Smart Cards:
Background and Prevention Information for Naturally Occurring Diseases of Operational Significance

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Anthrax (*Bacillus anthracis)*	
Background	• Anthrax is an acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. Anthrax most commonly occurs in wild and domestic lower vertebrates, (e.g., cattle, sheep, goats, camels, antelopes, and other herbivores), but it can also occur in humans when they are exposed to infected animals or to tissue from infected animals. • People may be exposed to anthrax (non-weaponized form) by working with dead animals and animal products from other countries where anthrax is more prevalent (see endemic areas for location information). • Animal hides pose a low risk of cutaneous (skin) anthrax and an extremely low risk of inhalation anthrax. However, exotic animal hides may pose a higher risk for exposure than domestic (U.S.-origin) hides. • Symptoms vary by route of exposure. With cutaneous exposure, the first symptom is a small sore that develops into a blister, which then develops into a skin ulcer with a black area in the center. With gastrointestinal exposure, the first symptoms are nausea, loss of appetite, bloody diarrhea, and fever. Inhalation symptoms are like cold or flu symptoms and can include a sore throat, mild fever, and muscle aches. Later symptoms include cough, chest discomfort, shortness of breath, tiredness, and muscle aches.
Endemic Area	• *B. anthracis* is most common in animals living in agricultural regions, to include regions in South and Central America, Southern and Eastern Europe, Asia, Africa, the Caribbean, and the Middle East. • Anthrax in wild livestock has occurred in the United States.
Occurrence Rate	• In the United States, 236 cases of anthrax were reported to the Centers for Disease Control and Prevention (CDC) from 1955 to 1999. Of the 236 reported cases, 153 were associated with industrial handling of animal hide or hair. Only nine of the 153 cases associated with industrial handling of hair or hide were inhalation anthrax. • The first case of inhalation anthrax, since the anthrax attacks in 2001, occurred in 2006. A 44-year-old man was infected allegedly due to using African animal hides to make drums.
Prevention Information	• Humans can become infected with anthrax through scrapes or cuts (open wounds), by handling products from infected animals, (e.g., hair, wool, hides, flesh, blood, etc.), or by breathing in anthrax spores from infected animal products (like wool, for example). Keep in mind that *B. anthracis* can survive in soil for many years. • In countries where anthrax is common and vaccination levels of animal herds are low, humans should avoid contact with livestock and animal products and avoid eating meat that has not been properly slaughtered and cooked. Use caution when working with animal products from those areas where *B. anthracis* is most common.
Centers for Disease Control and Prevention (CDC) (http://www.cdc.gov/ncidod/dbmd/diseaseinfo/anthrax_g.htm) and US Army Medical Research Institute for Infectious Disease (USAMRIID), *Medical Management of Biological Casualties Handbook*, 6th Edition, April 2005 (a.k.a. Blue Book).	

Avian Influenza ("Bird Flu") and Associated Viruses	
Background	• Bird flu is an infection caused by avian influenza viruses. These flu viruses occur naturally among birds. Wild birds worldwide carry the viruses in their intestines, but they usually do not get sick from them. However, bird flu is very contagious among birds and can make some domesticated birds, including chickens, ducks, and turkeys, very sick, leading to death. • Infected birds shed flu virus in their saliva, nasal secretions, and feces. Susceptible birds become infected when they have contact with contaminated excretions or surfaces that are contaminated with excrement. • It is believed that most cases of bird flu infection in humans are the result of contact with infected poultry or contaminated surfaces. • Symptoms of bird flu in humans have ranged from typical flu-like symptoms to eye infections, pneumonia, severe respiratory diseases (such as acute respiratory distress), and other severe and life-threatening complications. The symptoms of bird flu vary based on the virus that caused the infection.
Endemic Area	• Countries located along migratory routes need to be vigilant for signs of disease in wild and domestic birds. Many countries in Europe, Africa, and Asia have been affected at the same time. • The virus has become endemic in several of the initially affected countries in Asia.
Occurrence Rate	• In 2005, outbreaks of H5N1 among poultry were confirmed in Cambodia, China, Indonesia, Thailand, Vietnam, Russia, Romania, Turkey, and Kazakhstan. There were 270 human cases in Azerbaijan, Cambodia, China, Djibouti, Egypt, Indonesia, Iraq, Thailand, Turkey, and Vietnam. Of the WHO laboratory confirmed cases, there were 270 human cases, with 164 resulting in death. As of February 2007, Egypt has reported 20 confirmed cases with 12 fatalities. Indonesia also suffered additional cases, bringing the total number of confirmed cases to 81, of which 63 were fatalities. Nigeria reported an avian influenza fatality in February 2007.
Prevention Information	• The risk from avian influenza is generally low for most people because the viruses occur mainly among birds and do not usually infect humans. However, if there is an outbreak of H5N1, people should avoid contact with infected birds or contaminated surfaces, and should be careful when handling and cooking poultry. • The CDC advised that travelers to countries in Asia with known outbreaks of H5N1 avoid poultry farms, contact with animals in live food markets, and any surfaces that appear to be contaminated with feces from poultry or other animals.
CDC (www.cdc.gov) and WHO (http://www.who.int/en/) websites.	

