

SECTION 7

HEALTH RISKS AND PREVENTIVE MEDICINE

KEY JUDGEMENTS

U.S. military personnel deploying to the Korean peninsula will encounter significant infectious disease and environmental health risks. Disease and non-battle injuries present a major risk to the effectiveness of operational units and the success of the overall mission. Command emphasis on preventive medicine measures, good personal hygiene, disease surveillance and reporting, rapid disease outbreak investigation, and troop discipline at all levels will be essential for limiting the infectious disease and environmental health risk.

The primary infectious disease risks are from food- and waterborne diseases, acute respiratory infections, scrub typhus, hemorrhagic fever with renal syndrome (Korean hemorrhagic fever), and Japanese encephalitis. Risks may vary among geographic areas and seasons.

Environmental health risks on the Korean peninsula primarily are attributable to extremes of heat and cold,

depending on the region and season, and poor food and water sanitation. Unregulated industry and agriculture heavily pollute air, water, and soil resources.

Preventive countermeasures are the key to combat strength, and their implementation and continued emphasis must be a command responsibility. Use of local and regional food, water, and ice sources and local national food service support without proper inspection and approval by U.S. medical personnel (military public health, veterinary, and preventive medicine units) will put operational forces at great risk of acquiring food- and waterborne diseases (including diarrheal diseases, typhoid and paratyphoid fevers, and hepatitis A) that could significantly degrade the effectiveness of over 10 to 20% of the entire force within 24 to 48 hours. Additionally, without the implementation of effective preventive medicine countermeasures, small point source outbreaks could degrade company-size units to the point of being operationally ineffective for up to 7 days.

HISTORICAL PERSPECTIVE

The Korean War began 25 June 1950. During the most active combat period (July 1950 through June 1951), 60% of hospital admissions were disease associated, 17% were non-battle injuries, and 23% were battle injuries. The highest overall disease incidence occurred during the first 6 months of the war when U.S. troops deployed from Japan, unprepared for combat in Korea under adverse field conditions. The diseases occurring among American service members, in order of incidence, included sexually transmitted diseases, acute respiratory diseases, pneumonia, infectious hepatitis, malaria, cold injury, dysentery, hemorrhagic fever, tuberculosis, rheumatic fever, Japanese encephalitis, polio, scarlet fever, smallpox, scrub typhus, and louse-borne typhus.

Cold injuries during the winter months produced significant losses among the fighting force. With the intervention of the Chinese, during the winter of 1950-1951, 14% of U.S. personnel in 29 regiments were incapacitated by cold injury.

In the years since the war, public health conditions in the ROK have steadily improved. Thus, although disease risks still exist, endemic levels for many diseases have significantly decreased. Meanwhile, conditions in the DPRK have remained relatively primitive. A deteriorating economy has resulted in further degradation of public health conditions, potentially increasing the risk of many of the same endemic diseases which impacted operations during the Korean War.

HEALTH RISKS

Casualties other than those inflicted by the enemy can have a significant impact on any military operation. While this has been a well-accepted part of military doctrine since the American Revolution, it is sometimes overlooked when operations are planned or executed. Disease and non-battle injuries (DNBIs) can be debilitating or even fatal to individuals, but, more importantly, they can multiply battle casualties and prolong conflicts by disrupting operations. Thus, total readiness must include disease prevention measures and strongly enforced safety standards.

Risks Encountered in All Deployments

Movement: Whenever soldiers are moved quickly from one part of the world to another, their bodies need several days to adjust to new conditions. Soldiers are trained to do this on short notice; however, when they move to a new longitude, latitude, or altitude they must adapt to a corresponding new time zone, climate, or atmospheric pressure. Other problems such as emotional adjustment and changes in nutrition, personal hygiene habits, and physical activity may actually worsen, rather than improve, as time in the country increases.

Crowding: When soldiers deploy, they are likely to spend more time than usual with other personnel in close quarters (aircraft, vehicles, tents, new sleeping arrangements) and will share spaces with a whole new population. These factors increase the likelihood of respiratory diseases and other infections that are passed from person to person.

