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Medical Force Protection: El Salvador

Medical Force Protection countermeasures required before, during, and after deployment to the "area" are as follows:

Major Threats

Food or Waterborne Disease: Poor sanitation throughout country including major urban areas. Local food and water are heavily contaminated with bacteria, viruses and parasites. **Presume local water sources are not safe for drinking.** Risks include Diarrheal diseases (viruses, Shigella, e.coli, Campylobacter, salmonella and cholera), hepatitis A, typhoid/paratyphoid fever, Brucellosis and hepatitis E.
Vector-Borne Disease: Dengue fever is the major vector-borne disease and is found countrywide. It occurs year-round with peak transmission from MAY-OCT. Malaria is found throughout the country with the greatest risk of infection occurring along the Guatemalan border and coastal area below 600 meters. The primary strain is P. vivax. There is no known drug resistance in El Salvador. Sporadic cases of cutaneous and mucosal leischmaniasis have been reported and represent much lower risk for military personnel, but still require personal protection measures.
Water-Borne Disease: Leptospirosis poses a threat to troops directly exposed to bodies of water such as lakes, streams and irrigated fields. The organism is found throughout the country.
Sexually Transmitted Disease: Gonorrhea and chlamydia are prevalent but hepatitis B and HIV also occur.
Respiratory Disease: Tuberculosis is found throughout the country at a rate of 50-99/100,000 locals. Transmission typically requires prolonged exposure to an individual with active TB.
Animal Contact Disease: Infrequent and sporadic cases of anthrax, Q fever and rabies have been reported throughout the country.
Medical Facilities: The capital, San Salvador has 3 major hospitals, one of which, Hospital Diagnostico y Emergencias is recommended by the US Embassy in case of emergencies. The cities of San Miguel and Santa Ana have large hospitals with limited diagnostic capabilities and subspecialties. Ambulance service outside San Salvador is non-existent.

Requirements before Deployment

1. **Before Deploying report to Medical to:**
   a. Ensure routine immunizations for deployable personnel are up to date. Immunizations needed for area: **Hepatitis A, MMR, Polio, Typhoid, Yellow fever, Tetanus (Td), and Influenza.**
   b. If you have not been immunized against Hepatitis A (two dose series over 6 months) get an injection of Immunoglobulin with the initial Hepatitis A dose.
2. **Malaria Chemoprophylaxis:**
   a. **Mefloquine (Non-aviators only):** 250 mg per week, begun 2 weeks prior to entering El Salvador and continuing for 4 weeks after departure. **OR**
   b. **Doxycycline (approved in flight status):** 100 mg per day, begun 2 days prior to entering El Salvador and continuing for 4 weeks after departure.
   c. **Must include Primaquine terminal prophylaxis** (see "Requirements after deployment")
3. **Get HIV, PPD testing if not done in the past 12 months. G6PD status must be confirmed.**
4. **Obtain Adequate Personal Protective Supplies:** DEET anti-arthropod skin lotion must be issued and used by all personnel. Permethrin treatment is highly recommended for all field uniforms and bednets. Sunscreen, lip balm, and hearing protection should be used as needed.
5. **Complete pre-deployment health assessment (DD Form 2795)*** per NEHC TM 6490.00-1 (http://www-nehc.med.navy.mil/prevmed/epi/depsurv.htm) The form can be downloaded from the website: http://amsa.army.mil/deploy_surv/DD2795_Pre_Deploy.pdf

Requirements during Deployment

1. Deploy appropriate Preventive Medicine personnel and equipment.
2. Consume food, water, and ice only from US-approved sources; **"Boil it, cook it, peel it, or forget it"**.
3. Involve preventive medicine personnel with troop campsite selection.
4. Practice good personal hygiene, hand-washing, and waste disposal.
5. Operate messing facilities in accordance with service directives. Ensure hand-washing facilities near messing facilities.
6. Operate latrine facilities in accordance with service directives. Ensure hand-washing facilities near latrine facilities.
7. Avoid sexual contact. If sexually active, use condoms.
8. Use DEET and other personal protective measures against insects and other arthropod-borne diseases. Personal protective measures include but are not limited to proper wear of uniform, use of bed nets, and daily "buddy checks" in tick and mite infested areas.
9. Continue malaria chemoprophylaxis, if initiated. Command supervision necessary to ensure accountability for anti-malarial medications.
10. Perform vector surveillance and control as needed, particularly during rainy months when mosquito vectors breed.