Botulism (*Clostridium botulinum*)	
Background	• Botulism is a rare, but serious paralytic illness caused by a nerve toxin produced by the bacterium *C. botulinum*, which is commonly found in soil. *C. botulinium* organisms grow best in low oxygen conditions. • Naturally occurring botulinum can be found as foodborne botulism, wound botulism, and infant botulism. • Foodborne botulism is caused by eating foods that contain the botulism toxin. Wound botulism is caused by a toxin produced from a wound infected with *C. botulinum*. The botulinum bacteria that cause infant botulism is harbored in the intestines and released as the toxin in susceptible infants. • All forms of botulism can be fatal and are considered medical emergencies. There are seven types of botulism toxin; however, only types A, B, E, and F cause illness in humans.
Endemic Area	• Human botulism has been reported worldwide. • Spores from organisms producing type A or B toxins are distributed widely in the soil and have been found throughout the world. Toxin type B is found in Europe.
Occurrence Rate	• In the United States, an average of 110 cases of botulism is reported each year. Of these, approximately 25% are foodborne, 72% are infant botulism, and 3% are wound botulism. • The number of cases of foodborne and infant botulism has changed little in recent years, but wound botulism has increased because of the use of black-tar heroin, especially in California. • In October 2006, four cases of botulism (associated with commercial carrot juice) were reported in Georgia and Florida. Two additional cases were reported in Canada.
Prevention Information	• Be cautious of improperly prepared or canned food, and immediately report cases of foodborne botulism to prevent others from also consuming the toxin.
CDC (http://www.cdc.gov/ncidod/dbmd/diseaseinfo/botulism_g.htm), E Medicine (http://www.emedicine.com/MED/topic238.htm), and WHO websites (http://www.who.int/csr/don/2006_10_11a/en/index.html); and Blue Book, April 2005.	

Brucellosis (*Brucella*)	
Background	• Brucellosis is an infectious disease caused by the bacteria of the genus *Brucella*. These bacteria are primarily passed among animals; causing a disease of the reproductive system of livestock. • Various *Brucella* species affect sheep, goats, cattle, deer, elk, pigs, dogs, and several other animals. • Humans become infected by coming in contact with animals or animal products contaminated with *Brucella* bacteria. Humans are generally infected in one of three ways: eating or drinking something that is contaminated with *Brucella*, breathing in the organism (inhalation), or having the bacteria enter the body through skin wounds. • Symptoms are similar to the flu and may include fever, sweats, headaches, back pains, and physical weakness.
Endemic Area	• Brucellosis can be found worldwide. • Areas currently listed as high risk are: Portugal, Spain, Southern France, Italy, Greece, Turkey, North Africa, South and Central America, Eastern Europe, Asia, Africa, the Caribbean, and the Middle East.
Occurrence Rate	• Brucellosis is not very common in the United States, where approximately 100 to 200 cases occur annually. • Brucellosis is more common in countries lacking standardized and effective public health and domestic animal health programs.
Prevention Information	• The most common way to be infected is by eating or drinking contaminated milk products. When sheep, goats, cows, or camels are infected, their milk is contaminated with the bacteria. If the milk is not pasteurized, these bacteria can be transmitted to persons who drink the milk or eat cheeses made from it. • Inhalation of *Brucella* organisms is not a common route of infection, but it can be a significant hazard for people in certain occupations, such as those working in laboratories where the organism is cultured. • Humans need to use caution when working in the following situations: dealing with raw animal foods or animal husbandry; pork slaughter and processing; and certain dog breeding and birthing operations (humans have become infected through contact with infected fetal materials and discharge).
CDC (http://www.cdc.gov/ncidod/dbmd/diseaseinfo/brucellosis_g.htm) website and Blue Book, April 2005.	

Chikungunya Virus (Alphavirus)	
Background	• Chikungunya virus (CHIKV) is an alphavirus that is transmitted to humans by the bite of infected mosquitoes, usually of the genus *Aedes*. Chikungunya (CHIK) fever, the disease caused by CHIKV, was first recognized in epidemic form in East Africa during 1952-1953. Because CHIK fever epidemics are sustained by human-mosquito-human transmission, the epidemic cycle is similar to those of dengue and urban yellow fever. • Illness is characterized by sudden onset of fever, headache, malaise, joint pain or arthritis, muscle pain, and low back pain. Skin rash occurs in approximately half of the cases. Joint symptoms can be severe and involve small and large joints.
Endemic Area	• CHIK is indigenous to west, central, and southern Africa and many areas of Asia, and has been cited as the cause of numerous human epidemics in those areas. The virus circulates throughout much of Africa, with transmission thought to occur mainly between mosquitoes and monkeys.
Occurrence Rate	• Since the beginning of January 2006, countries in the southwest Indian Ocean have reported CHIK cases: Mayotte (2833 suspected cases), Mauritius (6000 suspected cases, including 1200 confirmed cases), and the Seychelles (8818 suspected cases). The following European countries reported imported cases from people returning from the aforementioned islands: France, Germany, Italy, Norway, and Switzerland. • In 2006, CHIK fever cases were also reported in travelers returning from known outbreak areas to Europe, Canada, the Caribbean (Martinique), and South America (French Guyana). During 2005-2006, 12 cases of CHIK fever were diagnosed in travelers who arrived in the United States from areas known to be epidemic or endemic for CHIK fever. • From February 2006 to 10 October 2006, the WHO Regional Office for Southeast Asia reported 151 districts in eight states/provinces of India affected by CHIK fever.
Prevention Information	• No vaccine is available against this viral infection. Prevention is entirely dependent upon taking steps to avoid mosquito bites and eliminate mosquito-breeding sites. • To avoid mosquito bites: o Wear full sleeve clothing and long dresses that cover the limbs. o Use mosquito coils, repellents, and electric vapor mats during the daytime. o Use mosquito nets to protect babies, the elderly, and others who may rest during the day. The effectiveness of such nets can be improved by treating them with permethrin (pyrethroid insecticide). Curtains and cloth can also be treated with insecticide and hung at windows or doorways to repel or kill mosquitoes.
CDC (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5538a2.htm) and WHO (http://www.who.int/csr/don/2006_10_17/en/index.html) websites.	

