



Medical Force Protection: Costa Rica

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

Major Threats

Diarrhea, respiratory diseases, injuries, hepatitis A, dengue fever, leptospirosis, rabies, Brucellosis, malaria, other arthropod-borne infections, sexually transmitted diseases, heat injury, and Chaga’s disease. Raw sewage, industrial wastes, agrochemicals, and salt-water intrusion may contaminate water.

Requirements before Deployment

1. **Before Deploying report to Medical to:**
 - a. Ensure your Immunizations are up to date, specific 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:**

Must include Primaquine terminal prophylaxis (see “Requirements after deployment”)

 - a. **Chloroquine 500 mg/week 2 weeks prior to entering Costa Rica, and until 4 weeks after departure.**
 - b. **Mefloquine 250 mg/week 2 weeks prior to entering Costa Rica, until 4 weeks after departure**
 - c. **Doxycycline 100 mg/day 2 days prior to entering Costa Rica, until 4 weeks after departure.**
3. **Get HIV testing if not done in the past 12 months.**
4. **Make sure you have or are issued from unit supply: DEET, permethrin, bednets/poles, sunscreen and lip balm. Treat utility uniform and bednet with permethrin.**

Requirements during Deployment

1. Consume food, water, and ice only from US-approved sources; **“Boil it, cook it, peel it, or forget it”.**
2. Involve preventive medicine personnel with troop campsite selection.
3. Practice good personal hygiene, hand-washing, and waste disposal.
4. Avoid sexual contact. If sexually active, use condoms.
5. 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.
6. Minimize non-battle injuries by ensuring safety measures are followed. Precautions include hearing and eye protection, enough water consumption, suitable work/rest cycles, acclimatization to environment and stress management.
7. Eliminate food/waste sources that attract pests in living areas.
8. Avoid contact with animals and hazardous plants.

Requirements after Deployment

1. Receive preventive medicine debriefing after deployment.
2. Seek medical care immediately if ill, especially with fever.
3. Get HIV and PPD testing as required by your medical department or Task Force Surgeon.
4. Malaria terminal prophylaxis: Primaquine 15 mg/day beginning on day of departure for 14 days, unless G-6 PD deficient.

VECTOR RISK ASSESSMENT PROFILE (VECTRAP): Costa Rica

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1. GEOGRAPHY: **Area** of 51,032 sq. km (19,652 sq. mi.), slightly smaller than West Virginia. **Cities** - San Jose (capital, metro. area pop. 890,434), Alajuela (34,556), Limon (33,925), Golfito (29,043). **Terrain** - A rugged central massif separates eastern and western plains. **Climate** - Tropical and subtropical.

2. VECTOR-BORNE DISEASES:

a. **Malaria:** *Plasmodium vivax* (97.5%) and *P. falciparum* (2.5%) are present in the coastal lowlands and along the borders with Nicaragua and Panama. This area accounts for 70% of the country with 791,000 inhabitants. Malaria is not found in the central highlands above 500 meters. No cases of chloroquine or Fansidar resistant falciparum malaria have 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.

Remarks: More than 1,150 cases (highest annual total since 1968) were reported during 1990, and 98 cases were reported during the first half of January 1991. The 1991 cases all occurred in unspecified "banana production areas," where a large transient population reportedly complicates control measures. Vivax malaria currently accounts for more than 97 percent of reported cases. No drug-resistant falciparum malaria has been reported.

b. **Dengue fever:** Recent reports indicates 3,324 cases of dengue fever and risk from dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS) remains ongoing, and at increasing rate in the northwestern area of Costa Rica. According to an unofficial September 1995 report, Costa Rican health authorities announced that circulation of four dengue viral serotypes (dengue 1, 2, 3 and 4) had been confirmed. According to the ministry of health up to mid-June 1999 there were 2389 cases of dengue reported of which 2089 came from the Caribbean province of Limon.

