ABSTRACT  In 2005 the United States and Romania signed a historic access agreement establishing the first U.S. military bases in the former Soviet bloc country of Romania. The bases will host joint exercises aimed at developing regional military cooperation with forces throughout the entire 92-country USEUCOM area of responsibility (AOR). These forward operating bases (FOBs) or “lily pads” will include the Smârdan Training Range, Babadag Training Range, Mihail Kogălniceanu (MK) Air Base, and Cincu Training Range. They will be under the command of Joint Task Force East (JTF-East), headquartered at the MK Air Base. Here described are the naturally occurring pathogens of clinical significance that exist in the region, including those of known biowarfare/bioterrorism (BW/BT) potential. Notwithstanding the length of deployment for training, proactive clinical and environmental surveillance should be linked to the implementation of adequate Force Health Protection (FHP) measures to minimize the impact these medical threats may have on JTF-East operations.

INTRODUCTION

Romania is located in southeastern Europe, on the lower Danube, bordering on the Black Sea. Romania shares borders with Hungary and Serbia to the west, Ukraine and Moldova to the northeast, and Bulgaria to the south. Romania has an area of 91,699 square miles, with 90 miles of Black Sea coastline, which provide an important outlet to the Mediterranean Sea and the Atlantic Ocean. Almost all of the Danube Delta is located within Romanian territory.

Romania has 22.3 million inhabitants with about 55% living in urban areas. The capital Bucharest is also the country’s most populous city, home to 1.9 million people according to a 2002 national census. In 2002, the World Health Organization (WHO) estimated the life expectancy in Romania to be 71.4 years on average (75 years for females and 67 years for males). Communicable diseases accounted for about 1% of deaths. Infectious/parasitic diseases and respiratory diseases ranked 8th and 10th, respectively, in the top 10 conditions that account for about 90% of the burden of diseases in Romania (3.2% and 3.1% total disability-adjusted life years [DALYs], respectively). Respiratory diseases accounted for 6% of all deaths in 2003, with pneumonia causing higher mortality rates than chronic lower respiratory diseases. By contrast, cardiovascular and neuropsychiatric conditions accounted for the highest burden of disease (42% total DALYs) among the Romanian population regardless of sex. Sexually transmitted diseases (STDs) are also a threat nationwide, Romania having the highest number of HIV infections in central/southeastern Europe (2005: 16,258 HIV cases). Since 1994–1995, there has been a steady increase in the HIV/AIDS incidence rate among adults, mainly related to transmission of the virus via sexual contact and injected drug use. The increase in sexual transmission is correlated with a growing incidence in other STDs, particularly syphilis. 1

The country is divided into 41 counties or districts (see Figure 1), with one municipality each where the seat of county administration is located. A network of 5,500 dispensaries constitutes the primary health care system, while polyclinics and hospital emergency rooms deliver ambulatory secondary health care. 2 Tertiary care is delivered through a network of civilian and military hospitals, with a range of subspecialty services and bed capacity based on the area served. The 11 military hospitals also provide civilian care, and are located in the following cities: Sibiu, Pitești, Timișoara, Oradea, Brașov, Cluj-Napoca, Craiova, Focșani, Constanța, and Bucharest. Most of the health care system is owned by the state, though private practice has been allowed since 1990. The quality of health care available varies greatly, but overall, it is well below U.S. standards.

The term “lily pads” was coined in 2003 by General James Jones, the former Supreme Allied Commander in Europe, to describe the concept of ‘jumping-off’ points. Others have referred to them as frontier posts along the U.S. security perimeter. Whatever the name, the new installations constitute a strategic shift (part of the Military Global Posture Review) intended to place U.S. forces closer to potential areas of conflict in North Africa, the Middle East, and Central Asia.

All U.S. Army and Air Force training operations in Romania will fall under the command of JTF-East. From the headquarters at the MK Air Base between 100 and 300 personnel will oversee rotations of brigade-sized Army units, and Air Force weapons training deployments, at Cincu, Smârdan, and Babadag Training Ranges. JTF-East will also oversee training in neighboring Bulgaria, at Bezmer Air Base and the

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The views of the author do not purport to reflect the position of the Department of the Army, the Department of Defense, or the U.S. Government (AR 360-5, para 4–3).