Cholera (V*ibrio cholerae*)	
Background	• Cholera is an acute, diarrheal illness caused by infection of the intestine with the bacterium *Vibrio cholerae*. • Although cholera can be life-threatening, it is easily prevented and treated. In the United States, because of advanced water and sanitation systems, cholera is not a major threat; however, everyone, especially travelers, should be aware of how the disease is transmitted and what can be done to prevent it. • A person may get cholera by drinking water or eating food contaminated with the cholera bacterium. In an epidemic, the source of the contamination is usually the feces of an infected person. The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water.
Endemic Area	• Cholera has been very rare in industrialized nations for the last 100 years. However, the disease is still common today in other parts of the world, including the Indian subcontinent and sub-Saharan Africa.
Occurrence Rate	• In January 1991, epidemic cholera appeared in South America and quickly spread to several countries. • A few cases have occurred in the United States among persons who traveled to South America or ate contaminated food brought back by travelers. • Between January and June 2006, 16,187 cases (including 476 deaths) of acute watery diarrhea were reported in eight out of 10 states in southern Sudan. • As of June 2006, Angola reported 46,758 cases (including 1893 deaths); 14 out of 18 provinces were affected.
Prevention Information	• The cholera bacterium may exist in the environment in brackish rivers and coastal waters. Personnel should avoid these areas if in a country or area with inadequate treatment of drinking water or sewage facilities. • Shellfish eaten raw have been a source of cholera, and a few persons in the United States have contracted cholera after eating raw or undercooked shellfish from the Gulf of Mexico. • The disease is not likely to spread directly from one person to another; therefore, casual contact with an infected person is not a risk for becoming ill.
CDC (http://www.cdc.gov/ncidod/dbmd/diseaseinfo/cholera_g.htm) and WHO (http://www.who.int/csr/don/archive/year/2006/en/index.html) websites.	

Dengue (Dengue Fever – *Flavivirus*)	
Background	• Dengue is a disease caused by any one of four related viruses, (e.g., DEN-1, DEN-2, DEN-3, or DEN-4). Dengue hemorrhagic fever (DHF) is a more severe form of dengue, which can be fatal if unrecognized and not properly treated. DHF is caused by infection with the same viruses that cause dengue. • Dengue is transmitted to people by the bite of an Aedes mosquito that is infected with a dengue virus. The mosquito becomes infected with dengue virus when it bites a person who has dengue or DHF. After a week, the mosquito can then transmit the virus while biting a healthy person. Dengue is not spread directly from person to person. • The symptoms of dengue are high fever, severe headache, backache, joint pains, nausea and vomiting, eye pain, and rash. DHF is characterized by a fever that lasts from two to seven days, with potential nausea, vomiting, abdominal pain, and headache. This stage is followed by hemorrhagic manifestations, skin hemorrhages, internal bleeding, etc.
Endemic Area	• Outbreaks of dengue occur primarily in areas where the Aedes aegypti (sometimes also Aedes albopictus) mosquitoes live. This includes most tropical urban areas of the world. • Dengue viruses may be introduced into areas by travelers who become infected while visiting other areas of the tropics where dengue commonly exists.
Occurrence Rate	• It is estimated that there are over 100 million cases of dengue worldwide each year. Dengue epidemics have become more frequent and larger in the past 25 years. • As of 2004, dengue fever was endemic in most tropical countries of the South Pacific, Asia, the Caribbean, the Americas, and Africa. The incidence of DHF has also increased in Southeast Asia, the South Pacific, and the American tropics in the past 25 years, with major epidemics occurring in many countries every three to five years. Madagascar reported a dengue outbreak, which started mid-January 2006. Maldives also experienced an outbreak of dengue from January to March 2006, with 602-suspected cases, including 64 cases of DHF and 9 cases of dengue shock syndrome. • Recent outbreaks of dengue in Paraguay have caused concern, with over 16,000 suspected cases reported as of 1 Jan 2007, to include 10 deaths.
Prevention Information	• There is no specific medication or vaccine for treatment or prevention of dengue. The best preventive measure for residents living in areas infested with the Aedes aegypti mosquito is to eliminate the places where the mosquito lays eggs, primarily artificial containers that hold water. • In areas with dengue, the risk of being bitten by mosquitoes indoors is reduced by utilization of air conditioning or windows and doors that are screened. • Proper application of mosquito repellents containing 20% to 30% DEET as the active ingredient on exposed skin and clothing will decrease the risk of being bitten by mosquitoes.
CDC (http://www.cdc.gov/ncidod/dvbid/dengue/resources/DengueFactSheet.pdf), WTOP (http://www.wtopnews.com/?nid=105&sid=1080458), and WHO (http://www.who.int/csr/don/2006_03_17/en/index.html) websites.	

Eastern Equine Encephalitis (EEE)	
Background	• Eastern equine encephalitis (EEE) is a mosquito-borne viral disease. It generally takes from three to ten days to develop symptoms of EEE after being bitten by an infected mosquito. • Many persons infected with EEE virus (EEEV) have no apparent illness. In people that develop the illness, symptoms range from mild flu-like illness to EEE (inflammation of the brain), coma, and death. • Because of the high mortality rate, EEE is regarded as one of the most serious mosquito-borne diseases in the United States. • Although horses can develop EEEV infections, they are not a significant risk factor for human infection because horses are considered "dead-end" hosts for the virus, (i.e., the amount of EEEV in their bloodstreams is usually insufficient to infect mosquitoes).
Endemic Area	• EEEV occurs in the eastern half of the United States, where it causes disease in humans, horses, and some bird species. According to the CDC, the worldwide distribution of EEE is limited to North and South America. • EEEV transmission is most common in and around freshwater sources, hardwood swamps in the Atlantic and Gulf Coast states, and in the Great Lakes region. • Human cases occur relatively infrequently, largely because the primary transmission cycle takes place in and around swampy areas where human populations tend to be limited.
Occurrence Rate	• There were approximately 220 confirmed cases of EEE in the United States from 1964-2004. The states with the largest number of cases were Florida, Georgia, Massachusetts, and New Jersey.
Prevention Information	• Residents of and visitors to endemic areas (areas with an established presence of the virus) need to take precautions, as well as those who engage in outdoor work and recreational activities in endemic areas. • Persons over age 50 and younger than age 15 seem to be at greatest risk for developing severe EEE when infected with the virus. • Note: Risk of exposure to EEEV-infected mosquitoes may increase as the human population expands into natural areas where the virus circulates (e.g., near hardwood, freshwater swamps in the eastern and north-central United States).
CDC (http://www.cdc.gov/ncidod/dvbid/arbor/eeefact.htm) website.	

