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The Deployed Military: Medical Readiness and Travel-Related Health Issues

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KEY POINTS

• Deployed military personnel represent a special category of travelers typically characterized as a young, disciplined, trained, predominantly male, strictly selected, controlled, and regularly monitored population traveling in groups with some level of medical care.

• Medical readiness (basically equivalent to the civilian pretravel consultation) is based on a policy-driven force health protection approach of physical, dental, and psychological examinations with mandatory investigations and vaccinations. Any contraindication for vaccination induces ineligibility for deployment.

• Noncombat-related injuries, gastrointestinal, dermatologic, and respiratory disorders represent the leading causes of health issues during deployment.

• Despite the tremendous improvement in hygiene, sanitation, infection control, vaccination, and chemoprophylaxis, infectious diseases remain a major problem for deployed armed forces in the 21st century as these preventive measures can become neglected over time or disrupted during early or most intense stages of military operations.

• In spite of a lower prevalence than diseases and noncombat-related injuries, battle injuries have a major physical and psychological impact. Enormous technologic and medical advances have been made in the fields of combat care, rehabilitation medicine, psychological support, and social support of the wounded and their families.

• Postdeployment routine screening by health care professionals should allow for better management of psychological injuries.

INTRODUCTION

With examples of contributions to the field such as Alphonse Laveran, Ronald Ross, and Alan Magill for malaria,1,2 Walter Reed and William Gorgas for yellow fever,3 William Leishman for leishmaniasis,4 and Léon Lapéyssonnie5 for the African meningitis belt, just to cite a few, military medicine has and continues to contribute to major scientific advances in the fields of infectious diseases and tropical medicine and, as a consequence, of travel medicine. As data regarding health problems in civilian travelers are globally comparable to those reported in deployed soldiers, this chapter will focus on the specifics of the deployed military population and its main incapacitating medical threats. The deployed military represent a special category of travelers characterized as a young, disciplined, trained, predominantly male population that is strictly selected, controlled, and regularly monitored, and that typically travels in a group accompanied by some level of medical care. Medical readiness (basically equivalent to the civilian pretravel consultation) is an overriding concern of all commanders. It is a policy-driven force health protection approach based on physical, dental, and psychological examinations with mandatory lab and/or radiologic investigations according to the service personnel’s country. It includes obligatory health education sessions regarding the specific deployment-related risks and up-to-date immunizations based on the country and service’s health policies (Table 36.1 provides information for US personnel). Any contraindication for vaccination results in ineligibility for deployment.

Deployments usually last from a few days to a year. Rest and recuperation leave (“R & R”) depends on the length of the mission and the institution’s policy. In the majority of cases, military health care providers are deployed with the troops allowing for continuous medical support. However, due to lack of time or fear of the stigma of appearing weak, personnel often do not seek care unless presenting with incapacitating symptoms.

Since the beginning of armed conflicts, diseases and noncombat-related injuries (NCRI) have always caused much greater morbidity and mortality than battle injuries. As an example, the French conquest of Madagascar in 1895 resulted in approximately 6000 malaria-related deaths for <30 killed in action.5 A recent prospective study (Fig. 36.1) showed similar findings with NCRI, gastrointestinal, dermatologic, and respiratory disorders representing the leading causes of health issues during deployment. The same authors reported a significant burden for infectious diseases (41% of all etiologies), with ubiquitous infections in the majority of cases.6 As with civilian travelers, the use of alcohol and drugs has been associated with an increased incidence of accidents, emotional disorders, and sexually transmitted infections.6–10 Alcohol-related regulations vary according to the country of origin and country of deployment, but the authors recommend restrictions against the use of alcohol on deployment to minimize these risks. Continuing
Abstract
Medical readiness in deployed servicemen is based on a policy-driven force health protection approach of physical, dental, and psychological examinations with mandatory investigations and vaccinations. Non-combat-related injuries, gastrointestinal, dermatologic, and respiratory disorders represent the leading causes of health issues during deployment.