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Novo Selo Army Training Range near the border with Turkey, and Graf Ignatievo Airfield in central Bulgaria, according to the U.S.–Bulgaria agreement signed in 2006.

Cincu Training Range is located on the territory of two counties, Sibiu and Brașov (15 miles east of the city of Făgăraș). The range has approximately 40 square miles of land and 62 miles of maintained access roads, but no fixed billeting facilities.

Smârdan (Mălina) Training Range is located in the county of Galați, a port on the Danube River. Established in 1951, it occupies nearly 33 square miles of land, and has billeting facilities for 600 troops.

Babadag Training Range is located in the county of Tulcea, 12 miles southeast of Babadag city. It occupies 10 square miles of land and has fixed billeting facilities for 230 troops. The range is in the immediate vicinity of the Danube Delta, the largest and best preserved of Europe’s deltas, home to 12,000–16,000 people and over 2 million birds. MK Air Base is located in the county of Constanța. It has an 11,480-foot concrete runway and facilities for flight management, administration, and personnel billeting, as well as warehouses and hangars.

The counties of Constanța and Tulcea comprise the Romanian portion of the Dobrogea region and includes the nearby county of Galati (where the Smârdan Training Range is located).

There are several sources of information with regard to Romania and related Force Health Protection measures (summarized in Table I), which include infectious disease threat awareness and immunization requirements. However, it is this author’s opinion that a proactive clinical and environmental surveillance in the Dobrogea region and an integration of open source information will substantially help in informing the commanders’ decision on implementing a successful Force Health Protection program regardless of the duration of deployment for training.

**Naturally Occurring Pathogens of Known Biological Warfare/Bioterrorism (BW/BT) Potential in Romania**

Anthrax, brucellosis, tularemia, Q fever, rabies, cholera, hantavirus hemorrhagic fever with renal syndrome (HFRS), and tick-borne diseases are endemic in the JTF-East AOR and may impact military operations.

**Anthrax**

Natural outbreaks of anthrax occur periodically in Romania especially in the Dobrogea region. Human cases are usually linked to the consumption of contaminated meat, although herding infected animals and handling carcasses are also risk factors. Vector transmission of the causative agent *Bacillus anthracis* is rare; however, cutaneous anthrax, the
The airborne anthrax infectious dose is not well defined and it may vary widely, from a few hundred spores to a few thousands depending on the agent virulence, environmental and host factors.\(^6\)\(^7\) \textit{B. anthracis} can be readily grown on blood agar plates from contaminated soils but scientific data to support human infection from spores present in the soil are not available. In the absence of such data and of studies assessing the anthrax spore load of soil in the Dobrogea region or the risk of acquiring infection during military training operations such as live fire exercises at the Babadag training area (especially during the dry summer months) when the soldiers are more at risk for being exposed to contaminated dust, it is difficult to foresee whether the implementation of an anthrax vaccination program (for troops deploying to Romania for training and not previously vaccinated) would provide an added value to the Force Health Protection. However, an increased awareness of potential pulmonary disease occurrence as a result of inhalation of anthrax spores present naturally in the environment should be underscored.

**Brucellosis**
Most cases can be traced directly to infected livestock. Infection with \textit{Brucella spp.} can come from handling contaminated meat or hides or from drinking milk from infected herds. The bacteria can survive for several weeks in milk, water, urine, or damp soil. However, it will die relatively quickly in dry conditions and is killed by sunlight.