Glanders (*Burholderia mallei*)	
Background	• Glanders is an infectious disease caused by the bacterium *Burkholderia mallei.* The symptoms of glanders depend upon the route of infection. Generalized symptoms of glanders include fever, muscle aches, chest pain, muscle tightness, and headache. Additional symptoms have included excessive tearing of the eyes, light sensitivity, and diarrhea. • The types of infection include localized infections, pus-forming skin infections, pulmonary infections, and bloodstream infections. • Glanders is primarily a disease affecting horses, but it also affects donkeys and mules, and can be naturally contracted by goats, dogs, and cats. • Glanders is transmitted to humans by direct contact with infected animals. The bacteria enter the body through the skin and the mucosal surfaces of the eyes and nose.
Endemic Area	• Geographically, the disease is endemic in Africa, Asia, the Middle East, and Central and South America.
Occurrence Rate	• There have not been any naturally occurring cases of Glanders in the United States since the 1940s. • Sporadic cases have been documented in veterinarians, horse caretakers, and laboratory workers/technicians.
Prevention Information	• Human infection has occurred rarely and sporadically among laboratory workers and those in direct and prolonged contact with infected, domestic animals. • Use caution when working for prolonged periods with susceptible animals in endemic regions.
CDC (http://www.cdc.gov/ncidod/dbmd/diseaseinfo/melioidosis_g.htm) website and Blue Book, April 2005.	

Japanese Encephalitis (JE)	
Background	• Japanese encephalitis (JE) is spread by rice field breeding mosquitoes that become infected with the JE virus. The mosquitoes become infected by feeding on domestic pigs and wild birds infected with the JE virus. Infected mosquitoes then transmit the JE virus to humans and animals during the feeding process. The JE virus is amplified in the blood systems of domestic pigs and wild birds. • Mild infections occur without apparent symptoms other than fever with headache. A more severe infection is marked by quick onset of the following symptoms: headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, etc. • The JE virus is not transmitted from person-to-person.
Endemic Area	• JE is endemic throughout many parts of Asia, India, Indonesia (Bali and Java only), Malaysia, Thailand, etc. • JE transmission principally occurs in rural agricultural locations where irrigation by flooding is practiced. In many areas of Asia, these ecologic conditions may occur near or occasionally within urban centers. • Transmission is seasonal and occurs in the summer and autumn in the temperate regions of China, Japan, Korea, and eastern Russia. Elsewhere, seasonal patterns of disease may be extended or vary with the rainy season and irrigation practices.
Occurrence Rate	• JE is the leading cause of childhood encephalitis in Asia, where up to 50,000 cases may be reported annually. Most infections are asymptomatic, but when encephalitis develops, the case-fatality rate can be as high as 30%. • Although children are at greatest risk of infection in endemic areas, outdoor occupation, recreational exposure, and male gender are also risk factors for infection. • Immunity to JE virus from previous vaccination or naturally acquired immunity reduces the risk of illness. Although most adults living in endemic areas have acquired natural immunity and older persons rarely develop the illness, a high case-fatality rate has also been reported in the elderly.
Prevention Information	• The risk to short-term travelers and those who confine their travel to urban centers is very low. Expatriates and travelers living for prolonged periods in rural areas where JE is endemic or epidemic are at greater risk. Travelers with extensive unprotected outdoor, evening, and nighttime exposure in rural areas, such as what might be experienced while bicycling, camping, or engaging in certain occupational activities, may be at high risk (even if their trip is brief).
CDC (http://www2.ncid.cdc.gov/travel/yb/utils/ybGet.asp?section=dis&obj=jenceph.htm) website.	

Melioidosis (*Burkholderia pseudomallei*)	
Background	• Melioidosis, also called Whitmore's disease, is an infectious disease caused by the bacterium *Burkholderia pseudomallei.* • Illness from melioidosis can be categorized as acute or localized infection, acute pulmonary infection, acute bloodstream infection, and chronic pus-discharging skin infection. • Besides humans, many animal species are susceptible to melioidosis. These include sheep, goats, horses, swine, cattle, dogs, and cats.
Endemic Area	• Melioidosis is predominately a disease of tropical climates, especially in Southeast Asia where it is endemic. It is distributed in water and soil in tropical and subtropical regions. • In many of these countries, *B. pseudomallei* is so prevalent that it is a common contaminate found on laboratory cultures. It has also been a common pathogen isolated from troops of all nationalities that have served in areas with endemic disease.
Occurrence Rate	• The greatest concentration of cases were reported in Vietnam, Cambodia, Laos, Thailand, Malaysia, Myanmar (Burma), and northern Australia. Additionally, it is seen in the South Pacific, Africa, India, and the Middle East. • A few isolated cases of melioidosis have occurred in the Western Hemisphere in Mexico, Panama, Ecuador, Haiti, Brazil, Peru, Guyana, and in the states of Hawaii and Georgia. • In the United States, confirmed cases range from none to five each year, and occur among travelers and immigrants.
Prevention Information	• The bacteria causing melioidosis are found in contaminated water and soil, and are spread to humans and animals through direct contact with the contaminated source. • Meliodiosis is most prevalent during the rainy seasons through contact with wet, contaminated soil. • Of note, most people exposed to naturally occurring melioidosis do not develop symptomatic melioidosis.
CDC (http://www.cdc.gov/ncidod/dbmd/diseaseinfo/melioidosis_g.htm) website and Blue Book, April 2005.	