Though much less common, battle injuries have a major physical and psychological impact. Enormous technologic and medical advances have been made in the fields of combat care, rehabilitation medicine, and psychological and social support of the wounded and their families. Although there have been tremendous improvements in hygiene, sanitation, infection control, vaccination, and chemoprophylaxis, preventive measures are not always adequate and can become neglected over time or disrupted during early or most intense stages of military operations. As a result, infectious diseases remain a major challenge for deployed armed forces in the 21st century.

Keywords
Combat
Deployment
Infectious diseases
Medical readiness
Military
Sexual health
Travel
Tropical
## TABLE 36.1 Vaccine Requirements for Deployed US Personnel

| Vaccine          | Administration                                                                 | Required for                                                                 |
|------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Anthrax          | Schedule: 0, 4 wk, 8, 12, 18 mo + annual booster                                 | Middle East (including Egypt and Southwest Asia (for ≥15 days in theater)    |
|                  | Route: Intramuscular                                                           | North America (per DOD policy)                                               |
|                  | Dose: 0.5 mL                                                                   | Indo-Asia-Pacific region (per DOD policy)                                    |
| Chickenpox       | Schedule: 0, 4–8 wk (2 doses) or + serologic testing                            | All destinations                                                             |
|                  | Route: Subcutaneous                                                            |                                                                              |
|                  | Dose: 0.5 mL                                                                   |                                                                              |
| Hepatitis A      | Schedule: 0, 6 mo (2 doses) or + serologic testing                              | All destinations                                                             |
|                  | Route: Intramuscular                                                           |                                                                              |
|                  | Dose: 1–18 years, 0.5 mL; ≥19 years, 1 mL; Twinrix ≥18 years, 1 mL             |                                                                              |
| Hepatitis B      | Schedule: 0, 1, 6 mo (3 doses) or + serologic testing                           | All destinations                                                             |
|                  | Route: Intramuscular                                                           |                                                                              |
|                  | Dose: 0–19 years, 0.5 mL; ≥20 years, 1 mL; Twinrix ≥18 years, 1 mL             |                                                                              |
| Influenza - Seasonal | Schedule: 1 dose annually                                                     | All destinations                                                             |
|                  | Route: Intramuscular, Intranasal                                                |                                                                              |
|                  | Dose: IM 0.5 mL; Intranasal 0.2 mL                                              |                                                                              |
| Japanese encephalitis | Schedule: 0, 28 d (2 doses). One-time booster if >1 year since series complete.| Indo-Asia-Pacific region (recommended)                                       |
|                  | Route: Intramuscular                                                           |                                                                              |
|                  | Dose: 0.5 mL                                                                   |                                                                              |
| MMR              | Schedule: 2 lifetime doses or + serologic testing                               | All destinations                                                             |
|                  | Route: Subcutaneous                                                            |                                                                              |
|                  | Dose: 0.5 mL                                                                   |                                                                              |
| Meningococcal    | Schedule: If at prolonged risk of disease exposure, vaccinate every 5 years.   | Africa                                                                       |
|                  | Route: Menomune, Subcutaneous, Menactra and Menveo, Intramuscular               | Europe (specific countries only)                                             |
|                  | Dose: 0.5 mL                                                                   |                                                                              |
| Pneumococcal     | Schedule: High risk: 1 dose, asplenic only: 1 dose + one-time booster if ≥5 years since first dose | All destinations for high-risk health conditions per Advisory Committee on Immunization Practices |
|                  | Route: Subcutaneous or Intramuscular                                           |                                                                              |
|                  | Dose: 0.5 mL                                                                   |                                                                              |
| Polio            | Schedule: 1 dose as adult                                                       | All destinations                                                             |
|                  | Route: Subcutaneous or Intramuscular                                           |                                                                              |
|                  | Dose: 0.5 mL                                                                   |                                                                              |
| Rabies           | Schedule: Preexposure: 0, 7 d, then 21 or 28 d Booster: 2–5 years (when titer drops >1:5) | All destinations                                                             |
|                  | Route: Intramuscular                                                          | For personnel at high risk for exposure                                       |
|                  | Dose: 1 mL                                                                    |                                                                              |
| Smallpox         | Schedule: 1 dose, every 10 years                                                | North America (per DOD policy)                                               |
|                  | Route: 15 percutaneous jabs for primary and revaccinates, over deltoid.         | Indo-Asia-Pacific region (per DOD policy)                                    |
| Tdap             | Schedule: 1 lifetime dose of Tdap, Td boosters every 10 years. For adults who previously have not received a dose of Tdap, 1 dose should be given regardless of interval since last tetanus vaccine | North America                                                               |
|                  | Route: Intramuscular (Tdap, Td, Tetanus Toxoid)                                | Indo-Asia-Pacific region                                                      |
|                  | Dose: 0.5 mL (Tdap, Td, Tetanus Toxoid)                                         | South America                                                                |
| Typhoid          | Schedule: Injectable: every 2 years; Oral: every 5 years                        | Africa                                                                       |
|                  | Route: Intramuscular or Oral                                                   | Middle East and Southwest Asia                                              |
|                  | Dose: IM 0.5 mL; Oral, 4 capsules (day 1, 3, 5, 7)                              | Europe (endemic areas only)                                                  |
|                  |                                                                              | North America (per Instruction 44-163)                                       |
|                  |                                                                              | Indo-Asia-Pacific region (for Operational Forces)                            |
|                  |                                                                              | South America                                                                |
| Yellow fever     | Schedule: 1 dose, every 10 years. Must be administered 10 days prior to travel | Africa (except Egypt)                                                        |
|                  | Route: Subcutaneous                                                            | Europe (specific country transit requirements)                               |
|                  | Dose: 0.5 mL                                                                   | Indo-Asia-Pacific region (specific country transit requirements)             |
|                  |                                                                              | South America (required for countries where the disease is present)          |