Human cases of brucellosis in Romania are rare, but outbreaks in livestock do occur. In 2000 there were 47 cases in swine and 270 cases in sheep.\(^6\) Brucellosis (caused by

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### TABLE I. Selected Military Resources for Informing Commanders’ Decision on Force Health Protection in Romania

<table>
<thead>
<tr>
<th>Resource</th>
<th>Provider</th>
<th>Website (all Websites were accessed on August 14, 2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOOAH 4 HEALTH</td>
<td>USACHPPM</td>
<td><a href="http://www.hooah4health.com/deployment/immunizations.html#">http://www.hooah4health.com/deployment/immunizations.html#</a></td>
</tr>
<tr>
<td>Romania Force Health Protection (FHP) recommendations</td>
<td>NCMI</td>
<td><a href="http://www.afmic.detrick.army.mil/">http://www.afmic.detrick.army.mil/</a></td>
</tr>
<tr>
<td>Army regulation 40-5: preventive medicine</td>
<td>USA</td>
<td><a href="http://www.army.mil/usapa/doctrine/Active_FM.html">http://www.army.mil/usapa/doctrine/Active_FM.html</a></td>
</tr>
<tr>
<td>Field manual 4-02.17: preventive medicine services</td>
<td>USA</td>
<td><a href="http://www.army.mil/usapa/doctrine/Active_FM.html">http://www.army.mil/usapa/doctrine/Active_FM.html</a></td>
</tr>
<tr>
<td>Field manual 4-25.12: unit field sanitation team</td>
<td>USA</td>
<td><a href="http://www.army.mil/usapa/doctrine/Active_FM.html">http://www.army.mil/usapa/doctrine/Active_FM.html</a></td>
</tr>
<tr>
<td>Field manual 21-10: Field hygiene and sanitation</td>
<td>USA</td>
<td><a href="http://www.army.mil/usapa/doctrine/Active_FM.html">http://www.army.mil/usapa/doctrine/Active_FM.html</a></td>
</tr>
<tr>
<td>Field manual 4-02.18: veterinary services, tactics, techniques, and procedures</td>
<td>USA</td>
<td><a href="http://www.army.mil/usapa/doctrine/Active_FM.html">http://www.army.mil/usapa/doctrine/Active_FM.html</a></td>
</tr>
</tbody>
</table>

USACHPPM, U.S. Army Center for Health Promotion and Preventive Medicine; DOD, U.S. Department of Defense; NCMI, National Center for Medical Intelligence (formerly the Armed Forces Medical Intelligence Center [AFMIC]); USA, U.S. Department of the Army.

result of transmission by horseflies, has been historically described.\(^4\)

The chronology of anthrax outbreaks in Romania, reported in recent years by local health authorities and the media is as follows:

- August 2000, 38 human cases and 2 deaths; 17 were lab confirmed; disease was detected in sick cattle, horses, pigs and sheep.
- July 2005, 42 people consumed anthrax-infected beef and goat meat.
- September 2005, 1 person dead (bacteria detected in the cerebrospinal fluid (CSF)).
- February 2006, 2 lab-confirmed cutaneous cases.

The extent of anthrax disease may be underestimated because of underreporting and self-treatment (antibiotics are purchased over the counter). Although Romania has an ongoing livestock vaccination program, the occurrence of natural outbreaks suggests both noncompliance with the program and a significant reservoir of spores in the soil. Anthrax spores are very hardy and may persist in soil for decades. Ploughing soil containing \textit{B. anthracis} spores can infect large numbers of livestock. Louis Pasteur reported that spores can pass through the digestive tract of earthworms.\(^5\) This would help spread the disease through the soil if the carcasses were simply buried or left for long times in the field. Although the disease does not readily pass directly between animals, this dispersal mechanism can contaminate large areas of land fairly rapidly. Of note, would-be terrorist Larry Wayne Harris reportedly obtained anthrax bacteria by exhuming cattle that had died of anthrax.\(^5\)
**B. melitensis** has been a notifiable disease since 1996 and no cases have been officially confirmed since then. However, data on human zoonotic cases are sparse in Romania and were not provided to the European Commission in 2000. In March 2007, a case of human brucellosis was reported in the local media but it was believed to have been contracted in Spain. Brucellosis outbreaks may occur after a significant time as is the case with Bulgaria, which did not have **B. melitensis** cases since 1941 but recently (June 12, 2006) reported to the World Organization for Animal Health several cases of infection. Four goats were diagnosed with **B. melitensis** infection, all of which were destroyed. In August 2007, in the Bulgarian village of Vuce, three human cases of brucellosis were reported and four others were suspected.

