progresses, commanders must plan for the changes in operational tempo, and the associated changes in their operations to support it. This must include logistical issues associated with risk control measures (e.g., PPE resupply). These personnel should periodically check the sick-call records for trends of increasing illness/injury, and inform commanders if trends that could be associated with OEH/ED hazards are observed.

In a deployment situation, soldiers may be working longer than eight hours per day, and/or have little or no time off from their jobs. As a result, both ambient environment and job or task-related exposures must be monitored and the risks associated with those exposures managed to acceptable risk levels. A variety of assessment strategies are used to do this and will be discussed in general below.

a. Chemical Hazards.

During deployment, reassessments and validation of both ambient and job task-related chemical hazards should be performed. Initially, the reassessment may involve a screening of the area through

a variety of samples from various potential sources of exposure (i.e., air, water - primarily drinking water - and soil).

Initial sampling should focus on key locations and sources of exposure (e.g., such as air from areas where soldiers spend most of their time); water from primary water sources (even locally supplied bottled water has been found to have significant levels of hazardous chemicals); and soil from areas where soldiers may be exposed the most through frequency of contact and amount of contact.

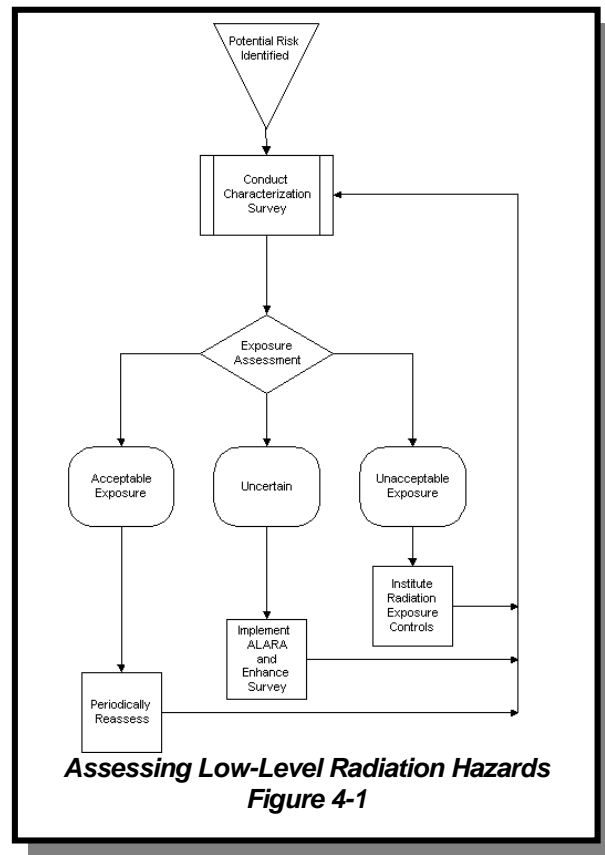
Improved information (e.g., more samples or more analytes measured in initial sampling) and improved quality data (higher sensitivity/specificity) will result in less uncertainty about the risk estimate. Resources and time afforded to increasing number, type, and sensitivity of analytical samples will have to be balanced with the other resource needs and hazards associated with a deployment. In addition, continuous and/or repeated sampling during deployments should be performed at levels that are appropriate for the mission and associated hazards. In other words, very limited monitoring may be performed in scenarios that are more closely associated with “wartime” operations. It is assumed, on the other hand, that peacekeeping missions will involve less critical, time-sensitive assessments, so additional resources may be appropriately designated to initial sampling as well as continuous/repeated monitoring.

b. Radiological Hazards.

Once the radiological sources have been identified in a pre-deployment scenario, the next step is to assess the hazard. This can be performed prior to or during deployment operations. USACHPPM TG 236A, *Basic Radiological Dose Estimation – A Field Guide (Draft)*, can be used as an assessment tool. USACHPPM TG 236A is designed to assess the identified radiological hazard at Level 1 (i.e., trained inexperienced field personnel or the noncommissioned officer with limited equipment capabilities).

Current low-level radiation (LLR) exposure guidelines are intended to protect personnel during military operations while at the same time maintaining the operational capability of the deployed force. ACE Directive 80-63, *ACE Policy for Defensive Measures Against Low-Level Radiological Hazards During Military Operations*, introduced the concept of Radiation Exposure Status categories that are linked to risk levels and cumulative doses up to 75 cGy.

Figure 4-1 can be used in the decision-making process when assessing radiological hazards from LLR sources. It links risk assessment initiatives in pre- deployment situations and during deployment.



c. Physical Hazards.

Management of physical hazards during the deployment generally include executing unit SOPs and current doctrine. The assessment and management of heat and cold injuries in the field is performed using the guidelines in FM 21-10, *Field Hygiene and Sanitation*. Again, USACHPPM TG 231, *Soldiers Guide for Occupational Exposure Risk Assessment During Deployments (Draft)*, provides a process and exposure guidelines that allow for the evaluation of noise hazards and discusses various risk management options for noise hazards as they arise.

d. Endemic Disease.

During a deployment, planners and the preventive medicine staff must reassess the risks associated with biological/entomological hazards in the deployment environment. This will involve continuous surveys of the sites where troops are located. Collecting quantified data depicting real-time exposures is the recommended survey action. This can involve employing various surveillance methods over an extended period of time. These can include—

- (1) Routine medical surveillance.
- (2) Routine arthropod and rodent surveys.
- (3) Environmental sampling to determine if pesticide residues are present.

During the early stages of deployment, it may be necessary to rely solely on individual prophylactic and preventive measures until risk exposure can be reassessed and protective measures implemented.

Generally, most biological warfare agents are intended for aerosol application. Increasingly bio-detectors may be useful in determining biological weapon use. However, a good surveillance system to detect outbreaks of unusual diseases continues to be an essential part of any detection system. The risk of biological weapons will be assessed through Armed Forces Medical Intelligence Center (AFMIC) and intelligence channels with input from the command G2/J2.

Determining if endemic disease/entomological risks are “acceptable” or establishing control measures to minimize the associated risks is a command responsibility. This may mean that subject matter experts must participate in determining what disease or pest thresholds are acceptable based on the commander’s intent and risk tolerance. (See Appendix E and Appendix F.)

The commander supervises, the preventive medicine staff officer or JTF surgeon evaluates, and the chain-of-command communicates the risks. Step 5 of the Risk Management Process concerns reassessing the situation to ensure appropriateness of the decisions and actions, then determines whether modifications to the actions are required. This also includes communicating decisions and rationale for actions both up and down the chain of command.

4-3. Phase III - Post-Deployment

a. Chemical, Radiological, and Physical Hazards.

One of the primary purposes of collecting real-time samples during deployments is to allow the continued cycle of reassessment and validation even after the deployment is complete. Post-deployment medical surveillance may at some point uncover health effects that are potentially associated with environmental exposures that occurred during deployments. Proper analysis of anticipated or unanticipated health effects potentially attributable to these exposures is difficult without some form of exposure data. It is important to note that the policy on post-deployment is being developed, and this TG will be updated accordingly. At this time, the requirements for documenting occupational exposures and ambient exposures are different—

(1) Documenting Occupational Exposures. The preventive medicine officer or other medical professionals should maintain any occupational sampling results obtained in theater for inclusion in soldiers' permanent health records. For continuity, it is important to track any occupational illness or injury through to its final disposition and be vigilant of any chronic or latent illnesses that may appear after the unit has returned to garrison.

(2) Documenting Ambient Exposures. In addition, the preventive medicine officer or other medical professionals should also maintain any other sampling results (i.e., ambient air water or soil measurements) and report the results through appropriate medical channels (regardless of whether exposures were deemed significant or not) to the USACHPPM (CDR USACHPPM, ATTN: MCHB-TS-DESP, APG-EA, MD 21010-5403).

b. Endemic Disease.