c. **Leptospirosis:** Cases of leptospirosis reportedly have occurred among residents of Puerto Limon who bathed in streams in that area. Leptospirosis is enzootic in Costa Rica, but most human cases previously had been associated with cattle-raising areas in the northwest. Twenty-six cases of leptospirosis were reported following Hurricane Joan. The Costa Rican public health ministry announced in June 1999 that leptospirosis has increased in the country in the last three years. The ministry's statistics show that the disease has gone from 27 cases in 1997 to 112 by mid-June 1999. The communities of Limon, Turrialba, San Carlos and Golfito have reported the biggest number of cases.

d. **Chagas' disease** has been reported from Alajuela, Liberia, and Puntarenas. Studies have shown 90% of the houses in barrios are infested with the vector, *Triatoma dimidiata*, with the majority of the bugs infected with trypanosomes. However, *T. dimidiata* is a poor vector and Chagas' is not considered a problem.

e. **Leishmaniasis:** *Leishmania mexicana mexicana* and *L. braziliensis panamensis* are reported at a rate of 9.561/100,000 countrywide. Mainly found in areas of newly cleared forest or secondary growth. Highest incidence 803.91/10,000 in Talamanca. Insect vectors are sand flies. Reservoirs are sloths (*Bradypus griseus* and *Choloepus hoffmanni*).

f. **Bancroftian filariasis**, vectored by *Culex pipiens fatigans*, is present at low levels of endemicity (2% infectivity rate) in the coastal city of Puerto Limon.

g. **Tick-borne typhus:** The Central American variant of *Rickettsia rickettsii* (vectored by the tick *Amblyomma americanum*) is found in the dry coastal plains and was responsible for 3 fatalities in 1987.

VECTOR RISK ASSESSMENT PROFILE (VECTRAP): Costa Rica (continued)

3. DISEASE VECTOR INFORMATION:

a. The primary vectors of malaria are *Anopheles albimanus* and *An. vestitipennis*. Preferred larval habitats for both species are the vegetative borders of small, sunlit ponds, and other impoundments such as borrow pits. *An. vestitipennis* appears to be more endophilic and endophagic than *An. albimanus*, but it will leave homes early in the morning to rest on surrounding vegetation. Both prefer to feed at ankle level, and rest on walls at less than 6 feet. Peak biting for *An. vestitipennis* occurs at 2200 - 2400 and 0400-0500 hrs. *An. albimanus* exhibits peak activity 2000-2200 and 0500-0900 hrs. Sporozoite rates for both are less than 1%. *An. pseudopunctipennis* and *An. punctimacula* are secondary vectors. *An. albimanus* is reported resistant to the insecticides DDT, Dieldrin, Lindane, and fenthion. However, *An. albimanus* is still susceptible to Malathion in Costa Rica.

b. The mosquito, *Aedes aegypti*, is the only vector for Dengue fever. It has been eradicated from Costa Rica on a couple of occasions, but reintroduction via shipping is a threat. *Aedes aegypti* is a peridomestic mosquito that prefers to breed in artificial containers near human habitations. It is diurnally active and feeds indoors or out, often biting around the neck or ankles. It typically rests indoors after feeding. *Ae. aegypti* is known to be resistant to DDT, Dieldrin and Lindane.

c. The vector of Chagas' disease is the reduviid bug, *Triatoma dimidiata*.

d. The sand flies, *Lutzomyia ylephiletor*, *Lu. tropidoi*, *Lu. gomezi*, *Lu. panamensis*, and *Lu. geniculata* are the vectors of Leishmaniasis.

e. Many mosquito species may vector filariasis.

4. DISEASE AND VECTOR CONTROL PROGRAMS:

a. 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 recommendations for chemoprophylaxis.

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. 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.

f. Expanded Vector Control Recommendations are available upon request.

VECTOR RISK ASSESSMENT PROFILE (VECTRAP): Costa Rica (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.

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