Disorder: Every time troops deploy, they establish a new community, which may settle as a temporary camp or remain in constant motion. In either case, disorder is present, which interrupts daily or weekly routines, removes the usual setting

for such routines, and discourages the precautions that might normally be taken to prevent injuries and diseases. The risk of unintended injuries, such as motor vehicle crashes, suddenly becomes very high. Maintaining personal hygiene is difficult, so skin diseases become more common. Soldiers may have sexual contact with persons who were previously unknown to them, increasing the risk of sexually transmissible diseases.

Specific Risks on the Korean Peninsula: Environmental Health Risks of Operational Importance

Living and sanitary standards are poor throughout the DPRK. Most water sources are fecally contaminated. Fertilization with night soil and poor food handling practices present significant risks of foodborne illness. Extremes of heat and cold also present risks, depending on the region and season. Water and air pollution are widespread throughout the DPRK.

Throughout the ROK, living and sanitary conditions are below Western standards. Heavy industrialization and a high population density overburden the ROK's infrastructure. Years of continual pollution have severely contaminated the air,

water, and soil. High summer and freezing winter temperatures present exposure risks.

Water Supply

Sources: The DPRK's water sources include rivers, creeks, springs, and wells; supplies usually are plentiful, but seasonal shortages occur. The ROK's water sources include streams, springs, wells, lakes, and reservoirs; supplies are adequate, although shortages have been reported in urban areas during summer.

Treatment/Distribution: In the DPRK, major cities use slow sand filtration and chlorination to treat water; however, contamination occurs during distribution because of seepage and back siphoning. Although some urban water supplies are delivered via individual house hookups, most households obtain water from public taps. In the ROK, municipal water is supplied to more than 50% of the population countrywide and to nearly 100% in the larger cities. ROK's drinking water needs are not being met because of inadequate treatment and storage capacities, obsolete equipment, and lagging government investment.

Living and Sanitary Conditions

DPRK's living and sanitation conditions are well below those in most developed nations. Overcrowded living quarters are common because the demand for housing exceeds supply. Although larger cities, such as Pyongyang, have a limited number of modern, well-equipped apartment buildings, most urban and rural housing consists of small, one-room houses without plumbing. Charcoal-burning home-heating systems frequently malfunction, resulting in dangerous levels of carbon monoxide within the dwellings. In rural areas, most housing offers minimum shelter, poor ventilation, and an excellent environment for vermin. Sewage disposal throughout most of the DPRK is inadequate. Although sewage treatment plants and septic systems are used in some large cities, sewage systems in most urban areas, consisting of both open and covered ditches, discharge raw sewage directly into streams or the sea. Rural inhabitants use outdoor privies for waste disposal, and night soil commonly is used as fertilizer.

ROK's living conditions are below developed nations' standards. The average Korean home is built partially of wood, brick, or stone, with tile or slate roofs. Millions of Koreans

now live in small, cramped high-rise apartments. Sewage treatment and trash disposal services are limited to urban areas. Most sewage is not treated before being discharged. Charcoal-burning home-heating systems frequently malfunction resulting in dangerous levels of carbon monoxide within the dwellings.

Pollution

In the DPRK, it is unlikely that special efforts have been made to protect the environment from industrial contaminants, since raw sewage is routinely discharged into the environment. DPRK authorities and the media are reporting heavy industrial contamination of the Tumen, Chongchong, and Taedong Rivers. The sources of the pollution are believed to be mining companies, paper factories, steel mills, refineries, and chemical factories along the rivers. Heavy industrial and vehicle emissions produce high levels of heavy metals and photochemical pollution in and around Chongjin, Hamhung, Sunchon, and Pyongyang.

In the ROK, pollution is a pressing environmental problem. Water, soil, and air pollution impact morbidity and mortality throughout the ROK. Thirty toxic chemicals banned by the

World Health Organization, most of them pesticides, still are used by farmers. Of these, aldicarb, captafol, and disulfoton are classified as extremely hazardous, while the remainder are classified as highly hazardous. Heavy metals from indiscriminate discharge of industrial waste contaminate ROK's watershed. The level of air pollution in Seoul is well above World Health Organization recommendations, with peak levels occurring during late fall and winter.