DOD, Department of Defense; MMR, measles-mumps-rubella.
Adapted from Joint Regulation on Immunizations and Chemoprophylaxis for the Prevention of Infectious Diseases [AR 40-562, BUMEDINST 6230.15B, AFI 48-110_IP, CG COMDTINST M6230.4G].
information and education, and prohibiting alcohol and drug use/abuse during rotations, should help to decrease the rates of NCRI and other alcohol and/or drug-associated medical issues.

**NONCOMBAT-RELATED INJURIES AND BACK PAIN**

Noncombat-related injuries (including road traffic injuries) are a major cause of soldier attrition during international operations. Although generally simple to treat during deployment (see Fig. 36.1), NCRI have progressively supplanted combat-related injuries, respiratory disease, infectious disease, and gastrointestinal disorders as the leading cause of hospital admissions during deployment. French authors observed a significantly higher NCRI rate in peacekeeping missions (Lebanon, Côte d’Ivoire) versus kinetic (combat) operations (Afghanistan). Among musculoskeletal disorders, French and US authors showed that low back pain and/or sciatica are a significant cause both for seeking care and for medical evacuation. This is partly because of the heavy load carried by dismounted troopers (protection gear, weaponry and ammunition, food and water, specialized equipment) that can range between 50 and 100 kg per soldier.

**COMBAT-RELATED INJURIES**

Despite their relatively low prevalence, combat-related injuries are the most feared result of military deployment and have a major psychological impact on troops, their families, and the media, and remain the number one priority of the military chain of command. Lessons learned from recent conflicts have led to major breakthroughs in the field of trauma care. Tactical combat casualty care, improved protection gear and armored vehicles, deployed forward surgical teams applying damage control surgery and resuscitation, advances in transfusion (fresh frozen plasma and platelets, lyophilized plasma, whole blood transfusion), and early medical evacuation have been associated with remarkably improved outcomes for the severely injured. However, the increased survival of patients sustaining severe pelvic, spinal, and extremity wounds with amputations has highlighted the essential role of rehabilitation medicine (improved prosthetics), psychiatrists, psychologists, and social workers in supporting the wounded and their families.