Post-deployment questionnaires are valuable to identify signs and symptoms of infectious diseases. A decision must be made concerning the best time to do an initial post-deployment physical exam and administer post-deployment questionnaires, as appropriate, to avoid the dispersion of forces to their pre-deployment organizations prior to completing these tasks. In some cases, this may be done at the troop medical clinic at their home station, or in country prior to leaving a deployment. This determination is particularly important for reservists and National Guard troops who may not reside near military medical facilities. The commander ensures troops are evaluated post-deployment for known exposures to disease and pesticides, and ensures troops continue all medications as required by the physician.

For example, malaria chemoprophylaxis must continue for four weeks after leaving the malaria area.

The commander also ensures all actions are appropriately archived for future reference (i.e., all pesticide usage must be archived with USACHPPM). Commanders should give all personnel the Department of Defense Form 2796, *Post-Deployment Health Assessment* to complete immediately at the end of the deployment not after returning to the staging area. See the following website to complete Department of Defense Form 2796:
<http://web1.whs.osd.mil/forms/DD2796.PDF>

Chapter 5

Communicating Health Risks While Deployed

For the purpose of this guide, the preventive medicine officer should communicate the OEH/ED risk(s) to the commander in the context of the FM 100-14 risk management process. The preventive medicine officer will need to communicate the OEH/ED risks accurately and objectively in a credible manner. He or she will need to explain the basis for significant assumptions, data, models, and inferences used or relied upon. The preventive medicine officer should be prepared to describe the sources, extent, and magnitude of significant uncertainties associated with the assessment. The preventive medicine officer must be prepared to make appropriate comparisons of OEH/ED risk(s) to other operational risks.

The commander may require the preventive medicine officer to communicate OEH/ED risks to the deployed/deploying force. Detailed information on Health Risk Communication can be found in Appendix G, *Health Risk Communication*.

Appendix A

References

Required

These documents must be available to the intended users of this document.

Allied Command Europe (ACE) Directive 80-63, *Ace Policy For Defensive Measures Against Low-Level Radiological Hazards During Military Operations*, 2 August 1996.

Allied Command Europe (ACE) Directive 80-64, *ACE Policy for Defensive Measures Against Toxic Industrial Chemical Hazards During Military Operations*, 20 December 1996.

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Medical Research Institute of Infectious Diseases, *Medical Management of Biological Casualties Handbook*, 1998.

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Standardization Agreement (STANAG) 2500, *NATO Handbook On The Medical Aspects Of NBC Defensive Operations AMEDP-6(B)*, (Feb 1996) (FM 8-9).

U.S. Army Center for Health Promotion and Preventive Medicine TG 230, *Chemical Exposure Guidelines for Deployed Military Personnel (Draft)*, 2001.

U.S. Army Center for Health Promotion and Preventive Medicine TG 231, *Soldier Occupational Exposure Assessment (Draft)*, 2001.

U.S. Army Center for Health Promotion and Preventive Medicine TG 236A, *Basic Radiological Dose Estimation – A Field Guide (Draft)*, June 200.

U.S. Army Center for Health Promotion and Preventive Medicine TG 238, *Radiological Sources of Potential Exposure and/or Contamination*, June 1999.

U.S. Army Center for Health Promotion and Preventive Medicine TG 244, *The Medical NBC Battlebook*, May 1999.

U.S. Army Center for Health Promotion and Preventive Medicine TG 251, *Occupational and Environmental Health Field Sampling Guide for Deployments (Draft)*, 2001.

29 Code of Federal Regulations Part 1910.1000, *Air Contaminants*. July 1999. Washington, D.C.: U.S. Government Printing Office.

Related

These readings contain relevant supplemental information.

Department of the Air Force, AIR FORCE PAMPHLET 91-215, *OPERATIONAL RISK MANAGEMENT (ORM) GUIDELINES AND TOOLS*. 1 JULY 1998.

Department of the Army (DA). *Hearing Conservation*. DA PAM 40-501, 10 December 1998.

Department of the Army (DA), *Industrial Hygiene Program (Draft)*. DA PAM 40-503, April 1998.

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U.S. Army Center for Health Promotion and Preventive Medicine, *Information for Combat Developers On Performance Effects From Exposure to Chemical Warfare Agents*, March 1999.

U.S. Army Center for Health Promotion and Preventive Medicine, Medical Issues Information Paper No. IP 31-017, *Biological Warfare Agents As Potable Water Threats*, March 1998.

U.S. Army Center for Health Promotion and Preventive Medicine, *U.S. Army Health Hazard Assessor's Guide*, August 1996.

U.S. Environmental Protection Agency (USEPA), AP42, *Compilation of Air Pollutant Emission Factors*, February 1995.

Referenced Forms:

DD Form 1532-1, *Pest Management Maintenance Record*
<http://www.defenselink.mil/pubs>

DD Form 2795, *Pre-Deployment Health Assessment*
<http://web1.whs.osd.mil/forms/DD2795.PDF>

DD Form 2796, *Post-Deployment Health Assessment*
<http://web1.whs.osd.mil/forms/DD2796.PDF>

Appendix B

Operational and Occupational and Environmental Health and Endemic Disease Surveillance Responsibilities

The concept of OEH/ED surveillance represents a paradigm shift in the way preventive medicine assets conduct their FHP mission on the battlefield. The planning considerations and responsibilities provided are extracted from, and revised to be consistent with, the intent of the Army Medical Department preventive medicine mission and FM 8-55, *Planning for Health Service Support*.

The Preventive Medicine Staff Section at Command Level (Division - Corps And Joint Task Force)—

1. Characterize the AO for the medical threat.
2. Prepare the preventive medicine estimate.
3. Communicate the estimate to the Command surgeon and develop the preventive medicine support plan.
4. Identify OEH/ED surveillance requirements for subunits.
5. Develop and implement the sample movement plan to conduct OEH/ED surveillance.
6. Specify missions for Medical Detachment preventive medicine at the Medical Group, Medical Brigade and/or Corps level.
7. Identify OEH/ED surveillance capability shortfalls and coordinate with preventive medicine support agencies for assistance and training.
8. Conduct OEH/ED risk assessment for the AO.
9. Coordinate preventive medicine support for the AO.
10. Advise the Command surgeon on preventive medicine issues.
11. Serve as the point of contact for all OEH/ED surveillance activities and concerns for the command.

The Medical Detachment, Preventive Medicine)—

1. Conduct OEH/ED surveillance activities in the area of responsibility (AOR), to include coordinating, compiling, analyzing, and reporting OEH/ED surveillance data to assist in evaluating conditions affecting the health of the supported force.
2. Collect OEH/ED samples and specimens, and perform selected analyses or evaluations to assist in the medical threat risk assessment.

3. Conduct vector and reservoir control in the assigned AOR to include application of pesticides.
4. Coordinate NBC-related biological specimen collection and evaluation with treatment, NBC, laboratory and intelligence units and organizations. (See FM 34-54, *Battlefield Technical Intelligence*.)
5. Monitor DNBI surveillance data, hospital admission, and reports of autopsy for signs of disease outbreaks and possible exposures to TIMs and NBC agents.
6. Monitor pest management, field sanitation, water treatment and storage, waste disposal, and DNBI control practices of units in AOR. Provide advice and training as necessary.
7. Conduct epidemiological consultation and disease outbreak investigation activities for the Corps Support Area.
8. Collect population information for troop concentrations and base camps that will help identify possible exposure groups (e.g., locations, living conditions, water source, food source, mission and activities performed by the unit).
9. Conduct specialized OEH/ED surveillance missions in the AO.
10. Conduct additional preventive medicine support as required.