Disease Risks of Operational Importance

Several diseases of military importance are endemic/enzootic on the Korean peninsula. Selected potential threats are described below:

Disease	Preventive Measures
1. Diarrheal and other enteric diseases	Strict field sanitation, typhoid immunization
2. Respiratory diseases	Flu immunization, personal hygiene,

	minimize crowding
3. Hepatitis A	Immune serum globulin, sanitation
4. Typhus	Personnel protective measures, area vector control, sanitation, personal hygiene
5. Korean hemorrhagic fever	Rodent control, field site selection
6. Japanese encephalitis	Personal protective measures, area vector control
7. Sexually transmitted diseases	Abstinence, personal protective measures
8. Leptospirosis	Water sanitation

9. Rabies	Animal avoidance, immunization (if needed)
10. Tuberculosis	Personal hygiene, minimize crowding
11. Helminthic infections	Sanitation, personal hygiene

NOTE

Malaria: Although mosquito surveys show that anopheline mosquitoes capable of serving as vectors for malaria are present on the Korean peninsula, there have been no indigenous cases of malaria for many years.

1. **Diarrheal Diseases.** Diarrheal diseases probably are the greatest infectious threat for troops deployed to the Korean peninsula. Bacterial, viral, parasitic, and viral causes are all possible.

Diarrheas within the first 2 weeks of deployment, with a typically limited duration of 2 to 5 days, should be expected.

A high degree of suspicion for complications resulting from dehydration in hot weather should be maintained. Aggressive rehydration with oral rehydration salt solutions and intravenous fluids as needed is recommended. Antibiotic treatment of moderate to severe diarrhea is indicated. Sulfa resistance has been reported since the Korean War. An empiric drug often used is the quinolone ciprofloxacin (500-mg bid for 3 days or a single 1-gm dose); quinolone resistance does not appear to be a problem. Prophylactic antibiotics generally should not be used except for critical tactical situations and then only for limited amounts of time. Prompt antibiotic treatment, coupled with loperamide, will resolve most diarrheas within 24 hours.

Enterotoxin producing Escherichia coli, Salmonella spp., Shigella spp., and Campylobacter spp. are usually isolated under similar settings. Food and waterborne preventive medicine measures have strong command support. Enforced hand-washing, fly control, sanitary disposal of human waste, and use of water only from approved sources should be priority measures in the field. All food/water/ice procurement and handling should involve direct preventive medicine supervision.

Norwalk and Norwalk-like viruses are frequent causes of diarrheal outbreaks during military operations. Severity of dehydration will be greatly increased by heat during the summer months.

Typhoid and paratyphoid fevers present a threat. Typhoid immunization is recommended but does not substitute for the behavioral preventive measures noted above.

2. Respiratory Diseases. Acute respiratory infections have been noted to be a common affliction on deployments to the Korean peninsula. Widespread transmission could compromise efficiency and readiness during deployments. Crowding in staging areas and tent camps, combined with poor personal hygiene, predisposes to efficient transmission of respiratory disease agents. U.S. troops may have had little prior exposure to strains endemic to this region. Agents responsible for routine respiratory disease include adenoviruses, rhinoviruses, influenza A and B, parainfluenza, and *Mycoplasma pneumoniae*. Troops should receive this year's influenza vaccine.

3. **Hepatitis A.** Hepatitis A is transmitted person-to-person by the fecal-oral route and causes a febrile illness of abrupt onset associated with gastrointestinal symptoms and jaundice. The incubation period is 15 to 50 days, and symptoms typically last several weeks. Large wildfire outbreaks in camp situations are possible. Food and latrine sanitation must be emphasized.

4. **Typhus.** Mites (Leptotrombidium spp.) act as reservoirs and vectors of scrub typhus. Rickettsial pox is transmitted by the house mouse mite (Liponyssoides sanguineus). Louse-borne (epidemic) and flea-borne (murine) typhus are contracted by scratching louse and flea feces into the skin respectively. Louse-borne typhus has been responsible for large epidemics in Korea and still is a threat under adverse circumstances, such as war or natural disaster.

5. **Korean Hemorrhagic Fever.** This was a disease of historic significance to U.S. military forces in the Korean War. The disease continues to exhibit a low level of annual incidence (0 to 5 cases among U.S. forces per year). Korean hemorrhagic fever is characterized by an abrupt onset of fever of 3 to 8 days duration, conjunctival injection, prostration, backache, headache, abdominal pain, anorexia, and vomiting.