Brucellosis may present itself as an acute, febrile illness or an insidious chronic disease with symptoms lasting for 3 to 6 months or up to a year. Arthritis occurs in one-third of the patients and the most severe disease is the result of endocarditis or infection of the central nervous system. There is no available vaccine for humans but antibiotic treatment is effective. Animal handlers should wear suitable protective clothing when handling infected animals. Although brucellosis is a rare disease in Romania and the dairy products are tested before being sold commercially, the risk of acquiring infection through ingestion of contaminated unpasteurized dairy should be minimized by educating troops who may choose to eat outside base in the Black Sea resorts or from farmers’ markets.

**Q Fever**

Q fever (also known as the Balkan flu) is a rickettsial disease caused by *Coxiella burnetii*. Tick species may transmit bacteria by infecting livestock and pets. Extremely virulent, one bacterium can cause infection. Moreover, *Coxiella* are also very hardy for nonsporulating organisms and can survive for months in dust and feces particles not affected by hot dry conditions. In 2004, in Avrig, Romania, an outbreak of Q fever was reported by local health authorities and the media. Fourteen cases of atypical pneumonia hospitalized between March and April 2004 were confirmed serologically to be the result of Q fever. The disease was linked to the consumption of unpasteurized dairy products and/or contact with feces of infected animals.

The acute Q fever (which sometime can be asymptomatic or characterized by nonspecific symptoms such as fever, headache, and chills) may progress to a debilitating chronic infection which is difficult to treat. Although doxycycline is indicated for the treatment of acute disease, the chronic form may require antibiotic combinations. An investigational vaccine is available in the United States for vaccinating at-risk personnel but the rare occurrences of the disease in Romania do not warrant its use. However, Q fever should be considered in differential diagnosis when there is a history of animal contact.

**Rabies**

It is a zoonotic disease caused by a rhabdovirus of the genus *Lyssavirus*, affecting a wide range of domestic and wild animals, including bats. However, in Europe, bat rabies is an epidemiologically distinct disease from classical rabies found in terrestrial animals. Animal bites are the most efficient means of transferring the virus but rarely infection can be caused by scratches that are contaminated with saliva.

Although a 2007–2016 Rabies Eradication Program based on vaccination of wild and domestic animals is ongoing in Romania, sporadic cases of human rabies are still reported. In 1986–2001 there were 42 human cases including one fatality, most of them involving contact with wild rabid animals. Quarantine was recently instituted in 4 counties because of rabies in a cow bitten by a rabid fox and all people who had contact with the animal have been vaccinated. From January 1 to March 31, 2007, 71 cases of rabies were reported to the WHO, a reduction from the 106 cases reported for the first quarter of 2006 (54 in wildlife, 16 in domestic animals, 0 in bats, and 1 in humans). The human case reported in Romania (admitted on March 16, 2007; deceased on March 27, 2007) was diagnosed as rabies only at the necropsy; the body did not show any signs of animal bites. In 2004, in the county of Brasov, a rabid brown bear killed two people and injured several others; all the injured received appropriate postexposure prophylaxis. From 2002 to 2005, the number of domestic animals (mostly dogs and cats) diagnosed with rabies increased. Urban rabies, because of feral or stray dogs roaming city streets, often in packs, is of concern since dog attacks are not uncommon (i.e., a 68-year-old Japanese businessman was killed in 2006 downtown Bucharest after a stray dog bit him in the leg severing an artery). In Galati city the number of stray dogs increased from a few hundred in 1989 to about 10,000 in 2004. The large number of stray dogs may also pose a risk for echinococcosis/hydatidosis as human cases are sporadically reported.