11. Minimize non-battle injuries by ensuring safety measures are followed. Precautions include hearing and eye protection, adequate water consumption, suitable work/rest cycles, and acclimatization to environment and stress management.
12. Eliminate food/waste sources that attract pests in living areas.
13. Avoid contact with animals and hazardous plants.
14. Avoid contact with lakes, rivers, streams and other surface water.
15. Conduct DNBI surveillance per NEHC TM 6490.00-1 (http://www-nehc.med.navy.mil/downloads/prevmed/weeklydnbi.pdf)

Requirements after Deployment

1. If malaria chemoprophylaxis initiated then continue chemoprophylaxis as described above.
2. If performing malaria chemoprophylaxis: begin **terminal prophylaxis** (for both chemoprophylaxis regimens): **Primaquine** 15 mg per day for 14 days starting on day of departure from El Salvador. **G6PD status must be determined prior to starting Primaquine.**
3. Receive preventive medicine debriefing after deployment.
4. Seek medical care immediately if ill, especially with fever.
5. Get HIV and PPD testing as required by your medical department or Task Force Surgeon.
6. **Complete post-deployment health assessment (DD Form 2796)*** per NEHC TM 6490.00-1 (http://www-nehc.med.navy.mil/prevmed/epi/depsurv.htm). The form can be downloaded from the website: http://amsa.army.mil/deploy_surv/DD2796_Post_Deploy.pdf

* Mail completed original copy of DD 2795 and 2796 to: Army Medical Surveillance Activity, Building T-20, Room 213 (Attn: Deployment Surveillance), 6900 Georgia Ave, N.W., Washington D.C. 20307-5001

VECTOR RISK ASSESSMENT PROFILE *(VECTRAP):* El Salvador

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1. GEOGRAPHY: **Area** - 21,476 sq. km (8260 sq. mi.); about the size of Massachusetts. **Cities** - ***Capital*** is San Salvador (pop. 1,400,000). ***Other Cities*** - Santa Ana (132,000), San Miguel (85,000). **Terrain** - Mountains separate the country into three distinct regions; southern coastal belt, central valleys and plateaus, and northern mountains.

2. VECTOR BORNE DISEASES:

a. **Malaria**: *Plasmodium vivax* and *P. falciparum* are present country-wide in rural areas under 1,000 meters elevation; risk greatest in coastal areas below 600 meters elevation and is minimal in northern and central zones. The areas of highest risk are the Pacific coastal areas and along the eastern border with Honduras. Risk is elevated from June through September. Highly endemic, but with reported annual case totals declining during the 1980s from more than 93,000 cases during 1981 to fewer than 9,100 during 1988. *Plasmodium falciparum* currently causes less than 1 percent of reported malaria cases, with *P. vivax* accounting for the remainder. Chloroquine-resistant malaria has not been reported. The risk of acquiring malaria in endemic areas is considered high without proper chemoprophylaxis and would result in a serious loss of combat effectiveness.
Recent (1997) newspaper reports state that Ministry of Health officials have declared an "alert" for malaria in the western regions of El Salvador. No malaria has been reported from San Miguel, the largest city in eastern El Salvador. The reports stated that malaria is considered endemic in El Salvador, with more than 5,000 cases reported last year (1996).

b. **Dengue fever**: Recent outbreaks of Dengue Fever have been reported. Presumably year-round, risk elevated from June through December; primarily in urban areas at lower elevations. Incidence has been variable, with outbreaks occurring from June through December. Most cases have occurred in the vicinity of San Salvador and in eastern regions bordering Honduras. Reports indicate that in late July 1995, there were 5,035 suspected cases, of which 377 were confirmed and 2 were DHF. Strains of dengue virus serotypes 1, 2, 3, and 4 have circulated during recent outbreaks. The potential risk of acquiring these diseases should be considered high as long as there is an existing population of the vector and a suitable reservoir. Combat effectiveness would be seriously reduced if dengue fever is acquired. As of October 1999, the El Salvador confirmed the death of 4 children and also said 21 children between the ages of 5 and 14 have been infected. As of 6 July 2002, the Ministry of Health of El Salvador reported 2,249 cases of dengue fever including 6 deaths and 156 cases of dengue hemorrhagic fever.