**PSYCHIATRIC DISORDERS**

Even though they represent a small portion of morbidity in deployed troops, psychiatric diseases are among the main causes of evacuation. Moreover, most posttraumatic stress disorders occur following deployment and symptoms increase the longer the duration after return. Several factors may contribute to susceptibility to emotional or psychological disorders during deployment: education; prior stressors and childhood adversity; emotional isolation; concerns about family during deployment; working in a new, foreign, remote, and hostile environment with limited individual space; restricted and highly secured movements; different rest-activity cycle; being absent during births and funerals at home; exposure to combat stress; and witnessing unexpected atrocities, wounded, and killed comrades. However, a recent prospective study found no association between deployment and suicide in current and former US military personnel. Preventing deployment-related psychiatric disorders relies on a thorough psychological and social assessment (as in US and French procedures, for example), during pre-enlistment medical screening, then prior to and following the tour, as well as the continuous social support of the families, and prohibition of alcohol and drug use/abuse during rotations.

**MALARIA AND OTHER VECTORBORNE DISEASES**

With the availability of protective countermeasures, morbidity and mortality from vectorborne disease have declined during recent military operations, but continue to pose significant operational threats to deployed forces. Experience has shown that knowledge, attitudes,
and practices on the part of both medical providers and those deployed can have a major impact on disease burden.\textsuperscript{20,21} Military operationalize protective countermeasures through a layered approach that includes use of permethrin-impregnated uniforms and nets, and DEET-containing repellents, vaccines, and chemoprophylaxis medications. From its earliest use among allied forces in the Pacific campaign of World War II, adherence to malaria chemoprophylaxis has been a challenge, leading to the dictum that ensuring adherence to chemoprophylaxis is a command responsibility and not just a medical responsibility.\textsuperscript{1,22,23} One notable exception to this experience was the very high rate of reported adherence among US military forces deployed to Liberia as part of the Ebola response in Operation United Assistance in 2014–2015, with no cases occurring while deployed.\textsuperscript{23} Faced with high threat of infectious disease during the operation, the military health community provided robust, expert-level consultation on force health protection measures to all deploying forces and leveraged command support to consistently reinforce prevention policies and procedures.\textsuperscript{24}

Force health protection policy (FHPP), set by theater commanders, establishes the countermeasures at the unit-level population, separate from individualized decision-making that may occur during an individual medical visit. Specific medication recommendations for a deployed force balance intensity of transmission, drug resistance, impact of nonadherence on efficacy, and medication cost. For example, current US military policy establishes either atovaquone-proguanil or doxycycline as first line chemoprophylaxis regimen and restricts the use of mefloquine to those both intolerant of first line agents and properly screened for contraindications.\textsuperscript{25} This entails the use, in US troops, of atovaquone-proguanil in high-threat settings, to include most of sub-Saharan Africa, and the use of doxycycline in lower threat regions such as Southwest Asia. Another example would be the French health corps policy that uses doxycycline as the only first line chemoprophylactic drug to optimize adherence.\textsuperscript{26} Use of primaquine for presumptive antirelapse therapy (PART) is typically recommended following deployments to risk areas for \textit{Plasmodium vivax} and \textit{P. ovale}. FHPP is constrained by Food and Drug Administration labeling to restrict the use of investigational products, which has historically been applied to dosing considerations of primaquine. Hence the US military lagged civilian practice, using 15 mg of primaquine base daily versus the current recommendation of 30 mg of base daily. Department of Defense (DOD) policies do in fact allow for a “standard of care” dosage to be recommended under FHPP.\textsuperscript{27} Force-wide testing of US recruits for G6PD deficiency is standard practice.