The Division Preventive Medicine Section (In Addition to the Preventive Medicine Staff Function)—

1. Monitor pest management, field sanitation, water treatment and storage, waste disposal, and DNBI control practices in the divisional area. Provide advice and training as necessary.
2. Investigate and evaluate pest management, sanitation, water supply, and waste disposal practices. Recommend corrective measures.
3. Conduct epidemiological consultation and disease outbreak investigation activities in the division area.
4. Coordinate and/or conduct OEH/ED surveillance activities in the division AO.
5. Collect occupational and environmental samples and specimens, and perform selected analyses or evaluations to assist in the medical threat risk assessment.
6. Coordinate NBC-related biological specimen collection and evaluation with treatment, NBC laboratory, and intelligence units and organizations (FM 34-54).
7. Monitor DNBI surveillance data, hospital admission, and reports or autopsy for signs of disease outbreaks and possible exposures to TIMs and NBC agents.

Preventive Medicine Section, Area Support Medical Battalion—

1. Monitor pest management, field sanitation, water treatment and storage, waste disposal, and DNBI control practices in the Corps Support Area (CSA). Provide advice and training, as necessary.
2. Investigate and evaluate pest management, sanitation, water supply, and waste disposal practices in the CSA. Recommend corrective measures.
3. Conduct epidemiological consultation and disease outbreak investigation activities for the CSA.
4. Conduct additional preventive medicine support as required.

Area Medical Laboratory—

1. Area Medical Laboratory (AML) preventive medicine support missions.

The AML is a field laboratory that provides confirmatory analysis and expert consultation to field Preventive Medicine assets and supports FHP. The preventive medicine support missions of the AML include—

- a. Epidemiological investigations.
 - b. Entomological laboratory analysis.
 - c. Radiation laboratory analysis and health physics consultation.
 - d. Occupational and environmental laboratory analysis and engineering and environmental science consultation.
 - e. Industrial hygiene laboratory analysis and expert consultation.
2. The AML will—
 - a. Analyze food, water, and wastewater samples.
 - b. Identify disease vectors, pests, and assess the efficacy of pesticides.
 - d. Serve as the central receiving facility for all occupational and environmental sampling for the theater.
 - d. Conduct field analysis of potentially acute hazards and coordinate the evaluation (including collection and shipping of samples) of long-term or low-level hazards by fixed facilities.
 - e. Receive, compile, and analyze theater-wide medical surveillance data and provide DNBI trend information and recommendations to Command surgeons and preventive medicine assets throughout the theater of operations.

- f. Determine the frequency and distribution of infectious agents and diseases.
- g. Provide technical consultation to supported preventive medicine assets.

U.S. Army Center For Health Promotion And Preventive Medicine—

1. Special Medical Augmentation Response Team – Preventive Medicine (SMART-PM): The SMART-PM concept identifies the USACHPPM augmentation assets to support deployed forces on the ground in the theater of operations (FM 8-42, *Combat Health Support in Stability Operations and Support Operations*). The main focus for support by SMART-PM is the AML OCONUS. The SMART-PM should perform the following OEH/ED surveillance tasks:

- a. Provide technical experts for short durations, special equipment, and/or supplies to support sustained OEH/ED surveillance.
- b. Initiate longitudinal monitoring programs for bases of operations and installations as part of long or open-ended missions.
- c. Conduct new equipment training and tactics employed by preventive medicine detachments and division, area support medical battalion preventive medicine sections.
- d. Conduct special surveys that support the OEH/ED surveillance assets in the theater of operations.
- e. Provide additional capabilities as necessary to capture the health threat to exposed forces caused by OEH/ED hazards.

2. USACHPPM Fixed Installation Support: There are six USACHPPM unit locations around the world. USACHPPM Headquarters is located on Aberdeen Proving Ground, Maryland. The U.S. Regional USACHPPM Commands located OCONUS are in Landstuhl, Germany and Camp Zama, Japan. The Regional USACHPPM Commands within the continental U.S. are located on Fort G.G. Meade, Maryland; Fort McPherson, Georgia; and Fort Lewis, Washington. The Joint Medical Surveillance tasks performed by the USACHPPM Fixed Installation Support are—

- a. Provide pre-deployment hazard characterization support.
- b. Provide special sampling and monitoring equipment to identify hazards and document exposures beyond deployed units' capabilities. USACHPPM's Deployment Environmental Surveillance Program serves as the single point of contact for deployment occupational and environmental surveillance issues as part of medical surveillance database and deployment surveillance analysis.
- c. Conduct technical analysis in support of deployed OEH/ED surveillance operations.
- d. Provide expert consultation to deployed assets in support of OEH/ED surveillance.

- e. Develop exposure guidelines for use in Stability and Support Operations and wartime versus peacetime standards.
- f. Provide exposure guidelines for low-level chemical agent concentrations and nuclear/radiological materials that can be used in both civilian and military arenas.
- g. Conduct special surveys or projects to support OEH/ED surveillance.
- h. Serve as the repository of all OEH/ED surveillance data for the DOD.

Armed Forces Medical Intelligence Center—

- 1. The AFMIC is responsible for producing finished intelligence for—
 - a. Foreign military and civilian medical capabilities.
 - b. Infectious disease and OEH/ED risks.
 - c. Scientific and technical developments in biotechnology and biomedical subjects of military importance.
- 2. AFMIC also manages the medical aspects of the DOD Foreign Materiel Program. To ensure that personnel get the most up-to-date information on locations that they may deploy to, forward a statement of information through the supporting intelligence office (J/G/S-2) to initiate active files for requested information.

Armed Forces Pest Management Board—

- 1. The Armed Forces Pest Management Board (AFPMB) recommends policy, provides guidance, and coordinates the exchange of information on all matters related to pest management throughout the DOD. The AFPMB's mission is to ensure that environmentally sound and effective programs are present to prevent pests and disease vectors from adversely affecting DOD operations.
- 2. The AFPMB has a wide variety of contingency-related policy, guidance, and information documents available for downloading from its web site at <http://www.afpmb.org>.

Appendix C

Public Information Sources

1. The Medical Environmental Disease Intelligence Countermeasures (MEDIC) CD, updated semiannually, is produced by AFMIC, Fort Detrick, Frederick, MD 21701 ((310) 619-7574, DSN 343-7576). The CD is also available through the USACHPPM web site:

<http://chppm-www.apgea.army.mil>

2. Intelligence staff should be able to supply both history and industrial information and population attitudes/industrial base information.

3. Other staff (engineer and military policy).

4. U.S. Environmental Protection Agency (USEPA) AP42, *Compilation of Air Pollutant Emission Factors*, February 1995.

5. USEPA Toxic Release Inventory data web site: <http://www.epa.gov/tri>

6. Library of Congress: <http://lcweb2.loc.gov/frd/cs/>

7. Central Intelligence Agency: <http://www.cia.gov/cia/publications/factbook/index.html>

8. Center for International Health Information: <http://www.cihi.com/Statistics.htm>

9. Other information: <http://www.pitt.edu/HOME/GHNet/GHKR.html>

10. Disease Vector Ecology Profiles are available through the AFPMB web page: <http://www.afpmb.org/pubs/dveps/devps.htm>

11. The Armed Forces Pest Management publication, Technical Information Memorandum No. 36, *Personal Protective Techniques Against Insects and Other Arthropods of Military Significance* is also available at their website: <http://www.afpmb.org/pubs/dveps/devps.htm>

12. The Navy Preventive Medicine Information System maintains up-to-date Disease Risk Assessment Profiles and Disease Vector Risk Assessment Profiles on most countries of the world. They can be obtained by contacting the Navy Occupational and Environmental Health Center ((804)-444-7575, ext. 456 or DSN 564-7575, ext. 456).

13. Centers for Disease Control and Prevention: <http://www.cdc.gov/health/diseases.htm>

14. World Health Organization: <http://www.who.int>

15. Information on specific biological warfare agents, to include route of exposure, signs and symptoms and control measures/treatment can be found in the Medical Research Institute of Infectious Diseases, *Medical Management of Biological Casualties Handbook*, July 1998, Fort Detrick, Frederick, MD 21701.