Plague (*Yersinia pestis*)	
Background	• Humans typically develop plague from contact with infected rodents (e.g., mice, rats, and squirrels) or, more commonly, their fleas. • The infected flea bites and transmits the bacteria to humans. This usually causes bubonic plague, which can progress to the septicemic and pneumonic forms of plague. • Pneumonic plague is transmitted by breathing in *Y. pestis* suspended in respiratory droplets from a person (or animal) with pneumonic plague. Respiratory droplets are spread most readily by coughing or sneezing. Becoming infected in this way usually requires direct and close (within six feet) contact with the ill person or animal.
Endemic Area	• Since 1900, plague has been endemic in the United States. Generally, plague is most common in the southwestern states, particularly New Mexico and Arizona. • Plague is also endemic in many countries in Africa, the former Soviet Union, the Americas, and Asia. • Naturally occurring pneumonic plague is uncommon, although small outbreaks do occur. Outbreaks in people occur in areas where housing and sanitation conditions are poor. These outbreaks can occur in rural communities or in cities. They are usually associated with infected rats and rat fleas that live in the home.
Occurrence Rate	• The WHO and the CDC report 1,000 to 3,000 cases of plague worldwide every year. • Worldwide, most cases of plague occur in Africa, with limited outbreaks in Asia and South America. • Between 1970 and 2003, 2% of plague cases have been pneumonic, 83% have been bubonic, and 15% have been septicemic. In the United States, case numbers have ranged between one and 40 cases annually. Peak occurrence is between April and November. The last time person-to-person transmission occurred in the United States was during the epidemic of 1924-1925 in Los Angeles, California. • In 2003, nine countries reported 2,118 cases and 182 deaths from plague; 98% of the cases were reported from Africa.
Prevention Information	• Do not pick up or touch dead animals. If plague has recently been found in your area, report any observations of sick or dead animals to the local health department or law enforcement officials. • If you anticipate being exposed to rodent fleas, apply insect repellents to clothing and skin, according to label instructions, to prevent flea bites. Wear gloves when handling potentially infected animals. If you live in areas where rodent plague occurs, treat pet dogs and cats for flea control regularly. • Note: People who have had close contact with an infected person can greatly reduce their chance of becoming sick if they begin antibiotic treatment within seven days of their exposure.
CDC (http://www.cdc.gov/healthypets/diseases/plague.htm) and WHO (http://www.who.int/topics/plague/en/) websites; and Blue Book, April 2005.	

Q Fever (*Coxiella burnetti*)	
Background	• Q fever is a zoonotic disease caused by *Coxiella burnetii*, a species of bacteria that is distributed globally. • Cattle, sheep, cats, and goats are the primary reservoirs of *C. burnetii*. Infection has been noted in a wide variety of other animals, including other species of livestock and in domesticated pets. *C. burnetii* does not usually cause clinical disease in these animals. • Humans are often very susceptible to the disease, and very few organisms may be required to cause infection. Ingestion of contaminated milk, followed by regurgitation and inhalation of contaminated food, is a less common mode of transmission. Other modes of transmission to humans, including tick bites and human-to-human transmission are rare.
Endemic Area	• *C. burnetti* occurs worldwide, with the exception of New Zealand. • The disease was reported to be endemic to California during the 1950s. • In certain regions of France and Spain, the organism is highly prevalent, being the second most common etiology of community-acquired pneumonia, and causing five to eight percent of the endocarditis (inflammation of the membrane of the heart) cases. • A few clusters were reported in the province of Nova Scotia, Canada and were related to exposure through birthing cats.
Occurrence Rate	• In 1999, Q fever became a notifiable disease in the United States, but reporting is not required in many other countries. Because the disease is underreported, public health officials cannot reliably assess how many cases of Q fever have actually occurred worldwide. • Many human infections go unnoticed. In the United States, Q fever outbreaks have resulted mainly from occupational exposure involving veterinarians, meat processing plant workers, sheep and dairy workers, livestock farmers, and researchers at facilities housing sheep. Prevention and control efforts should be directed primarily toward these groups and environments.
Prevention Information	• The following measures should be used in the prevention and control of Q fever: o Educate the public on sources of infection; appropriately dispose of placenta, birth products, fetal membranes, and aborted fetuses at facilities housing sheep and goats (birthing materials contain a significant number of organisms, which are resistant to many environmental factors); restrict access to barns and laboratories used in housing potentially infected animals; and use only pasteurized milk and milk products. o Vaccinate (where possible) individuals engaged in research with pregnant sheep or live *C. burnetii* and quarantine imported animals; routinely test animals for antibodies to *C. burnetii*; and implement measures to prevent airflow to other occupied areas.
CDC (http://www.cdc.gov/ncidod/dvrd/qfever/index.htm) and E Medicine (http://www.emedicine.com/med/topic1982.htm) websites; and Blue Book, April 2005.	