c. **Triatomid bugs; enzootic in all rural areas vector Chagas' disease (American trypanosomiasis)** less than 1,500 meters in elevation. Up to an estimated 9 percent of the total population may be infected; reportedly, about 13 percent of blood in blood banks is seropositive.

d. **Rickettsioses** (tick-borne; reportedly occur.

e. **Leishmaniasis**: Transmitted by the bite of an infective sand fly (*Lutzomyia* spp.) Undetermined; risk for cutaneous leishmaniasis (CL) presumably is limited to forested rural areas. Risk for visceral leishmaniasis (VL) associated with stone fences and stone piles (that shelter populations of the sand fly vector) in dry, warm valleys near the Honduran border. CL associated with *Leishmania mexicana* reportedly occurs in the Rio Lempa valley, but incidence data are not available. Only 4 cases of VL (attributed to *L. chagasi* infection, presumably with dogs being the enzootic reservoir) have been reported since 1950, all near the border with Honduras.

e. **Venezuelan Equine Encephalitis** (VEE) has been reported, however, the risk appears limited.

3. DISEASE VECTOR INFORMATION:

a. The main vector of malaria is the mosquito, *Anopheles albimanus*. *An. pseudopunctipennis* is a secondary vector. *An. albimanus* is reported to be resistant to the insecticides DDT, Dieldrin, Lindane, Chlorpyrifos, Fenitrothion, Malathion, Propoxur, and synthetic pyrethroids.

VECTOR RISK ASSESSMENT PROFILE *(VECTRAP):* El Salvador (continued)

b. *Aedes aegypti* is the vector of yellow fever and dengue fever. *Ae. aegypti* is reported resistant to DDT, Dieldrin, Lindane, and Permethrin.

c. The vectors of Chagas' Disease are the reduviid bugs, *Triatoma dimidiata* and *Rhodnius prolixus*.

d. Ticks of the genus *Dermacentor* and *Amblyomma* are the vectors of tick-borne typhus.

e. Venezuelan Equine Encephalitis is transmitted by various mosquito species.

f. Leishmaniasis is vectored by sand flies. Most sand flies are active between dusk and dawn and have very limited flight ranges. Presumed vector species in El Salvador include *Lutzomyia longipalpus* for visceral leishmaniasis (VL), vector species for cutaneous leishmaniasis (CL) are undetermined.

4. DISEASE AND VECTOR CONTROL PROGRAMS:

a. Prevention & Control: Malaria chemoprophylaxis should be mandatory. Consult the Navy Environmental Preventive Medicine Unit #2 in Norfolk, VA (COMM: 757-444-7671; DSN: 564-7671; FAX: 757-444-1191; PLAD: NAVENPVNTMEDU TWO NORFOLK VA) for the current chemoprophylaxis recommendations.

b. Yellow fever immunizations should be current.

c. The conscientious use of personal protective measures will help to reduce the risk of many vector-borne diseases. The most important personal protection measures include the use of DEET insect repellent on exposed skin, wearing permethrin-treated uniforms, and wearing these uniforms properly. The use of DEET 33% lotion (2 oz. tubes: NSN 6840-01-284-3982) during daylight and evening/night hours is recommended for protection against a variety of arthropods including mosquitoes, sand flies, other biting flies, fleas, ticks and mites. Uniforms should be treated with 0.5% permethrin aerosol clothing repellent (NSN 6840-01-278-1336), per label instructions. NOTE: This spray is only to be applied to trousers and blouse, not to socks, undergarments or covers. Reducing exposed skin (e.g., rolling shirt sleeves down, buttoning collar of blouse, blousing trousers) will provide fewer opportunities for blood-feeding insects and other arthropods. Additional protection from mosquitoes and other biting flies can be accomplished by the use of screened eating and sleeping quarters, and by limiting the amount of outside activity during the evening/night hours when possible. Bednets (insect bar [netting]: NSN 7210-00-266-9736) may be treated with permethrin for additional protection.