Rabies virus infects the central nervous system, causing swelling of the brain (encephalopathy) and eventually death within days of the onset of symptoms, if not treated. The U.S. Embassy in Romania recommends rabies pre-exposure immunization for everyone over the age of 2 for embassy personnel before arriving in the country. There are currently two rabies vaccines licensed in the United States. The current Department of Defense (DOD) policy is to administer rabies vaccine to personnel with a high risk of exposure (e.g., animal handlers; certain laboratory, field, and security personnel; personnel frequently exposed to potentially rabid animals in a nonoccupational or recreational setting). Postexposure prophylaxis with rabies immunoglobulin is also available. Most importantly, the risky behavior of petting or feeding stray dogs should be avoided as the perception of rabid dogs as aggressive and foaming at the mouth is misconstrued (these symptoms begin only after the brain is infected).

**Cholera**

Cholera is caused by *Vibrio cholerae*, which leads to severe diarrhea, a massive loss of fluid from the body that can cause death in a few hours. Sporadic cases were reported, especially...
in or nearby Danube Delta counties. Infections associated with the consumption of raw seafood have been reported along the Black Sea coast. Although 300 cases have been reported to WHO between 1990 and 1995 (with 66 cases in August 1990 in Tulcea County), the epidemiology of cholera in Romania is unknown and data are further complicated by over-the-counter sales of antibiotics and self-medication.

The rule of thumb for protection against food- or waterborne diseases, as recommended by USACHPPM, is to assume that all food, ice, and water not approved by the U.S. military are contaminated. Oral rehydration alone can help as treatment and antibiotics will shorten the duration of diarrhea and decrease vomiting. The over-the-counter sales of antibiotics and self-medication in Romania may have led to the occurrence of antibiotic-resistant strains.\textsuperscript{18}

**HFRS**

HFRS is an elevated disease threat in the Balkans. It is caused by hantavirus infection, which can result from the inhalation of aerosolized dust from soil or other debris contaminated with infected rodent urine or feces. Hantaviruses can remain infectious in the environment from hours to 2–3 days depending on the environmental conditions.

Euroasiatic hantaviruses (Hantaan, Dobrava, Seoul, and Puumala virus) are responsible for HFRS and nephropathia epidemica /Balkan endemic nephropathy (BEN). The significance of hantavirus antibodies in Romanian patients with BEN is sometimes difficult to assess since many patients do not show any signs of hemorrhagic fever, renal syndrome, or hantavirus pulmonary syndrome.\textsuperscript{19} Although most human infections are sporadic, the risk of epidemic outbreaks is also present in Romania. In general, case-fatality rates range from less than 0.1\% for HFRS caused by Puumala virus to 5–10\% for HFRS caused by the Hantaan virus. Supportive care is indicated in hantavirus infection, as there is no specific treatment or licensed vaccine available.

**Tick-Borne Diseases**

Tick-borne diseases should be considered a serious threat to personnel deployed to the region because of the high level of exposure to tick vectors. Medical threat awareness, use of DOD insect repellent system and proper wear of permethrin-treated uniforms will help minimize the risk of acquiring a tick-borne disease especially during the spring and summer when the ticks are most active. No tick-borne encephalitis (TBE) vaccines are available or licensed in the United States.

Crimean-Congo hemorrhagic fever (CCHF) is a viral encephalitis transmitted by *Hyalomma marginatum* ticks, which are most active April–August, reaching peak feeding activity April–May. Health care workers may be at risk for acquiring infection via contact with contaminated body fluids if proper infection control measures are not used. Treatment of CCHF is primarily supportive but ribavirin has also been used with some benefit.\textsuperscript{15} European TBE is transmitted by *Ixodes ricinus* (the same tick transmits Lyme disease) and is widely distributed in brushy and forested areas at elevations up to 1,500 m. TBE is endemic in Europe except in the Benelux countries and the Iberian Peninsula. In Romania there is higher risk of TBE in Tulcea County and in Transylvania. The exact number of humans affected by TBE in Romania is not known and epidemiological studies of prevalence are not available. The only treatment currently available is supportive.