Appendix D

Sample Preventive Medicine Estimate

Headquarters
Place
Date, time, and zone

PREVENTIVE MEDICINE ESTIMATE OF THE SITUATION

References: *Maps, overlays, charts, or other documents required to understand the plan. Reference to a map will include the map series number and country or geographic area if required; sheet number and name, if required; edition; and scale.*

1. MISSION. (*Statement of the specific preventive medicine mission*)

2. SITUATION AND CONSIDERATIONS.

a. Enemy situation.

- (1) Communicable disease.
- (2) Sanitation levels.
- (3) Public health capabilities.
- (4) Immunization status.
- (5) Level of field sanitation training.
- (6) Nuclear, biological, and chemical capabilities.
- (7) Directed energy capabilities.

b. Friendly situation.

- (1) Status of preventive medicine individual and unit supplies and PPE.
- (2) Operational situation.
- (3) Types of rations used.

- (4) Unit preventive medicine readiness.
 - (a) Field sanitation team training and equipment (including PPE).
 - (b) Individual and unit preventive medicine measures training and enforcement.
 - (5) Potable water and ice.
 - (a) Sufficient production and distribution units.
 - (b) Sufficient availability and quantity.
 - (6) Availability of aircraft for aerial spray operations.
- c. Characteristics of the area of operations. *Discuss the following:*
- (1) Terrain.
 - (a) Does AO favor arthropod/rodent populations?
 - (b) Is the AO at high altitude?
 - (c) Is water available?
 - (d) How will the terrain affect pest management operations?
 - (e) How does the terrain affect air quality?
 - (f) Is there any known chemical or biological soil/water contamination in the AO?
 - (2) Climate and weather. *Discuss the following:*
 - (a) Will the season affect disease transmission?
 - (b) Will the season affect heat/cold injury?
 - (c) Will the season affect disease vectors?
 - (d) Will the season affect water supply?
 - (e) Will the season affect pest management operations?
 - (f) How does the weather affect air quality?
 - (g) How will the weather affect soil and water NBC-Environmental contamination levels?

(3) Civilian population. *Discuss the following as needed:*

- (a) Endemic disease.
- (b) Epidemic disease.
- (c) Sources of disease on Mission Support Request.
- (d) Disease immunization status.
- (e) Water treatment standards:
 - Biological residual potential
 - Chemical contamination potential
 - Radiological contamination potential
- (f) Waste disposal practices:
 - Solid Waste Disposal
 - Chemical Disposal (including petroleum, oils, and lubricants)
 - Infectious Waste
 - Radiological Waste
- (g) Nutritional standards.
- (h) Civilian medical support/public health system.
- (i) Industry in the AO that may be a source of hazardous chemical air/soil/water contamination.

(4) Flora and fauna. *Discuss the following:*

- (a) Arthropod vectors in AO.
- (b) Arthropod vectors resistant to pesticides.
- (c) Venomous animals and arthropods.
- (d) Poisonous plants.
- (e) Dead animals or vegetation that may indicate chemical/biological contamination.

(5) Enemy prisoners of war (EPWs). *Discuss the following:*

- (a) Presence of disease.
- (b) Number EPW public health officers.
- (c) Disease immunization status.
- (d) Nutritional standards.

(6) Other.

d. Strengths to be supported.

(1) United States Uniformed Services:

- (a) Army.
- (b) Navy.
- (c) Air Force.
- (d) Marines.
- (e) Coast Guard.

(2) Department of Defense Civilians.

(3) Allied forces.

(4) Coalition forces.

(5) EPWs.

(6) United States national contract personnel.

(7) Indigenous and third country civilians.

(8) Detainees.

(9) Internees

(10) Others.

e. Health status of the command.

(1) Origin of the troops—

(a) Are they heat acclimated?

(b) What are endemic diseases?

(2) Presence of disease.

(3) Immunization status.

(4) Status of nutrition.

(5) Clothing and equipment (including PPE). If commercial respirators are to be used—

(a) Have soldiers been medically cleared to wear commercial respirators?

(b) Have soldiers been fit tested for commercial respirators?

(6) Fatigue/resistance to disease.

(7) Other.

f. Assumptions.

(1) Is the assumption really necessary for the solution?

(2) Will the results change if the assumptions are not made?

g. Special factors.

3. ANALYSIS

a. Estimates.

(1) Tasks involving arthropods/rodents—

(a) Disease/injury threat assessment.

(b) Survey and identification requirements.

(c) Control requirements.

(2) Tasks involving OEH/ED—

- (a) Heat.
- (b) Cold.
- (c) Water.
- (d) Sanitation.
- (e) Protection from radiological hazards.
- (f) Protection from chemical hazards.
- (g) Protection from physical hazards (e.g., noise, welding arc, respirable dust, confined space, etc.).

(3) Tasks involving disease:

- (a) Epidemiology.
- (b) Immunizations.
- (c) Prophylaxis.

b. Requirements.

- (1) Supplies.
- (2) Equipment/PPE.
- (3) Civil/military support.

c. Resources available—

- (1) Organic preventive medicine personnel.
- (2) Attached preventive medicine personnel.
- (3) Supporting preventive medicine personnel.
- (4) Status of unit field sanitation teams.
- (5) Civilian public health personnel.
- (6) Captured enemy public health personnel.

(7) Preventive medicine troop ceiling.

(8) Preventive medicine supply status.

d. Preventive medicine COAs. *(Determine, as a result of the above analysis, all logical COAs that will support the Commander's OPLAN and accomplish the Health Service Support mission. Expressed in terms of what, when, where, how, and why.)*

4. EVALUATION AND COMPARISON OF PREVENTIVE MEDICINE COURSES OF ACTION. *(Compare each COA against the obstacles that will be encountered and against the casualties which could result from inaction.)*

5. CONCLUSION. *(Decide which COA will best fulfill the mission. List the major advantages and disadvantages of the selected COA.)*

/s/
*Preventive Medicine
Staff Officer*

Annexes *(as required)*
Distribution:

Appendix E

Preventive Medicine Officer Planning Considerations

ISSUES THAT MUST BE ADDRESSED DURING THE PRE-DEPLOYMENT PHASE—

Is the current threat assessment information on hand from AFMIC's Medical Environmental Disease Intelligence Countermeasures CD-ROM, the AFPMB Disease Vector Ecology Profiles, the U.S. Navy's Vector Risk Assessment Profiles, etc.?

1. What diseases are endemic to this area? Have personnel received a medical threat briefing? By whom and when?
2. Have action thresholds, based on the medical threat, been developed to guide initiation of pest control operations?
3. Do the preventive medicine detachments that will be deployed have all their required table of organization and equipment and pesticides on hand?
4. Are Unit Field Sanitation Teams that will be deployed manned, trained, and equipped?
5. Was the deployment site used for any previous industrial or agricultural activity? If yes, detail what these activities were.
6. Have soldiers' uniforms been treated with Permethrin? Is an adequate supply of Permethrin on-hand?
7. Are bed nets on-hand, issued, treated with Permethrin, and prepared to be used by the soldiers and in the hospitals?
8. Prepare a Sampling Plan to assess the risk when units are on site.

ISSUES THAT MUST BE ADDRESSED DURING THE DEPLOYMENT PHASE—

Food and Water

1. Are adequate food storage facilities provided or available?
2. How often are food service facilities inspected?
3. Are wastes disposed of in an environmentally sound manner that protects human health and does not provide access for flies, roaches and vertebrate pests?
4. Are there any locations where wastes have been disposed of incorrectly and may cause a hazard to soldiers?