d. The most important element of an *Aedes aegypti* control program is SOURCE REDUCTION. Eliminating or covering all water holding containers in areas close to human habitation will greatly reduce *A. aegypti* populations. Alternatively, containers may be emptied of water at least once a week to interrupt mosquito breeding. Sand or mortar can be used to fill tree holes and rock holes near encampments.

e. Prevention of tick bites includes avoiding tick infested areas when feasible, mandating personal protection measures, clearing campsites of tall grasses and other low vegetation, and spraying area with an appropriate acaricide (always read and follow label instructions). Use the buddy system to search total body area every 3-4 hours for attached ticks. Prompt removal of attached ticks may prevent disease transmission.

f. Because the breeding habitats of most sand fly species are not easily identified, not easily accessible, or unknown, control strategies focus mainly on adult sand flies. Spraying residual insecticides on buildings (including screening on portals of entry) animal shelters, and other adult resting sites can control Peridomestic sand fly species. Area chemical control of sylvan sand fly species is impractical. Personal protective measures will reduce sand fly bites and environmental modification (e.g., clearing forests, eliminating rodent burrows/breeding sites, relocating domestic animals away from human dwellings) has been used to reduce local sand fly populations.

g. Expanded vector control recommendations are available upon request.

VECTOR RISK ASSESSMENT PROFILE *(VECTRAP):* El Salvador (continued)

5. IMPORTANT REFERENCES:

Contingency Pest Management Pocket Guide Technical Information Memorandum(TIM)24. Available from the Defense Pest Management Information Analysis Center (DPMIAC) www.afpmb.org/pubs/tims/ (DSN: 295-7479 COMM: (301) 295-7479). Best source for information on vector control equipment, supplies, and use in contingency situations.

Control of Communicable Diseases Manual-Edited by James Chin. Seventeenth Ed. 2000. Available to government agencies through the Government Printing Office. Published by the American Public Health Association. Excellent source of information on communicable diseases.

Medical Environmental Disease Intelligence and Countermeasures-(MEDIC). January 2002. Available on CD-ROM from Armed Forces Medical Intelligence Center, Fort Detrick, Frederick, MD 21702-5004. A comprehensive medical intelligence product that includes portions of the references listed above and a wealth of additional preventive medicine information.

Internet Sites- Additional information regarding the current status of vector-borne diseases in this and other countries may be found by subscribing to various medical information sites on the internet. At the Centers of Disease Control and Prevention home page subscriptions can be made to the Morbidity and Mortality Weekly Report(MMWR)and the Journal of Emerging Infectious Diseases. The address is www.cdc.gov. The World Health Organization Weekly Epidemiology Report (WHO-WER) can be subscribed to at www.who.int/wer. The web site for PROMED is http://www.promedmail.org/.
Although PROMED is not peer reviewed, it is timely and contains potentially useful information. The CDC and WHO reports are peer reviewed. Information on venomous arthropods such as scorpions and spiders as well as snakes, fish and other land animals can be found at the International Venom and Toxin Database website at http://www.kingsnake.com/toxinology/. Information on anti-venom sources can also be found at that site. Information on Poisonings, Bites and Envenomization as well as poison control resources can be found at www.invivo.net/bg/poison2.html.

USERS OF THIS VECTRAP: Please notify NDVECC Jacksonville, or the appropriate NEPMU, if you acquire any medical entomology information that can be used to update this VECTRAP.

CUSTOMER SURVEY: In order to improve our VECTRAPS we would like your opinions on the quality and quantity of information contained in them. Please take time to fill out the survey which is contained as an attachment and Fax or e-mail your response back to us. Thank you for your cooperation.

ADDITIONAL INFORMATION ON DISEASE VECTOR SURVEYS, CONTROL AND SPECIMEN ID's WILL BE PROVIDED UPON REQUEST.