Leishmaniasis, specifically Old World cutaneous leishmaniasis, has posed a consistent operational threat during recent US and UK military operations in Southwest Asia. Recent experience has shown that forces have the greatest risk while theaters of operations are least mature, increasing the chance of sleeping on the ground, use of improvised shelters, and failure to utilize insecticide-treated nets with ultrafine mesh size.\textsuperscript{28,29} Recent military experience with leishmaniasis has informed current management recommendations with an emphasis on topical, oral, or even wound care alone as management for Old World cutaneous leishmaniasis.\textsuperscript{30} This approach is especially important from the perspective of maintaining troops in the field and avoiding need for hospitalization or evacuation for parenteral therapy.

Regarding New World cutaneous leishmaniasis, in French Guiana for example, \textit{Leishmania} (\textit{Viannia}) \textit{guyanensis} and \textit{L. (V.) braziliensis} are associated with concomitant or late mucosal leishmaniasis that can cause destructive lesions of the nasooropharyngeal/laryngeal mucosa. As a consequence systemic treatment (pentamidine isethionate or meglumine antimoniate) requiring close monitoring is recommended for infected French soldiers.\textsuperscript{31}

The prevention approach for arboviral diseases centers on the use of vaccines, when available, and proper wearing of the uniform and repellants. The US military currently supports vaccine research programs to develop vaccines against long-term threats such as dengue and emerging threats like Zika.\textsuperscript{32,33}

**SEXUAL HEALTH**

Sexually transmitted infections (STIs) have always been an important part of military history with non-negligible impact on the operating capacity of troops. For example, during the Peninsular War of 1808–1814, half of all admissions in British troops were for gonorrhea and syphilis.\textsuperscript{34} The pursuit of pleasure during war campaigns led to the establishment of military brothels that were shut down in the late 20th century but unfortunately replaced by local civilian bordellos. The military are an “at-risk” sexually active population as approximately one-third are in the under 25-year-old age category—the age range that experiences the highest rate of STIs.\textsuperscript{35} High incomes and purchasing power during deployments, feeling of invincibility, influence of pornography, sexual deprivation, cultural interactions, and group dynamics can generate a high prevalence of STI-associated behaviors like binge drinking and drug use, lack of condom use, and multiple sexual partnerships.\textsuperscript{36}

A recent US study, conducted in the Navy, shifted the focus of STI acquisition among male shipboard sailors from sex workers to predominantly regular sexual partners within the local military community as the consequence of the growing number of female recruits.\textsuperscript{37} Other authors showed that family/personal life stress and psychological distress influenced the number of partnerships more strongly for women than for men.\textsuperscript{38} Another emerging issue of the growing number of women in the military is unwanted pregnancies during deployment.\textsuperscript{39} Preventing STIs and unintended pregnancies requires information and education, access to condoms and contraceptives, and prohibiting alcohol and drug use/abuse during rotations.

**DERMATOLOGIC DISEASES**

Due to service personnel’s living and working conditions such as crowding, close contact, diminished cleanliness, compromised skin integrity (friction blisters, cracks or tinea pedis in the feet, cuts and abrasions), military status is a recognized risk factor for streptococcal and staphylococcal skin and soft tissue infections (impetigo, erysipelas, cellulitis, cutaneous abscesses, Panton-Valentine leukocidin-positive \textit{Staphylococcus aureus} skin infection).\textsuperscript{40} During deployments to tropical or subtropical destinations, these skin conditions tend to occur more frequently because of the increased heat and humidity, exacerbated by wearing heavy protective gear, and reduced washing and laundry facilities. In addition, they are harder to treat under such circumstances.\textsuperscript{33} These environmental and lifestyle factors also facilitate superficial fungal infections that may develop in >50% of soldiers, presenting as tinea pedis, tinea cruris, tinea corporis, tinea axillae, tinea capitis, onychomycosis, and/or pityriasis versicolor.\textsuperscript{41} Due to the maceration in combat boots, feet not only pay a heavy price in terms of fungal and gram-positive cocci infections but also of other conditions such as pitted keratolysis (\textit{Corynebacterium} sp.) (Fig. 36.2). These lower limb lesions in turn increase the risk of erysipelas and cellulitis with the potential for significant negative impact on force availability.\textsuperscript{42} Additional skin disorders include other corynebacterial infections (erythrasma and trichomycosis) and heat rash (miliaria crystallina, miliaria rubra, miliaria pustulosa, and miliaria profunda). Tropical climate-related bacterial and fungal infections can also be associated with delayed wound healing.\textsuperscript{43}