Soldier Protection

1. Are the medical community and the Command surgeon aware of arthropod threats?
2. Are the medical community and the Command surgeon communicating with the entomologist?
3. Has education on avoiding pests and pest habitats been conducted?
4. Are individuals practicing good personal and unit area sanitation?
 - a. Are arthropod repellents on-hand, and are they being used?
 - b. Is an adequate supply of DEET-based lotion on hand?
 - c. Have any individual training materials, such as Tick and Rodents Cards, been issued to the soldiers informing them of the hazards?
 - d. Are the soldiers aware of and conducting tick checks using the buddy system?
 - e. Is an Arthropod and Rodent Surveillance Program in place? The type of sampling necessary and the sampling frequency for each type of vector or nuisance animal can be found in USACHPPM TG 251, *Environmental and Occupational Sampling Guide for Military Deployments (Draft)*.
 - f. The sampling methods include—
 - (1) Larval mosquito surveillance (dip sampling).
 - (2) Adult mosquito surveillance (light traps, resting boxes, etc).
 - (3) Biting flies surveillance (sticky traps).
 - (4) Filth flies (fly sticky strips).
 - (5) Fleas and lice (complaints; sick call records).
 - (6) Cockroaches (sticky trap surveillance).
 - (7) Ticks and mites (skin rashes, tick drags, complaints).
 - (8) Stored product pests (rations infested/destroyed).
 - (9) Venomous Arthropods (scorpions, centipedes, ants, etc.).

(10) Commensal rodents (traps, glue boards, droppings, burrows).

(11) Venomous animals (poisonous snakes collected or seen).

- g. Is an Arthropod and Rodent Control Program for disease vectors being used?
- h. Is there an attempt to reduce the number of food sources and breeding habitats?
- i. Are control personnel properly trained?
- j. Is there an established Respiratory Protection Program for the pest control personnel?
- k. Is the PPE for the pest control personnel adequate?
- l. Are pesticides being used?
- m. Are the pesticides being used USEPA and DOD approved?
- n. Is pesticide usage recorded on a DD Form 1532-1, *Pest Management Maintenance Record*, or equivalent?
- o. Are pesticides stored in an appropriate facility?
- p. Is a list of pesticides currently used present and up to date?
- q. Are pesticide labels and material safety data sheets on hand? Are there bilingual labels for the protection of civilians?
- r. Are bilingual pesticide-warning signs posted at the pesticide storage facility?
- s. Is an eyewash kit available?
- t. Is spill control equipment and supplies on hand?
- u. Is pesticide application equipment calibrated and working properly?

Appendix F

Infectious Disease Information

Table F-1. Arthropod Vectors Associated With Specific Diseases

| DISEASE | PATHOGEN | VECTOR | SPECIFIC VECTOR(S) |
|---|---------------------------------|------------------------------------|--|
| Anthrax | <i>Bacillus anthracis</i> | DEER FLIES Family Tabanidae | |
| Babesiosis | <i>Babesia microti</i> | HARD TICKS Family Ixodidae | |
| Bartonellosis (only occurs in Western Andes) | <i>Bartonella bacilliformis</i> | SAND FLIES Family Psychodidae | <i>Phlebotomus verrucarum</i> |
| Bed Bugs | Parasitism | BED BUGS Family Cimicidae | <i>Cimex lectularius</i> <i>Cimex hemipterus</i> |
| Body Lice | Parasitism | SUCKING LICE Family Pediculidae | <i>Pediculus humanus humanus</i> |
| Boutonneuse Fever | <i>Rickettsia conori</i> | HARD TICKS Family Ixodidae | |
| California Encephalitis | Bunyaviridae, Bunyavirus | MOSQUITOES Family Culicidae | <i>Aedes</i> mosquitoes |
| Chikungunya | Togoviridae, <i>Alphavirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| Colorado Tick Fever | Reoviridae, Orbivirus | HARD TICKS Family Ixodidae | |
| Crimean-Congo Hemorrhagic Fever | Bunyaviridae, <i>Nairovirus</i> | HARD TICKS Family Ixodidae | <i>Hyalomma</i> spp. |
| Dengue | Flaviviridae, <i>Flavivirus</i> | MOSQUITOES Family Culicidae | <i>Aedes aegypti</i> , <i>Aedes</i> spp. in tropics |
| Eastern Equine Encephalitis | Togoviridae, <i>Alphavirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| Ehrlichiosis, Human Granulocytic | <i>Ehrlichia phagocytophila</i> | HARD TICKS Family Ixodidae | <i>Ixodes scapularis</i> |
| Ehrlichiosis, Human Monocytic | <i>Ehrlichia chaffeensis</i> | HARD TICKS Family Ixodidae | <i>Amblyomma americanum</i> |
| Epidemic Relapsing Fever | <i>Borrelia recurrentis</i> | SUCKING LICE Family Pediculidae | <i>Pediculus humanus humanus</i> |
| | | SOFT TICKS Family Argasidae | <i>Ornithodoros</i> spp. |

| DISEASE | PATHOGEN | VECTOR | SPECIFIC VECTOR(S) |
|--|--|--|---|
| Filariasis | <i>Wuchereria bancrofti</i> | MOSQUITOES Family Culicidae | <i>Culex fatigans</i> <i>Anopheles gambiae</i> <i>Anopheles sinensis</i> |
| | <i>Brugia malayi</i> | | <i>Mansonia uniformis</i> <i>Mansonia longipalpa</i> <i>Anopheles sinensis</i> |
| Hantaviral Disease | Bunyaviridae | RODENTS | |
| Head Lice | Parasitism | SUCKING LICE Family Pediculidae | <i>Pediculus humanus capitis</i> |
| Japanese Encephalitis | Flaviviridae, <i>Flavivirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| Leishmaniasis | <i>Leishmania</i> spp. | SAND FLIES Family Psychodidae | <i>Phlebotomus</i> spp. <i>Lutzomyia</i> spp. |
| Leptospirosis | <i>Leptospira interrogans</i> | RODENTS | |
| Loiasis (Tropical West and Central Africa only) | <i>Loa loa</i> | DEER FLIES Family Tabanidae | <i>Chrysops silacea</i> <i>Chrysops dimidiata</i> <i>Chrysops distinctipennis</i> |
| Louse-borne (epidemic) Typhus | <i>Rickettsia prowazekii</i> | SUCKING LICE Family Pediculidae | <i>Pediculus humanus humanus</i> |
| Lyme Disease | <i>Borrelia burgdorferi</i> | HARD TICKS Family Ixodidae | <i>Ixodes</i> spp. |
| Malaria | <i>Plasmodium falciparum</i> <i>Plasmodium vivax</i> <i>Plasmodium ovale</i> <i>Plasmodium malariae</i> | MOSQUITOES Family Culicidae | <i>Anopheles</i> spp. |
| Mansonellosis | <i>Mansonella ozzardi</i> | BLACK FLIES Family Simuliidae | <i>Simulium rugglesi</i> <i>Simulium anatinum</i> |
| Murine (endemic) Typhus | <i>Rickettsia typhi</i> (= <i>Rickettsia mooseri</i>) | FLEAS Family Pulicidae | <i>Xenopsylla cheopis</i> <i>Leptopsylla segnis</i> <i>Polyplax spinulosa</i> |
| Murray Valley Encephalitis | Flaviviridae, <i>Flavivirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| Nairobi Sheep Disease | Bunyaviridae, <i>Nairovirus</i> | TSETSE FLIES Family Glossinidae Genus Glossina | <i>Culicoides tororensis</i> |
| Onchocerciasis | <i>Onchocerca volvulus</i> | BLACK FLIES Family Simuliidae | <u>Tropical African</u> <i>Simulium damnosum</i> <i>Simulium naevi</i> <u>Central and South America</u> <i>Simulium ochraceum</i> |