Rift Valley Fever (*Phlebovirus*)	
Background	• Rift Valley Fever (RVF) is an acute, fever-causing viral disease that affects domestic animals, (such as cattle, buffalo, sheep, goats, and camels) and humans. • The RVF virus primarily affects livestock, but can cause disease in a large number of domestic animals. • Humans can get RVF from mosquito bites and from other bloodsucking insects that serve as vectors. Humans can also get the disease if they are exposed to blood or other body fluids of infected animals. This exposure can result from the slaughtering or handling of infected animals or by touching contaminated meat during the preparation of food. • Infection through aerosol transmission of RVF virus has resulted from contact with laboratory specimens containing the virus.
Endemic Area	• RVF is generally found in regions of eastern and southern Africa where sheep and cattle are raised, but the virus also exists in most countries of sub-Saharan Africa and in Madagascar. • RVF is most commonly associated with mosquito-borne epidemics during years of unusually heavy rainfall.
Occurrence Rate	• The most notable epizootic of RVF, which occurred in Kenya in 1950-1951, resulted in the death of an estimated 100,000 sheep. • In 1977, the virus was detected in Egypt (probably exported there in infected domestic animals from Sudan) and caused a large outbreak of RVF among animals and humans. • The first epidemic of RVF in West Africa was reported in 1987 and was linked to construction of the Senegal River Project. In September 2000, a RVF outbreak was reported in Saudi Arabia and subsequently Yemen. These cases represent the first RVF cases identified outside Africa. • As of 30 Jan 07, there have been 411 suspected cases and 121 deaths in Kenya. Of the above figures, 131 cases have been laboratory confirmed. Somalia also reported 100 suspected cases with 48 deaths and 1 laboratory confirmed case.
Prevention Information	• A person's chances of becoming infected can be reduced by taking measures to decrease contact with mosquitoes and other bloodsucking insects through the use of mosquito repellents and bed nets. • Avoiding exposure to blood or tissues of animals that may potentially be infected is an important protective measure for persons working with animals in RVF-endemic areas.
CDC (http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/rvf.htm) and WHO (http://www.who.int/csr/don/2007_01_31/en/index.html) websites.	

Severe Acute Respiratory Syndrome (SARS)	
Background	• Severe acute respiratory syndrome (SARS) is a viral respiratory illness caused by a coronavirus, called SARS-associated coronavirus (SARS-CoV). • Primarily, SARS is spread by close person-to-person contact. • SARS-CoV is thought to be transmitted most readily by respiratory droplets (droplet spread) produced when an infected person coughs or sneezes. The virus also can spread when a person touches a surface or object contaminated with infectious droplets, and then touches his or her mouth, nose, or eye(s).
Endemic Area	• After first appearing in Southern China in November 2002, SARS was first reported in Asia in February 2003, and was then recognized as a global threat by March 2003. • The illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the SARS global outbreak (2003) was contained.
Occurrence Rate	• During November 2002 through July 2003, a total of 8,098 people worldwide became sick with SARS. Of these, 774 people died. • By late July 2003, no new cases were being reported, and the WHO declared the global outbreak over. • In the United States, only eight persons were laboratory-confirmed as SARS cases and there were no deaths. The eight confirmed SARS patients had traveled to areas where SARS-CoV transmission was occurring.
Prevention Information	• Droplet spread can happen when droplets from the cough or sneeze of an infected person are propelled a short distance (generally up to three feet) through the air and deposited on the mucous membranes of the mouth, nose, or eyes of persons who are nearby. • Available information suggests that persons with SARS are most likely to be contagious only when they have symptoms, such as fever or cough. Patients are most contagious during the second week of illness. • Persons with SARS should limit their interactions outside the home, until ten days after their fever has gone and their respiratory (breathing) symptoms have gotten better. • Conduct frequent hand washing with soap and water, or use an alcohol-based hand rub. Avoid touching your eyes, nose, and mouth with unclean hands, and encourage people around you to cover their nose and mouth when coughing or sneezing.
CDC (http://www.cdc.gov/NCIDOD/SARS/faq.htm) and WHO (http://www.who.int/topics/sars/en/) websites.	

Tularemia (*Francisella tularensis*)	
Background	• Tularemia is a potentially serious illness that occurs naturally in the United States. It is caused by the bacterium *Francisella tularensis* found in animals, especially rodents, rabbits, and hares, thus acquiring the name Rabbit Fever. • People can get tularemia from the bite of an infected tick, deerfly, or other insect; handling infected animal carcasses; eating or drinking contaminated food or water; and breathing in the bacteria, *F. tularensis*. • The bacteria that cause tularemia occur widely in nature and could be isolated and grown in quantity in a laboratory, although manufacturing an effective aerosol weapon would require considerable sophistication. • The signs and symptoms of tularemia depend on how individuals were exposed. Possible symptoms include skin ulcers, swollen and painful lymph glands, inflamed eyes, sore throat, mouth sores, diarrhea, or pneumonia. If the bacteria are inhaled, symptoms can include abrupt onset of fever, chills, headache, muscle aches, joint pain, dry cough, and progressive weakness.
Endemic Area	• Endemic areas include North America and parts of Europe and Asia. Tularemia is a widespread disease in animals.
Occurrence Rate	• About 200 human cases of tularemia are reported each year in the United States. Most cases occur in the south-central and western states. Nearly all cases occur in rural areas.
Prevention Information	• Since tularemia occurs naturally in many parts of the United States, use insect repellent containing DEET on your skin, or treat clothing with repellent containing permethrin, to prevent insect bites. • Wash your hands often, using soap and warm water, especially after handling animal carcasses. • Be sure to cook your food thoroughly and ensure that your water is from a safe source. • Note any change in the behavior of your pets (especially rodents, rabbits, and hares) or livestock, and consult a veterinarian if they develop unusual symptoms. • Tularemia is not known to spread from person to person. People who have tularemia do not need to be isolated.
CDC (http://www.bt.cdc.gov/agent/tularemia/) and WHO (http://www.nlm.nih.gov/medlineplus/ency/article/000856.htm) websites; and Blue Book, April 2005.	