Boutonneuse fever (also known as Mediterranean spotted fever) is also endemic along the Black Sea coast and in the city of Bucharest and is transmitted by the dog tick *Rhipicephalus sanguineus*. From January until June 2007 there were 13 cases of boutonneuse fever reported at the Infectious Diseases Hospital in Constanța.\textsuperscript{20} Symptoms include fever, myalgia, arthralgia, chills, nausea, vomiting, a small black ulcer at the tick bite site, and a red maculopapular rash on hands, legs, and feet.\textsuperscript{21} Treatment with antibiotics should be initiated immediately without laboratory confirmation of diagnosis. The risk of acquiring boutonneuse fever upon contact with dogs should be emphasized to troops deployed in the area.

**Mosquito-Borne Diseases**

**West Nile Virus**

West Nile virus (WNV) causes a mild disease considered of minor military impact according to the National Center for Medical Intelligence (NCMI). However, infection will complicate diagnoses since fever cannot be clinically distinguished from other arboviral fevers. WNV has an infection cycle that involves birds and mosquitoes feeding on both birds and humans (primarily members of the *Culex pipiens* complex). Ticks can sometimes substitute as vectors in certain dry and warm habitats lacking mosquitoes. There is no vaccine or cure for WNV infection, treatment is purely supportive. A large outbreak with an unusual morbidity and mortality occurred in 1996 in Bucharest and counties in southeastern Romania (including Tulcea and Constanța in JTF-East AOR) involving at least 393 hospitalized cases and 17 deaths. In 1997–2000, 39 human cases of clinical WNV infection including 5 that were fatal were diagnosed serologically throughout the region, but epidemic disease did not recur.\textsuperscript{22} Other clusters of encephalitis cases that occurred during the summer and were attributed to WNV but not laboratory confirmed are believed to have been the result of TBE.\textsuperscript{23} Serologic confirmation of WNV infection in birds, mammals, and humans in the Danube Delta suggested that the virus was transmitted locally with a possible replenishment of virus reservoirs by migratory viremic birds from other continents such as Africa.\textsuperscript{23} Of note, the European Community has funded a project named EDEN (Emerging Diseases in a Changing Environment) to pursue field studies in Romania (Bucharest and the Danube Delta) to identify potential vector species, characterize virus transmission cycles, seroprevalence in horses, and resident and migratory birds, and the role of environmental factors—particularly climate—in viral ecology and the incidence of disease. EDEN studies also include tick-borne, rodent-borne leishmania,
malaria, and Rift Valley fever virus (which may also be introduced in Europe by migratory birds).

**Tahyna Virus**

Tahyna virus, which causes influenza-like fever and respiratory symptoms and sometimes central nervous system involvement, is widespread across Europe and the virus was isolated and detected serologically in Romania.\(^{24}\) Birds and rabbits are vertebrate hosts. Since the Danube Delta is a major migratory route for birds, Tahyna virus has the potential to emerge as a significant human pathogen in the area. Other two Bunyaviruses, Batai and Lednice viruses, have also been reported in Romania.\(^ {24}\)

For Force Health Protection guidance on mosquito-borne diseases see references provided in Table I. There is no specific treatment for the West Nile or Tahyna virus infections; in severe cases, supportive therapy is indicated.

**Tuberculosis (TB)**

TB is a major health problem in Romania. In 2004, 31,567 cases of TB were reported to WHO (134.6 cases per 100,000), and a total of 2,387 TB deaths were reported in 2003 (the second highest notification rates in the WHO European Region), 10 times higher than the average rate in the European Union and highest notification rates in the WHO European Region), and a total of 2,387 TB deaths were reported in 2003 (the second highest notification rates in the WHO European Region), 10 times higher than the average rate in the European Union.\(^ {25}\) Eastern Europe also has the highest levels of multi-drug resistant TB (MDR-TB) in the world and TB here is 10 times more likely to be MDR-TB than in the rest of the world.\(^ {25}\)

The high rate of TB in Romania suggests that the ongoing vaccination program in Romania with the BCG (*Bacillus Calmette-Guerin*) vaccine has no sizeable impact on TB transmission dynamics and its effectiveness has been mainly demonstrated in childhood, when tuberculosis is rarely contagious.