| DISEASE | PATHOGEN | VECTOR | SPECIFIC VECTOR(S) |
|------------------------------|---|------------------------------------|--|
| O'nyong-nyong | | MOSQUITOES Family Culicidae | <i>Anopheles gambiae</i> only |
| Pinkeye | <i>Streptococcus pyogenes</i> | HIPPILATES FLIES | |
| Plague | <i>Yersinia pestis</i> | FLEAS Family Pulicidae | <i>Xenopsylla cheopis</i> |
| Queensland Tick Typhus | <i>Rickettsia australis</i> | HARD TICKS Family Ixodidae | <i>Ixodes holocyclus</i> |
| Query "Q" Fever | <i>Coxiella burnetii</i> | HARD TICKS Family Ixodidae | |
| | | SOFT TICKS Family Argasidae | |
| | | MITES | <i>Trombicula?</i> spp. |
| | | RODENTS | |
| Rickettsial Pox | <i>Rickettsia akari</i> | MITES | |
| Rift Valley Fever | Bunyaviridae, <i>Phlebovirus</i> | MOSQUITOES Family Culicidae | Mosquitoes and <i>Phlebotomus</i> spp. |
| Rift Valley Fever | Bunyaviridae, <i>Phlebovirus</i> | TSETSE FLIES Family Glossinidae | <i>Culicoides</i> spp. |
| Rocky Mountain Spotted Fever | <i>Rickettsia rickettsii</i> | HARD TICKS Family Ixodidae | <i>Dermacentor</i> spp. |
| Ross River Fever | Togoviridae, <i>Alphavirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| Salmonellosis | <i>Salmonella</i> spp. | RODENTS | |
| Sand Fly Fever | Bunyaviridae, <i>Phlebovirus</i> | SAND FLIES Family Psychodidae | <i>Phlebotomus</i> spp. <i>Lutzomyia</i> spp. |
| Scabies | Parasitism | MITES | <i>Sarcoptes scabiei</i> |
| Schistosomiasis | <i>Schistosoma mansoni</i> <i>Schistosoma haematobium</i> <i>Schistosoma mekongi</i> <i>Schistosoma japonicum</i> <i>Schistosoma intercalatum</i> | TREMATODES | |
| | | | |
| | | | |
| | | | |
| | | | |
| Scrub Typhus | <i>Rickettsia tsutsugamushi</i> | MITES | <i>Leptotrombidium</i> spp. |
| | | SOFT TICKS Family Argasidae | |
| Siberian Tick Typhus | <i>Rickettsia sibirica</i> | HARD TICKS Family Ixodidae | |
| Sindbis Virus | Togoviridae, <i>Alphavirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |

| DISEASE | PATHOGEN | VECTOR | SPECIFIC VECTOR(S) |
|--|--|------------------------------------|--|
| St. Louis Encephalitis | Flaviviridae, <i>Flavivirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| Tickborne Encephalitis Kyasanur Forest Encephalitis Louping-III Disease Omsk Hemorrhagic Fever Powassan Encephalitis Russian Spring-Summer Encephalitis | Flaviviridae, <i>Flavivirus</i> | HARD TICKS Family Ixodidae | |
| Tickborne Relapsing Fever | <i>Borrelia duttoni</i> (Africa) <i>Borrelia</i> sp. (Middle East) <i>Borrelia hermsi</i> (US) <i>Borrelia turicatae</i> (US) <i>Borrelia parkeri</i> (US) | SOFT TICKS Family Argasidae | |
| Trench Fever | <i>Rochalimaea quintana</i> | SUCKING LICE Family Pediculidae | <i>Pediculus humanus humanus</i> |
| Trypanosomiasis, African | <i>Trypanomoma brucei gambiense</i> | TSETSE FLIES Family Glossinidae | <u>West Africa</u> <i>Glossina palpalis</i> <i>Glossina tachinoides</i> |
| | <i>Trypanomoma brucei rhodesiense</i> | | <u>East Africa</u> <i>Glossina morsitans</i> <i>Glossina swynnertoni</i> |
| Trypanosomiasis, American, Chagas Disease | <i>Trypanosoma cruzi</i> | KISSING BUGS Family Reduviidae | <i>Rhodnius prolixus</i> <i>Triatoma infestans</i> <i>Panstrongylus megistus</i> |
| Tularemia | <i>Francisella tularensis</i> | HARD TICKS Family Ixodidae | |
| | | DEER FLIES Family Tabanidae | |
| Tungiasis | | FLEAS Family Pulicidae | <i>Tunga penetrans</i> |
| Venezuelan Equine Encephalitis | Togoviridae, <i>Alphavirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| Western Equine Encephalitis | Togoviridae, <i>Alphavirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| West Nile Virus | Flaviviridae, <i>Flavivirus</i> | MOSQUITOES Family Culicidae | <i>Aedes</i> and <i>Culex</i> spp. |
| Yellow Fever | Flaviviridae, <i>Flavivirus</i> | MOSQUITOES Family Culicidae | <u>Urban</u> <i>Aedes aegypti</i> |
| | | | <u>Sylvatic</u> <i>Aedes simpsoni</i> <i>Aedes africanus</i> <i>Haemogogus</i> spp. <i>Sabethes</i> spp. |

Table F-2. Diseases Associated with Disease Pathogens

| Diseases | Pathogens | Specific Vectors, Intermediate Hosts, or Reservoirs |
|---|---|--|
| PERSON TO PERSON: Airborne Droplet or Direct Contact with Respiratory or Ocular Secretions | | |
| Acute Respiratory Disease (Coryza, Sinusitis, Otitis Media, Rhinitis, Pharyngitis, Laryngitis), Conjunctivitis, Viral Pneumonia | Adenoviruses <i>Chlamydia pneumoniae</i> <i>Chlamydia trachomatis</i> Coronaviruses Coxsackie virus groups A & B Echoviruses <i>Haemophilus influenzae</i> Respiratory Syncytial Virus Rhinoviruses | [Pharyngitis pathogen may also be transmitted by food contamination.] |
| Influenza | Influenza A, B & C viruses | |
| Streptococcal Diseases (Pharyngitis, Rheumatic and Scarlet Fevers, Impetigo, Erysipelas) | <i>Streptococcus pyogenes</i> | |
| Bacterial Pneumonia, Bronchitis Meningitis, Septicemia | <i>Chlamydia pneumoniae</i> <i>Chlamydia trachomatis</i> <i>Haemophilus influenzae</i> <i>Neisseria meningitidis</i> <i>Streptococcus pneumoniae</i> <i>Streptococcus pyogenes</i> | |
| Legionnaires' Disease, Pontiac Fever | <i>Legionella</i> spp. | |
| Tuberculosis | <i>Mycobacterium tuberculosis</i> | |
| Pertussis | <i>Bordetella pertussis</i> | |
| Diphtheria | <i>Corynebacterium diphtheriae</i> | |
| Mumps | Mumps virus | |
| Mononucleosis, Burkitt Lymphoma, Nasopharyngeal Carcinoma | Epstein-Barr virus | |
| Cytomegalovirus Disease | Cytomegalovirus | |
| Viral Exanthema: | | |
| Measles | Measles virus | |
| German Measles | Rubella virus | |
| Chickenpox | Varicella-zoster virus | [Transmission may also occur by person to person direct non-sexual contact with skin lesions or exudates.] |
| Hand, Foot, and Mouth Disease | Coxsackie virus groups A & B | [Transmission may also occur by enteral (fecal-oral) route.] |
| Erythema Infectiosum | Parvovirus B19 | |
| Smallpox, Monkeypox | Orthopoxviruses | |