Prevention of these infections is based on strict hygiene measures including washing/drying or changing clothes daily (or multiple times a day if needed), and if feasible, airing skin and feet out when possible. Regular self-examination of the feet for early treatment of infections...
and blisters, as well as immediate and careful wound management, is recommended.

Other diseases such as scabies (Sarcoptes scabiei), chickenpox (varicella zoster virus), and measles (in case of misdiagnosis during childhood or omitted vaccination) are difficult to address in these deployment settings. Cases should be rapidly diagnosed, isolated, and treated (when possible).

**GASTROINTESTINAL AND RESPIRATORY INFECTIONS**

Gastrointestinal and respiratory infections are among the most common ailments suffered by deployed military and are frequently cited as detrimental to military function. In 2003–2004, a majority of US personnel reported having suffered from diarrhea (76.8% in Iraq and 54.4% in Afghanistan) and respiratory illness (69.1% overall). Additionally many reported decreased individual performance effectiveness because of the illness (diarrhea [46%], respiratory [14%]). In 2008, 50% of a British paratrooper unit in Afghanistan was unfit for duty due to diarrhea.

The incidence of diarrhea during deployment is about 5%–7% per 100 person-months. It is associated with poor hygiene and contaminated food, which are encountered more frequently early in a deployment where hand-washing facilities are lacking and soldiers can be tempted to try fresh local food instead of eating the canned and/or lyophilized nutrients included in their self-contained, individual field rations. Enterotoxigenic *Escherichia coli* (ETEC), *Campylobacter*, and *Shigella* have been identified as causing 38%–45% of diarrhea. Viral causes are less common but are frequent causes of outbreaks. Prevention is based on rapidly establishing and maintaining effective sanitation and provision of clean food and water. To reduce the operational impact of diarrhea and to avoid associated deployment complications of dehydration and heat injury, rapid, effective treatment with a single-dose antibiotic (azithromycin or a fluoroquinolone) and loperamide is typically recommended.

The risk of respiratory infections is thought to be an increased because of crowded living conditions compounded by relative immune compromise brought on by physical and emotional stress. This is exacerbated by exposure to dust and smoke, extremes of temperature, and high altitude and novel pathogens endemic to that region. Clinical presentations include the “common cold,” the “flu” (influenza-like illness), bronchitis, and pneumonia. Influenza virus is the classic respiratory scourge of the military, but other respiratory viruses such rhinoviruses, human coronaviruses, respiratory syncytial virus, parainfluenza virus, and adenoviruses are common causes of cold and flu symptoms. Pneumonia is most often caused by *Streptococcus pneumoniae* and influenza virus. Pneumonia epidemics due to adenovirus type 14 (Ad14) reemerged among US military recruits when a vaccine was not available. Strategies to reduce the incidence and impact of respiratory infections include an emphasis on hygiene measures (hand-washing, reduced crowding, cohorting of ill, etc.), vaccination for common pathogens (influenza, Ad14), antibiotic prophylaxis (penicillin in US training camps to reduce group A strep pharyngitis), and early diagnosis and directed treatment of infection.

**CONCLUSION**

Despite the tremendous improvement in hygiene, sanitation, infection control, vaccination, and chemoprophylaxis, infectious diseases remain a major problem for deployed armed forces in the 21st century as these preventive measures can become neglected over time or disrupted during the early or the most intense stages of military operations. Dramatic improvements have been made in the last decade regarding combat casualty care not only for physical wounds but also for the invisible ones (i.e., the psychological injuries). Routine screening following deployments by health care professionals is important to ensure better management of these mental disorders.