Venezuelan Equine Encephalitis (VEE)	
Background	• Venezuelan equine encephalitis (VEE) is a mosquito-borne viral disease. • The virus gains access to a human's bloodstream from the bite of an infected mosquito. After the virus replicates and releases itself into the bloodstream, it infects other cells, causing fever and the other symptoms typical of febrile illnesses. • In a subset of patients, the virus gains entrance into the central nervous system (CNS), where it continues to replicate, resulting in acute encephalitis.
Endemic Area	• Human and animal infections have occurred in equatorial South and Central America, including Colombia, Panama, Peru, Brazil, Venezuela, French Guiana, Guyana, and Surinam. • VEE is rare in the United States; however, a major epidemic in horses occurred in Texas in 1971. There is no evidence of human-to-human or horse-to-human transmission.
Occurrence Rate	• There are fewer than 100 documented and laboratory-confirmed human cases. • Since its isolation in 1938, many equine epizootics and epidemics have been reported in Colombia, Venezuela, Trinidad, Peru, Ecuador, Mexico, the United States, and other countries; the number of reports of human and equine cases has increased during recent years.
Prevention Information	• Initial diagnosis may be difficult; therefore, a high index of suspicion is required in examining a symptomatic patient with a history of travel to an endemic area or an area experiencing an active epidemic. • Use caution and prevent exposure to mosquitoes in endemic areas. • In addition, keep in mind that VEE has an animal borne reservoir in bats, birds, rodents, equines (horses, donkeys, mules), and certain tropical jungle mammals.
E Medicine (http://www.emedicine.com/emerg/topic886.htm), Pan American Health Organization (PAHO) (http://www.paho.org/English/sha/epibul_95-98/be954out.htm), and CDC (http://www.cdc.gov/ncidod/eid/vol10no5/03-0634.htm) websites; and Blue Book, April 2005.	

Viral Hemorrhagic Fevers (VHFs) – Ebola, Marburg, Lassa, and Crimean Congo Hemorrhagic Fever	
Background	• VHF survival is dependent on an animal or insect host, called the natural reservoir. The viruses are geographically restricted to the areas where their host species live. Humans are not the natural reservoir for any of these viruses. Humans are infected when they come into contact with infected hosts. However, with some viruses, after the accidental transmission from the host, humans can transmit the virus to one another. For the most part, rodents and arthropods are the main reservoirs for viruses causing VHFs. With a few noteworthy exceptions, there is no cure or drug treatment.
Endemic Area	• **Ebola:** The exact origin, locations, and natural habitat (known as the "natural reservoir") of Ebola virus remain unknown. However, based on available evidence and the nature of similar viruses, researchers believe that the virus is zoonotic and is normally maintained in an animal host that is native to the African continent. • **Lassa:** Lassa fever is an endemic disease in portions of West Africa. It is recognized in Guinea, Liberia, Sierra Leone, as well as Nigeria. However, because the rodent species which carry the virus are found throughout West Africa, the actual geographic range of the disease may extend to other countries in the region. • **Marburg:** The Marburg virus is indigenous to Africa. While the geographic area to which it is native is unknown, this area appears to include at least parts of Uganda and Western Kenya, and perhaps Zimbabwe. • **Crimean-Congo Hemorrhagic Fever (CCHF):** CCHF is found in Eastern Europe, particularly in the former Soviet Union. It is also distributed throughout the Mediterranean, in northwestern China, central Asia, southern Europe, Africa, the Middle East, and the Indian subcontinent.
Occurrence Rate	• Human cases or outbreaks of hemorrhagic fevers caused by these viruses occur sporadically and irregularly. The occurrence of outbreaks cannot be easily predicted. Confirmed cases of Ebola have been reported in the Democratic Republic of the Congo, Gabon, Sudan, Ivory Coast, Uganda, and the Republic of the Congo. The virus is not known to be native to other continents. The number of Lassa virus infections per year in West Africa is estimated at 100,000 to 300,000, with approximately 5,000 deaths. Unfortunately, such estimates are crude, due to lack of uniform surveillance. In some areas of Sierra Leone and Liberia, it is known that 10%-16% of people admitted to hospitals have Lassa fever, which indicates the serious impact of the disease on the population of this region. • Recorded cases of Marburg are rare, and have appeared in only a few locations. From January – August 2006, 242 lab confirmed cases, to include 20 deaths from CCHF were reported by the Ministry of Turkey.
Prevention Information	• Spread of the virus (all VHFs in general) between humans has occurred in a setting of close contact, often in a hospital. Droplets of body fluids, or direct contact with persons, equipment, or other objects contaminated with infectious blood or tissues are all highly suspected as sources of disease. If VHF is suspected, maintain proper personal protection and ensure that appropriate contact and airborne precautions are in place. NOTE: Personnel with VHFs will need to be isolated. Agricultural workers and others working with animals should use insect repellent on exposed skin and clothing. Wearing gloves and other protective clothing is recommended. Individuals should also avoid contact with the blood and body fluids of livestock or humans who show symptoms of infection.
CDC (http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/vhf.htm) website and Blue Book, April 2005.	

