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Wars are an unfortunate but apparently inescapable consequence of human socialization. In the past quarter-century alone, there have been dozens of major armed conflicts worldwide. Several of these wars have been multinational in scope and have involved the deployment of large numbers of ground forces from their home countries to distinct areas of conflict in developing portions of the world, such as southwest and central Asia (e.g., Iraq, Afghanistan) and Africa.

Troops who are deployed as combatants or in other military capacities on foreign soil are at risk of acquiring infectious diseases endemic to that region on the basis of intimate human and environmental exposures and their immunologic naiveté with regard to local endemic or enzootic pathogens. This risk is magnified by the crowded social conditions engendered by mass troop deployments, infrastructure destruction, and population displacement; it is further amplified by vulnerabilities in public health, such as the lapses in hygiene and sanitation that invariably accompany armed conflicts. The clinical spectrum of infectious illness acquired in this setting includes acute infections in the combat theater, acute infections with delayed symptoms, and chronic or relapsing infections. The latter two scenarios have the potential to cause illness in veterans returning from foreign wars.

The impact of acute infectious diseases of war, which were once a major cause of noncombat mortality, has significantly lessened in modern conflicts, largely because of the use of preventive vaccines and the early institution of antimicrobial therapy. Nonetheless, these acute diseases remain an important cause of morbidity in deployed military personnel (Table 152e-1). Many acute infectious diseases, such as influenza, meningococcal meningitis, hepatitis A, and adenoviral respiratory disease, can largely be prevented by routine vaccination of troops. Others, such as bacterial gastroenteritis and viral respiratory tract infections, continue to represent common causes of minor morbidity among deployed forces. The incidence of several other acute infections, such as malaria and dengue, can be favorably impacted—although not completely abrogated—by the use of chemoprophylaxis, personal protective measures, and vector control. Uncommonly, infections that have short incubation periods and are acquired just days before leaving a combat theater may become clinically manifest only upon the return of troops to their countries of origin. Such was the case in a cluster of African tick typhus that occurred during short-term U.S. troop deployments to Somalia and Botswana in the early 1990s. However, because most acute infections with brief clinical incubation periods are self-limited or responsive to treatment, they are not typically seen in returning war veterans and will not be addressed further in this chapter.

A number of infectious diseases acquired in a theater of military operations may become apparent in veterans only after they have returned to their home countries. Although their incidences have not been precisely defined, these complications of military service—manifesting clinically with either acute or chronic signs and symptoms—may cause significant morbidity in affected veterans and in some settings may endanger public health through secondary transmission or contamination of the blood supply. Of a sample of nearly 53,000 U.S. veterans of the Persian Gulf War (1990–1991), 7% were diagnosed with an infectious disease in the aftermath of the war; no excess risk of mortality was observed over a 6-year follow-up comparison with nondeployed veterans.

This chapter focuses on infectious diseases that have occurred or have been a source of concern in returning veterans of foreign wars over the past quarter-century. During this period, several pathogens have been associated with disease in this population, as discussed below. Some pathogens have been associated with only rare case reports in war veterans, and some, given their epidemiology, may pose

TABLE 152e-1 ACUTE INFECTIOUS DISEASES OF WAR THAT HAVE BRIEF CLINICAL INCUBATION PERIODS AND THEREFORE ARE LIKELY TO CAUSE SYMPTOMATIC ILLNESS IN MILITARY PERSONNEL DURING DEPLOYMENT

Bacterial
Meningococcal meningitis
Gastroenteritis (enterotoxigenic or enteroinvasive <i>Escherichia coli</i> , <i>Shigella</i> , <i>Salmonella</i> , <i>Campylobacter</i>)
Typhoid fever
Cholera
Typhus (epidemic, murine, scrub)
African tick-bite fever
Leptospirosis
Sexually transmitted diseases (gonorrhea, chlamydial infection, genital herpes, genital warts, chancroid, syphilis)
Combat wound infections
Q fever
Viral
Norovirus gastroenteritis
West Nile virus infection
Crimean-Congo hemorrhagic fever
Influenza
Adenoviral respiratory disease
Viral upper respiratory tract infections
Dengue
Alphavirus infections (e.g., Chikungunya, O'nyong-nyong, or Sindbis virus)
Tickborne encephalitis
Sandfly fever
Hantavirus syndromes
Parasitic
Malaria
Gastroenteritis (cryptosporidiosis, giardiasis, amebiasis)
Ophthalmomyiasis

a risk in future conflicts. In general, it is practical to classify infections with delayed signs and symptoms related to prolonged incubation periods or significant clinical latency in terms of their potential to manifest clinically as acute illnesses or chronic/relapsing diseases. Table 152e-2 provides details regarding the epidemiology, clinical characteristics, diagnosis, therapy, and prevention of infectious diseases of concern in returning war veterans. Figure 152e-1 illustrates a differential diagnostic approach—based on prominent signs or symptoms—to suspected infections in this population.

ACUTE INFECTIOUS DISEASES WITH DELAYED CLINICAL PRESENTATIONS

Malaria (See Chap. 248) Malaria, which is due to infection with *Plasmodium* species of protozoa, has historically caused significant battlefield morbidity and lost duty time among armed forces; these phenomena have been affirmed by recent U.S. military experiences in Africa and central Asia. Because of its worldwide prevalence and its pathophysiology, malaria remains an important cause of infection both during military operations and in returning war veterans.

The risk of malaria is exacerbated by several factors inherent to war: inadequate shelter promoting increased troop exposure to vectors; abeyance of governmental programs for vector control; and ecologic changes leading to an increased vector presence in the contested environment. Because of the complex life cycle of the parasite and the predilection of *P. vivax* and *P. ovale* to remain latent in their liver stages of development for prolonged periods, malaria in foreign-stationed troops may become clinically apparent only after their return home. In the aftermath of the Vietnam War, more than 13,000 cases of malaria—the vast majority due to *P. vivax*—were imported into the United States. Of the 7683 Soviet troops diagnosed with *P. vivax*