**DISCLOSURE**

The opinions or assertions expressed herein are the private views of the authors, and are not to be considered as official or as reflecting the views of the American and French Military Health Services.

**REFERENCES**

1. Cox FE. History of the discovery of the malaria parasites and their vectors. Parasit Vectors 2010;3:5.
2. Plowe CV. In memoriam: a tribute to Alan Magill. Trends Parasitol 2016;32(4):265–6.
3. Chaves-Carballo E, Carlos Finlay and yellow fever: triumph over adversity. Mil Med 2005;170:881–5.
4. Vincent HM, William Boog Leishman: parasitologist and politician. Parasitology 2016;1–8.
5. Milleliri JM, Léon Lapeyssonnie: on the trail to its end. Med Sante Trop 2016;26:15–21.
6. Migliani R, Pradines B, Michel R, et al. Malaria control strategies in French armed forces. Travel Med Infect Dis 2014;12:307–17.
7. Aoun O, Roqueplo P, Rapp C. Spectrum and impact of health problems during deployment: a prospective, multicenter study of French soldiers operating in Afghanistan, Lebanon and Côte d’Ivoire. Travel Med Infect Dis 2014;12:378–84.
8. Stewart BT, Yankson IK, Afuaka F, et al. Road traffic and other unintentional injuries among travelers to developing countries. Med Clin North Am 2016;100:331–43.
9. Stahlman S, Javanbakht M, Cochran S, et al. Self-reported sexually transmitted infections and sexual risk behaviors in the U.S. military: how sex influences risk. Sex Transm Dis 2014;41:359–64.
10. Ramchand R, Rudavsky R, Grant S, et al. Prevalence of, risk factors for, and consequences of posttraumatic stress disorder and other mental health problems in military populations deployed to Iraq and Afghanistan. Curr Psychiatry Rep 2015;17:37.
11. Sanders JW, Putnam SD, Frankart C, et al. Impact of illness and non-combat injury during Operations Iraqi Freedom and Enduring Freedom (Afghanistan). Am J Trop Med Hyg 2005;73:713–19.

12. Penn-Barwell IG, Roberts SA, Midwinter MJ, et al. Improved survival in UK combat casualties from Iraq and Afghanistan: 2003–2012. J Trauma Acute Care Surg 2015;78:1014–20.

13. Spinella PC, Pidcoe HF, Strandenes G, et al. Whole blood for hemostatic resuscitation of major bleeding. Transfusion 2016;56: S190–202.

14. Pidcoe HF, Eden JK, Mora AG, et al. Ten-year analysis of transfusion in Operation Iraqi Freedom and Operation Enduring Freedom: increased plasma and platelet use correlates with improved survival. J Trauma Acute Care Surg 2012;73:5445–52.

15. Sailliol A, Martinaud C, Cap AP, et al. The evolving role of lyophilized plasma in remote damage control resuscitation in the French Armed Forces Health Service. Transfusion 2013;53:865–71.

16. Schoenfeld AJ, Dunn JC, Belmont PJ, Pelvic, spinal and extremity wounds among combat-specific personnel serving in Iraq and Afghanistan (2003–2011): a new paradigm in military musculoskeletal medicine. Injury 2013;44:1866–70.

17. LeardMann CA, Powell TM, Smith TC, et al. Risk factors associated with suicide in current and former US military personnel. JAMA 2013;310:496–506.

18. Burnette WN, Hoke CH Jr, Scovill J, et al. Infectious diseases investment decision evaluation algorithm: a quantitative algorithm for prioritization of naturally occurring infectious disease threats to the U.S. military. Mil Med 2008;173:174–81.

19. Gibbons RV, Streitz M, Babina T, et al. Dengue and US military operations from the Spanish-American War through today. Emerg Infect Dis 2012;18:623–30.

20. Kersgard CM, Hickey PW. Adult malaria chemoprophylaxis prescribing patterns in the military health system from 2007–2011. Am J Trop Med Hyg 2013;89:317–25.