Data on mycobacterial infections other than *Mycobacterium tuberculosis* in Romania were not available in the literature. However, the presence of large numbers of livestock in the mainly rural JTF-East AOR may provide the basis of increased concern of *M. bovis* zoonosis as the disease may be acquired by ingestion or inhaling the bacteria or consumption of infected milk.\(^ {26}\)

TB infection control may also pose unique challenges considering the close contact of U.S. personnel with their Romanian counterparts in joint training operations and the presence of Romanian contractors providing maintenance services on bases. TB screening of Romanian personnel may not be feasible because of BCG vaccination and other considerations. However, pre- and postdeployment administration of the purified protein derivative (PPD) test to U.S. forces should be strongly considered regardless of the duration of deployment to identify PPD converters/reactors and assess TB exposures for medical follow-up.

**Avian Influenza**

The first outbreak of H5N1 highly pathogenic avian influenza (HPAI) in domestic poultry was registered in October 2005 in Tulcea County (less than 20 miles from the Babadag training area). By May 31, 2006, the total number of reported avian flu outbreaks in Romania had reached 116 (in the Danube Delta, Transylvania, and Bucharest). Romanian authorities have taken measures to contain the outbreaks including culling of tens of thousands of birds, banning the sale of live birds and pigs in markets, confining domestic birds and pigs indoors or in closed yards countrywide, giving annual influenza vaccine to residents and military operating in the area, disinfection of vehicles, and restricting access to affected areas.

Romanian military were actively involved in quarantine and infection control measures.\(^ {27}\) Seventeen patients with suspected H5N1 infection were tested at the National Influenza Centre in Bucharest, and all tested negative. A second outbreak in backyard poultry was reported in November 2007 in Murighiol village, Tulcea County.

Although there is currently no vaccination for the H5N1 virus that causes avian influenza, maintaining good basic hygiene practices and avoiding contact with wild birds or poultry remain the best defense at this time when the virus is not yet adapted for human infection and transmission.

Since the avian outbreaks first occurred in the Danube Delta region, it is likely that the H5N1 HPAI was introduced in the country by migratory waterfowl and transmitted via contact of wild migratory or shorebirds with poultry as well as human factors.

The U.S. government is actively involved in providing technical and financial assistance to Romania for avian influenza surveillance, epidemiology, rapid diagnostics, and disease containment training.\(^ {28}\)

**DISCUSSION**

The NCMI (formerly Armed Forces Medical Intelligence Center [AFMIC]) assessment of Romania indicates an intermediate risk for infectious diseases, with food and water-borne diseases posing the main operation threat (11–50% attack rate per month).

Although this risk assessment applies to the country overall, unique regional factors should be considered when implementing an effective FHP program for U.S. military forces deploying at the Romanian training bases. The JTF-East headquarters and 3 out of 4 training bases (Babadag, MK, and Smârdan) are located in the Dobrogea region, in the immediate vicinity of Danube Delta where over 2 million birds and up to 16,000 people live. Outbreaks in this population of fishermen, cattle and bee breeders occur frequently, and have historically included WNV, anthrax, diphtheria, cholera, and suspected HPAL. Population-specific data in the region are not available, and disease cases may be underreported because of over-the-counter sale of antibiotics.

Deployments to Eastern Europe thus pose unique challenges but also opportunities for implementing robust infectious disease surveillance and control measures. In addition to a proactive clinical and environmental surveillance, a joint U.S.–Romanian implementation of surveillance and testing of...
mosquitoes, ticks, and sand flies for various arthropod-borne diseases, characterization of pathogens, and their use in serological surveillance of troops deployed in the area may provide information on emerging pathogens and promote targeted control efforts in support of worldwide military operations.