| Diseases | Pathogens | Specific Vectors, Intermediate Hosts, or Reservoirs |
|---|---|--|
| PERSON TO PERSON: Mucous Membrane Contact, Sexual Transmission | | |
| Venereal Warts, Cervical Cancer | Human Papilloma Virus | |
| Herpes Simplex | Herpes Simplex Virus | |
| Syphilis | <i>Treponema pallidum</i> | |
| Chancroid | <i>Hemophilus ducreyi</i> | |
| Granuloma Inguinale | <i>Calymmatobacterium granulomatis</i> | |
| Lymphogranuloma Venereum | <i>Chlamydia trachomatis</i> | |
| Urethritis, Cervicitis, Pelvic Inflammatory Disease | <i>Chlamydia trachomatis</i> Mycoplasma spp. <i>Neisseria gonorrhoea</i> <i>Ureaplasma urealyticum</i> | |
| Trichomoniasis | <i>Trichomonas vaginalis</i> | |
| Bloodborne Viral Infections: | | [Transmission may also occur by blood product transfusion or by inoculation with sharp items contaminated with blood or serous body fluids.] |
| HIV Disease, AIDS | Human Immunodeficiency Virus | |
| Acute and Chronic Hepatitis, Hepatocellular Cancer | Hepatitis B virus Hepatitis C virus | |
| Adult T-Cell Leukemia, Spastic Paraparesis | Human T-cell Lymphotropic Virus 1 | |
| PERSON TO PERSON: Direct, Non-Sexual Contact With Skin Lesions, Exudates, Mucous Membranes | | |
| Hansen's Disease (Leprosy) | <i>Mycobacterium leprae</i> | |
| Non-Venereal Treponematoses (Endemic Syphilis, Pinta, Yaws) | <i>Treponema carateum</i> <i>Treponema pallidum</i> subspecies | |
| PERSON TO PERSON: Fecal-Oral (Including Food and Water As Possible Vectors) | | |
| Poliomyelitis | Poliovirus | |
| Acute Hepatitis | Hepatitis A virus Hepatitis E virus | |
| Typhoid Fever | <i>Salmonella typhi</i> | |
| Amebiasis | <i>Entamoeba histolytica</i> | |
| Pinworm | <i>Enterobius vermicularis</i> | |

| Diseases | Pathogens | Specific Vectors, Intermediate Hosts, or Reservoirs |
|--|--|--|
| FOOD, WATER, OR SOIL INGESTION: Contamination From Animal or Human Feces, or From Foodhandlers' Skin (<i>S. aureus</i>) | | |
| Enteritis (Acute Food Poisoning, Secretory Diarrhea, Dysentery) | <i>Bacillus cereus</i> <i>Campylobacter</i> spp. <i>Clostridia perfringens</i> <i>Cryptosporidium parvum</i> <i>Escherichia coli</i> <i>Giardia lamblia</i> <i>Salmonella</i> spp. <i>Shigella</i> spp. <i>Staphylococcus aureus</i> <i>Vibrio cholerae</i> <i>Yersinia</i> spp. | |
| Listeriosis | <i>Listeria monocytogenes</i> | |
| Roundworm Infection | <i>Ascaris lumbricoides</i> | |
| Whipworm Disease | <i>Trichuris trichura</i> | |
| Pulmonary Capillariasis | <i>Capillaria aerophila</i> | |
| Guinea Worm Infection | <i>Dracunculus medinensis</i> | Copepods (<i>Cyclops</i> spp) in drinking water |
| Hydatid Disease | <i>Echinococcus</i> spp. | Primarily canids (dogs) [Transmission may also occur by direct or indirect animal contact.] |
| Toxoplasmosis | <i>Toxoplasma gondii</i> | Primarily felines (cats) [Transmission may also occur by eating infected meat.] |

| Diseases | Pathogens | Specific Vectors, Intermediate Hosts, or Reservoirs |
|--|---|---|
| FOOD INGESTION: Agent Contained Within Food Source | | |
| Marine Biotoxin Poisoning: | | |
| Scombroid Fish Poisoning | (Histamine from fish decomposition) | Scombroid fish, mahi-mahi, bluefish, salmon |
| Puffer Fish Poisoning | (Tetrodotoxin produced by puffer fish) | Puffer fish |
| Ciguatera Fish Poisoning | <i>Gambierdiscus toxicus</i> | Reef fish |
| Shellfish Poisoning (paralytic, neurotoxic, diarrhetic, amnesic) | Alexandrium spp. Dinophysis spp. <i>Gymnodinium breve</i> <i>Pseudonitzschia pungens</i> | Shellfish |
| Anisakiasis | Anisakis spp. Pseudoterranova spp. | Fish |
| Intestinal Fluke Infection | Echinostoma spp. <i>Fasciolopsis buski</i> <i>Gastrodiscoides hominis</i> <i>Heterophyes heterophyes</i> <i>Metagonimus yokogawai</i> | Fish, aquatic plants (snail intermed.) |
| Liver Fluke Infection, Cholangiocarcinoma | <i>Clonorchis sinensis</i> Fasciola spp. Opisthorchis spp. | Fish (snail intermed.) |
| Lung Fluke Infection | Paragonimus spp. | Crabs or Crayfish |
| Capillariasis | <i>Capillaria hepatica</i> | Mammalian liver |
| | <i>Capillaria philippinensis</i> | Fish |
| Trichinosis | <i>Trichinella spiralis</i> | Pork |
| Tapeworm Diseases | Diphyllobothrium spp. | Fish |
| | <i>Taenia saginata</i> | Beef |
| | <i>Taenia soleum</i> | Pork |
| Dwarf, Rat, and Dog Tapeworms | <i>Dipylidium caninum</i> Hymenolepis spp. | Insects [Transmission may also occur by direct or indirect animal contact, the enteral (fecal-oral) route, or food contamination.] |
| Spongiform Encephalopathy (Creutzfeldt-Jakob and related dis.) | vCJD (a prion or virus-like agent) | Beef products |

| Diseases | Pathogens | Specific Vectors, Intermediate Hosts, or Reservoirs |
|--|--|--|
| CONTACT WITH ANIMALS OR THEIR TISSUES, SECRETIONS, OR WASTE | | |
| Psittacosis | <i>Chlamydia psittaci</i> | Parakeets, parrots, lovebirds |
| Q fever [See Table 7] | <i>Coxiella burnetii</i> | Sheep, cattle, goats, dogs, cats, birds |
| Anthrax [See Table 7] | <i>Bacillus anthracis</i> | Mammals (esp. grazing) |
| Brucellosis | <i>Brucella</i> spp. | Cattle, swine, goats, sheep |
| Leptospirosis | <i>Leptospira interrogans</i> | Rats, swine, cattle, dogs, raccoons |
| Pasteurellosis | <i>Pasteurella haemolytica</i> <i>Pasteurella multocida</i> | Dogs, cats |
| Tularemia [See Table 7] | <i>Francisella tularensis</i> | Rabbits, hares, voles, muskrats, beavers |
| Relapsing Fever [See Table 7] | <i>Borrelia recurrentis</i> | Wild rodents |
| Rat Bite Fever | <i>Spirillum minus</i> <i>Streptobacillus moniliformis</i> | Rats |
| Cat-Scratch Fever | <i>Bartonella henselae</i> | Domestic cats |
| Rabies | Rabies virus | Dogs (wild & domestic), cats, skunks, raccoons, mongoose |
| Hantaviral Diseases (Hemorrhagic Fever, Nephropathy, Pulmonary Syndrome) | Hantaviruses | Wild rodents |
| Arenaviral Diseases (Hemorrhagic Fever, Lassa Fever, Lymphocytic Choriomeningitis) | Guanarito, Junin, Lassa, LCM, Machupo, and Sabia` viruses | Wild rodents, house mice (LCM) |
| Filoviral Hemorrhagic Fevers | Ebola, Marburg viruses | (not identified) |
| Meningoencephalitis | Simian B virus | Monkeys |

| Diseases | Pathogens | Specific Vectors, Intermediate Hosts, or Reservoirs |
|---|---|---|
| SOIL OR WATER CONTACT: Direct Skin or Mucous Membrane Penetration by Infective Parasites | | |
| Hookworm Disease | <i>Ancylostoma duodenale</i> <i>Necatur americanus</i> | Soil |
| Strongyloidiasis | <i>Strongyloides stercoralis</i> | Soil |
| Schistosomiasis (Bilharziasis) | <i>Schistosoma</i> spp. | Water (snail intermed.) |
| SOIL OR WATER CONTACT: Contact With Free-Living Organisms in Soil or Water | | |
| Melioidosis (Whitmore Disease) | <i>Pseudomonas pseudomallei</i> | |
| Amebic Encephalitis, Meningoencephalitis, Conjunctivitis | <i>Acanthamoeba</i> spp. <i>Balamuthia mandrillaris</i> <i>Naegleria fowleri</i> | |
| SOIL OR WATER CONTACT: Inhalation of Free-Living Organisms From Soil | | |
| Pulmonary and Systemic Mycoses | <i>Blastomyces dermatidis</i> <i>Coccidioides immitis</i> <i>Histoplasma capsulatum</i> <i>Paracoccidioides brasiliensis</i> | |
| Sporotrichosis | <i>Sporothrix shenckii</i> | [Transmission may also occur by dermal inoculation with decaying vegetation.] |

| Diseases | Pathogens | Specific Vectors, Intermediate Hosts, or Reservoirs |
|--|--|---|
| OPPORTUNISTIC: Ubiquitous Organisms Causing Disease in Individuals Where Immune Function is Locally or Systemically Compromised | | |
| Dermal, Mucous Membrane, Pulmonary, and Systemic Infections | <i>Aspergillus</i> <i>Candida</i> spp. <i>Cryptococcus neoformans</i> <i>Fusarium</i> <i>Melassezia furfur</i> <i>Pneumocystis carinii</i> <i>Trichophyton</i> <i>Zygomycetes</i> | |