21. Whitman TJ, Coyne PE, Magill AJ, et al. An outbreak of Plasmodium falciparum malaria in U.S. marines deployed to Liberia. Am J Trop Med Hyg 2010;83:258–65.

22. Joy RJ. Malaria in American troops in the South and Southwest Pacific in World War II. Med Hist 1999;43:192–207.

23. Saunders DL, Garges E, Manning JE, et al. Safety, tolerability, and compliance with long-term amantarial chemoprophylaxis in American soldiers in Afghanistan. Am J Trop Med Hyg 2015;93:584–90.

24. Miller RS, Rini EA, Paris R, et al. Unprecedented protection for malaria during Operation United Assistance and late breakthroughs upon return. Military Health System Research Symposium; 2015 Aug 18.

25. Murray CK, Yun HC, Markelz AE, et al. Operation United Assistance: infectious disease threats to deployed military personnel. Mil Med 2015;180:626–51.

26. Department of Defense. Health Affairs Policy 13-002 Guidance on Medications for Prophylaxis of Malaria. Washington, DC; April 15, 2013. Available at http://www.health.mil/~/media/MHS/Policy%20Files/Import/13-002.ashx.

27. Department of Defense. DOD Instruction 6200.02. Application of Food and Drug Administration (FDA) Rules to Department of Defense Force Health Protection Programs. Washington, DC; February 27, 2008. Available at http://www.dtic.mil/whs/directives/coreres/pdf/620002p.pdf.

28. Armed Forces Health Surveillance Center. Leishmaniasis in relation to service in Iraq/Afghanistan, U.S. Armed Forces, 2001-2006. MSMR 2007;14:2–5.

29. Bailey MS. Tropical skin diseases in British military personnel. J R Army Med Corps 2013;159:224–8.

30. Aronson N, Herwaldt BL, Libman M, et al. Diagnosis and treatment of Leishmaniasis: clinical practice guidelines by the Infectious Diseases Society of America (IDSA) and the American Society of Tropical Medicine and Hygiene (ASTMH). Clin Infect Dis 2016;63:e202–64.

31. Thomas SJ, Rothman AL. Trials and tribulations on the path to developing a dengue vaccine. Am J Prev Med 2015;49:5334–44.

32. Abbinck P, Larroca RA, De La Barrera RA, et al. Protective efficacy of multiple vaccine platforms against Zika virus challenge in rhesus monkeys. Science 2016;353:1129–32.

33. Duffy NE, Clay K, Wilson R, et al. Sexual health and HIV in the army. J R Army Med Corps 2013;159:206–14.

34. Harbertson J, Scott PT, Moore J, et al. Sexually transmitted infections and sexual behaviour of deploying shipboard US military personnel: a cross-sectional analysis. Sex Transm Infect 2015;91:581–8.

35. Grindlay K, Grossman D. Unintended pregnancy among active-duty women in the United States military, 2011. Contraception 2015;92:589–95.

36. Lamb I, Morgan M. Skin and soft tissue infections in the military. J R Army Med Corps 2013;159:215–23.

37. Guo S, Dipietro LA. Factors affecting wound healing. J Dent Res 2010;89:219–29.

38. Connor P, Porter CK, Swierzewski B, et al. Diarrhoea during military deployment: current concepts and future directions. Curr Opin Infect Dis 2012;25:546–54.

39. Sanchez JL, Cooper MJ, Myers CA, et al. Respiratory infections in the U.S. military: recent experience and control. Clin Microbiol Rev 2015;28:743–800.

40. Riddle MS, Sanders JW, Putnam SD, et al. Incidence, etiology, and impact of diarrhea among long-term travelers (US military and similar populations): a systematic review. Am J Trop Med Hyg 2006;74:891–900.

41. Hawk D, Tribble DR, Riddle MS. Clinical treatment of nondysenteric travelers’ diarrhea during deployment. Mil Med 2010;175:140–6.