Hemorrhagic manifestations are uncommon, but may appear about the third day, followed by proteinuria, hypotension, and sometimes shock. Renal abnormalities may be mild or progress to acute renal failure and continue for several weeks. The majority of deaths (case fatality rate is about 7% in Korea) occur during the anuric phase from renal shutdown. Convalescence usually is rapid and complete during the third week. Risk occurs year-round; peak disease incidence occurs October through November.

6. Japanese Encephalitis. This mosquito-borne viral disease has a farm animal reservoir, primarily swine. The last major epidemic of Japanese encephalitis in the ROK occurred during 1982, with 1,197 reported cases among local nationals. Human cases of the disease have decreased in the ROK, partially because of a national vaccination program and changes in agricultural practices.

7. Sexually Transmitted Diseases. Syphilis, gonorrhea, venereal warts, herpes, chlamydia, and hepatitis are common sexually transmitted diseases in Korea. Gonorrhea acquired in Korea should be assumed to be penicillin resistant and treated with Ceftriaxone. Human immunodeficiency virus disease

currently is not a significant problem in Korea, although the disease is present.

8. **Leptospirosis.** This febrile disease, transmitted by direct or indirect contact with the urine of infected animals, is distributed worldwide and has been of military significance. Transmission to soldiers typically occurs when they traverse bodies of fresh water or mud contaminated by infected animal urine. Most areas of Korea are low risk.

9. **Rabies.** Before 1975, rabies was a serious concern on the Korean peninsula. Since 1976, there have been only two cases of human rabies in the ROK, with none occurring since 1984.

10. **Tuberculosis.** Tuberculosis is present in the civilian and military populations in the DPRK and the ROK.

11. **Helminthic Infections.** These infections include ascariasis, clonorchiasis, and hookworm infection. Soldiers should be cautioned not to walk barefoot and not to lie down and expose skin to the soil. They should not eat local food, and must carefully wash hands and eating utensils.

OTHER MEDICAL CONSIDERATIONS OF OPERATIONAL IMPORTANCE

Cold and Heat Related Injuries: Winter months on the Korean peninsula are extremely cold and windy, making cold-related injuries a major medical threat. During the Korean War, over 8,000 United Nations Command soldiers suffered cold weather injuries.

Heat not only is a primary medical problem, it also exacerbates other diseases, making diagnosis and treatment more difficult. It is a command responsibility to prevent heat injuries; this is a difficult task because many U.S. troops are initially unacclimatized, and water supplies may be limited or contaminated.

Oral Health Threat: Although there is not a known oral health threat unique to the Far East, there are a number of oral conditions that will be a threat to soldiers in this type of operation. Periods of fatigue, nutritional deficiencies, psychological stress, and poor oral hygiene are known to exacerbate acute necrotizing ulcerative gingivitis, acute pericoronitis of the third molars, and periodontal abscess.

These dental conditions are debilitating and, if not managed carefully, can result in absence from duty for several days for treatment. Milder gingival and periodontal disease also may increase in incidence and will interfere with the fitness of the soldier. The chronic nature of dental decay makes it probable that the health of troops deployed in an orally fit condition will deteriorate if field oral hygiene is not practiced and if dental care is not provided. Education to address the dental threat should focus on three specific areas: the importance of field oral hygiene; the availability of oral hygiene aids in the Ration Supplement, Sundries Pack, Type I, and from the field PX; and the programs for sustaining and maintaining dental services. To be effective, these measures must be an integral part of the complete medical care program.

PREVENTION OF DISEASE AND INJURY

Vaccines

For specific immunizations and prophylaxes, consult your service preventive medical staff.

Heat and Solar Radiation

Summer months in Korea are characterized by hot and extremely humid conditions. These factors and the lack of heat injury prevention measures contribute to the significant number of heat injuries that occur each year. (See Heat Injury Prevention Chart.)

Drinking adequate amounts of water and following a prescribed work/rest cycle in accordance with the heat injury prevention chart contained in this guide must be continually emphasized during summertime operations.

Other preventive measures include eating all meals to replace salts lost through perspiration, scheduling strenuous