Appendix G

Health Risk Communication

General

1. Health risk communication is the exchange of information between interested stakeholders such as commanders or deploying personnel about the nature, magnitude, significance, and/or control of health risks during deployment. The effectiveness of this health risk communication will rely on the communicator's responsibility to—

- a. Develop key messages.
- b. Know the audience.
- c. Be prepared.
- d. Believe in the topic.

Soldiers will be preoccupied with both professional and personal issues, such as separation from family and financial obligations. These worries will distract soldiers from the message and might prevent them from paying full attention to the communicator. It is crucial during deployments that the communicator speaks and acts with integrity and believes in the message. If unit leadership does not communicate that it is doing everything possible to protect the service members, then trust and credibility will be lost and morale will suffer.

2. To successfully accomplish the task of OEH/ED risk communication to the deployed/deploying force, the preventive medicine officer must be thoroughly grounded in the following elements:

- a. The communication should be clear, understandable, informative, accurate, and concrete.
- b. The source of the communication should be perceived as credible and reliable.
- c. When the target population is not homogeneous, the message should be presented in several ways, each specifically designed for one segment of the target population.
- d. Whenever possible, the target population or representatives of it should be closely involved in planning and implementing the program. The earlier the involvement the better.
- e. Multi-mode presentation is considered to be more effective than single-mode presentation. This applies both to mass-media programs and to programs designed for smaller target populations. In the latter situation, face-to-face, two-way communication is also advocated.
- f. Feedback about the behavior change and its consequences in lowering risk is highly effective, and should be used whenever possible.

g. Repetitions of the message are desirable to a point; too many repetitions are ineffective or even deleterious.

h. Certainly, the message should be interesting and vivid.

Soldiers will be preoccupied with both professional and personal issues, such as separation from family and financial obligations. These worries will distract soldiers from the message and might prevent them from paying full attention to the communicator.

Guidelines

Regardless of the audience, several facets of the health risk communication research should be considered to ensure the effective exchange of health risk information. Following a health risk communication program can aid in building and maintaining relationships, establishing trust and credibility, and effectively exchanging technical/scientific/medical information. Table G-1 provides detailed information on the health risk communication guidelines.

Table G-1. Health Risk Communication Guidelines

| | |
|--|---|
| Simplify language and presentation, not content: | <p>When trying to communicate the complex issues behind a health risk, it is easy to leave out information that seems to be overly technical. Risk communication research and studies have proven that all audience members can understand any technical subject if it is presented properly.</p> <p>This can be done, for example, through the use of visuals and diagrams and by defining all technical/medical/scientific jargon and acronyms.</p> |
| Be objective, not subjective: | <p>It is often very easy to differentiate between opinions and facts. It can be difficult, however, to respond credibly to opinions without substantiating them or offending the individual asking the question.</p> <p>In order to maintain credibility, respond to both opinions and facts in the same manner.</p> |
| Communicate clearly and honestly: | <p>To communicate clearly, present information at the audience's level of understanding. People can reject information that is too difficult for them, or they can reject a communicator who is perceived to be dishonest or untrustworthy. As a result, they may refuse to acknowledge the information or become hostile. On the other hand, they may become hostile if they feel patronized. The bottom line is – know the audience!</p> <p>In addition, whenever possible, provide familiar examples and concrete information that can help put the risk in perspective.</p> |
| Deal with uncertainty: | <p>When communicating health risks, results are not definitive.</p> <p>Discuss sources of uncertainty, such as how the data were gathered, how they were analyzed, and how the results were interpreted. This demonstrates that the uncertainties are recognized, which can lead to an increase in trust and credibility. However, when discussing uncertainty, the communicator should stress his/her expertise and knowledge of the subject. This will reinforce the leadership's ability to handle the situation and could allay concerns and fears regarding the risk and the risk-management decision.</p> |
| Be cautious when using risk comparisons: | <p>In order to put risks in perspective, comparing an unfamiliar risk to a familiar one can be helpful. However, some types of comparisons can alienate audience members.</p> <p>Avoid comparing unrelated risks, such as the risks associated with smoking versus those associated with air contamination. People rarely accept the comparison of unrelated risks.</p> |
| Develop key messages: | <p>Key messages are those items of importance, the health risk information that needs to be communicated. They must be clear, concise, and to the point.</p> <p>No more than three messages should be communicated at one time. Repeat key messages as often as possible to ensure they are not misunderstood or misinterpreted.</p> |
| Be prepared: | <p>When either presenting health risk information or answering questions regarding an individual's concerns, be prepared. Most questions and concerns can be anticipated if the audience is known. In fact, the communicator should know 70 percent of the possible questions that could be asked. Consider how to answer general questions and how to respond to specific inquiries.</p> |

Appendix H

Acronyms

| | |
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| ACE | Allied Command Europe |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| AFMIC | Armed Forces Medical Intelligence Center |
| AFPMB | Armed Forces Pest Management Board |
| AI | Area of Interest |
| AMEDD | Army Medical Department |
| AML | Area Medical Laboratory |
| AO | Area of Operation |
| AOR | Area of Responsibility |
| COA | Course of Action |
| CSA | Corps Support Area |
| DHHS | Department of Health and Human Services |
| DNBI | Disease and Non-Battle Injury |
| DOD | Department of Defense |
| DODI | Department of Defense Instruction |
| ED | Endemic Disease |
| EPWs | Enemy Prisoners of War |
| FHP | Force Health Protection |
| FM | Field Manual |
| IPB | Intelligence-preparation-of-the-battlefield |
| JTF | Joint Task Force |
| LLR | Low-Level Radiation |
| MDMP | Military Decision-Making Process |
| MEDIC | Medical Environmental Disease Intelligence Countermeasures |
| METT-TC | Mission, Enemy, Terrain, Troops, Time, and Civilian |
| NATO | North American Treaty Organization |
| NBC | Nuclear, biological, chemical |
| NIOSH | National Institute for Occupational Safety and Health |
| OCONUS | Outside the Continental United States |

| | |
|----------|---|
| OEH | Occupational and Environmental Health |
| OPLAN | Operations Plan |
| OPORD | Operations Order |
| ORM | Operational Risk Management |
| OSHA | Occupational Safety and Health Administration |
| PEL | Permissible Exposure Limit |
| PPE | Personal Protective Equipment |
| PRD | Presidential Review Directive |
| SMART-PM | Special Medical Augmentation Response Team – Preventive Medicine |
| SOPs | Standing Operating Procedures |
| STANAG | Standardization Agreement |
| TG | Technical Guide |
| TIC | Toxic Industrial Chemical |
| TIM | Toxic Industrial Material |
| TLV | Threshold Limit Value |
| USACHPPM | U.S. Army Center for Health Promotion and Preventive Medicine |
| USEPA | U.S. Environmental Protection Agency |