Although the surveillance of environmental quality of the air, soil, and potable water supplies at FOBs is a matter of standard policy, the U.S. bases in Romania may require a biological site assessment to include soil sampling and testing for the presence of Coxiella burnetti, Brucella spp., and B. anthracis bacteria and spores, to evaluate the risk of potential exposures to biological hazards. The occurrence of anthrax outbreaks suggests both noncompliance with the government sponsored livestock vaccination program and the presence of a large reservoir of spores in the environment. Effective soil decontamination procedures were historically applied elsewhere (for instance in former BW testing sites such as the Rebirth Island in the Aral Sea and the Gruinard Island near Scotland) and were deemed not to cause soil infertility while killing the anthrax spores (among others, the British used a solution of formaldehyde 5% in seawater applied at a rate of 50 liters per square meter). U.S. Army personnel with expertise in environmental testing and remediation may originate from the following organizations:

- U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) provides worldwide technical support for implementing preventive medicine, public health, and health promotion/wellness programs.
- U.S. Army’s first and ninth area medical laboratories (AMLs) provide health hazard surveillance to Army, joint, or combined forces through robust analytical capabilities.
- The 20th Support Command Chemical, Biological, Radiological, Nuclear, and High-Yield Explosive (CBRNE)’s (1) Analytical and Remediation Activity (CARA) provides analytical mobile lab support and conducts remediation and restoration activities in support of CBRNE and the elimination of the threat of weapons of mass destruction, and (2) Technical Escort units conduct no-notice deployment to provide chemical and biological advice, verification, sampling, detection, mitigation, render-safe, decontamination, packaging, escort and remediation of chemical and biological devices or hazards worldwide in support of crisis or consequence management and chemical and biological defense equipment, technical intelligence, and doctrine development.

A robust preventive medicine (PVNTMED) in the context of a sustained FHP program should be an integral part of JTF-East Force Health Protection operations regardless of the length of deployment for training of U.S. troops in Romania, and effective tools should be implemented to standardize and enhance human and animal infectious disease surveillance in the area. Because of the presence of endemic biological agents of BT/BW concern in Romania, a robust laboratory capability is essential in early recognition of a natural outbreak versus a bioterrorism attack. A delay in the identification of causative agents of disease may delay the time to treatment. In addition, although the municipal hospital in Constanta may provide urgent medical care for troops, the availability of advanced laboratory testing or specific medical countermeasures such as the botulinum antitoxin may be optimally provided by U.S. Army Medical Department personnel on site considering the overall status of health care facilities in Romania.

Another area of consideration and improvement would be the medical intelligence collection. Currently, data on clinical and basic research on military significant pathogens in a country of interest can only be obtained from disparate sources since the NCMI does not provide such information on these topics. Such a pathogen-specific database may arm U.S. personnel with scientific and epidemiological data to implement an effective PVNTMED/FHP program and focus future studies on emerging pathogens.

Monitoring of local media by deployed U.S. personnel as demonstrated during the ROMEX’05 U.S.–Romanian exercise may provide advance knowledge of current or emerging medical or environmental threats in the area to the JTF-East commander, so that preemptive or mitigation measures can be planned for and rapidly implemented.

Although usually used to address the need for increased awareness to the social, ethnographic, cultural, economic, and political elements of the people among whom a force is operating, the principles of the “human terrain system” may potentially be applied in the medical context to give commanders an organic capability to understand and mitigate at the operational and tactical levels the regional medical threats and thus the “medical human terrain.” A putative “medical human terrain team” in the JTF-East could function as an FHP advisor to the brigade-size units rotating for training in the area ensuring all activities account for the human terrain/medical threat dimension of the AOR, providing three primary capabilities: (a) expert medical advice based on a constantly updated, user-friendly medical threat database on the AOR; (b) the ability to direct focused study on medical issues of specific concern to the commander; and (c) a reach-back link to a network of subject matter experts in the United States. No such system currently exists for understanding the human “medical threat-centric” terrain and integrating this “medical human terrain layer” into the common operational picture to achieve medical, situational, and regional awareness.

Last but not least, organizing a multinational conference focused on military PVNTMED and FHP issues in the JTF-East AOR would lead to an increased understanding of host nations’ capabilities and an invaluable exchange of PVNTMED information in a combined force environment.

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