Additional Naturally Occurring Diseases			
Disease	**Symptoms**	**Animal Carrier/Reservoir**	**Endemic Area/Occurrence Rate**
Campylobacteriosis (*Campylobacter spp.*)	Most people who become ill with Campylobacteriosis get diarrhea, cramping, abdominal pain, and fever within two to five days after exposure to the organism.	Cats, dogs, farm animals, improper food preparation.	*Campylobacter* is one of the most common bacterial causes of diarrheal illness in the United States. Virtually all cases occur as isolated, sporadic events, not part of large outbreaks. Fifteen cases are diagnosed each year for each 100,000 persons in the population.
E. coli (*Escherichia coli* 0157:H7)	Infection with E. coli often leads to bloody diarrhea, and occasionally to kidney failure.	Cattle, improper food preparation.	Leading cause of foodborne illness. Though most illness has been associated with eating undercooked, contaminated ground beef, people have also become ill from eating contaminated bean sprouts or fresh leafy vegetables, such as lettuce and spinach. An estimated 73,000 cases occur annually in the United States. The September 2006 outbreak in United States linked to contaminated spinach sickened over 170 people.
Hantavirus (Hantavirus Pulmonary Syndrome)	Early symptoms include fatigue, fever and muscle aches, especially in the large muscle groups-thighs, hips, back, and sometimes shoulders. May also include headaches, dizziness, chills, and abdominal problems, such as nausea, vomiting, diarrhea, and abdominal pain.	Wild mice.	Found in North, South, and Central America; the United States, Argentina, Chile, Uruguay, Paraguay, Brazil, Bolivia, and Panama. Through September 19, 2006, a total of 453 cases of hantavirus pulmonary syndrome have been reported in the United States. The case count started when the disease was first recognized in May 1993.
Histoplasmosis (*Histoplasma spp.*)	The symptoms of Histoplasmosis vary greatly, but the disease primarily affects the lungs. Most infected persons have no apparent ill effects. The acute respiratory disease is characterized by respiratory symptoms, a general ill feeling, fever, chest pains, and a dry or nonproductive cough. Occasionally, other organs are affected.	Bat guano (stool).	*H. capsulatum* is found throughout the world and is endemic in certain areas of the United States. The fungus has been found in poultry, house litter, caves, areas harboring bats, and in bird roosts. Approx. 80% of population living in areas with endemic disease is skin-test positive.
Hand, Foot, and Mouth Disease (HFMD)	HFMD is characterized by fever, sores in the mouth, and a rash with blisters. The disease begins with a mild fever, poor appetite, malaise ("feeling sick"), and frequently a sore throat. The skin rash develops over one to two days with flat or raised red spots, some with blisters. The rash does not itch, and it is usually located on the palms of the hands and soles of the feet. It may also appear on the buttocks. A person with HFMD may have only the rash or the mouth ulcers. Note: HFMD is contagious.	Humans; Viruses from the group called enteroviruses cause HFMD. The most common cause is coxsackievirus A16; sometimes, HFMD is caused by enterovirus 71 or other enteroviruses. The enterovirus group includes polioviruses, coxsackieviruses, echoviruses and other enteroviruses.	HFMD occurs mainly in children under ten years old, but may also occur in adults too. Everyone is at risk of infection, but not everyone who is infected becomes ill. Infants, children, and adolescents are more likely to be susceptible to infection and illness from these viruses, because they are less likely than adults to have antibodies and be immune from previous exposures to them. Individual cases and outbreaks of HFMD occur worldwide, more frequently in summer and early autumn. In the recent past, major outbreaks of HFMD attributable to enterovirus 71 have been reported in some South East Asian countries (Malaysia, 1997; Taiwan, 1998).

Additional Naturally Occurring Diseases			
Disease	**Symptoms**	**Animal Carrier/Reservoir**	**Endemic Area/Occurrence Rate**
Lyme Disease (*Borrelia burgodorferi*)	Typical symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans, (i.e., Lyme disease rash with bull's eye appearance).	Dogs, ticks.	In the United States, the CDC has determined that endemic areas include non-urban communities throughout much of the Northeast (Southern Maine to Virginia), parts of the upper Midwest (Minnesota and Wisconsin), and areas along the West Coast (northern California and Oregon). However, Lyme disease cases have been reported in all states except Montana. In 2005, 23,305 cases of Lyme disease were reported yielding a national average of 7.9 cases for every 100,000 persons. In the ten states where Lyme disease is most common, the average was 31.6 cases for every 100,000 persons.
Monkey Pox (Monkeypox virus)	In humans, the signs and symptoms of monkeypox are like those of smallpox, but usually they are milder. Another difference is that monkeypox causes the lymph nodes to swell. About 12 days after people are infected with the virus, they will get a fever, headache, muscle aches, and backache; their lymph nodes will swell; and they will feel tired. One to three days (or longer) after the fever starts, they will get a rash. This rash develops into raised bumps filled with fluid and often starts on the face and spreads, but it can start on other parts of the body too. The bumps go through several stages before they get crusty, scab over, and fall off. The illness usually lasts for two to four weeks.	Prairie dogs, Gambian rats, rabbits, squirrels, etc.	Africa and the United States. In early June 2003, monkeypox was reported among several people in the United States. Most of these people got sick after having contact with pet prairie dogs that were sick with monkeypox. This was the first time that there has been an outbreak of monkeypox in the United States.
Nipah Virus Encephalitis (Nipah virus)	Illness with Nipah virus begins with 3-14 days of fever and headache. This is followed by drowsiness and disorientation characterized by mental confusion. These signs and symptoms can progress to coma within 24-48 hours. Some patients have had a respiratory illness during the early part of their infections.	Nipah virus is transmitted to humans, cats, and dogs through close contact with infected pigs.	Nipah virus caused a relatively mild disease in pigs in Malaysia and Singapore. As of April 27, 1999, 257 cases of febrile encephalitis were reported to the Malaysian Ministry of Health (MOH), including 100 deaths.
Prion Diseases: Transmissible Spongiform Encephalopathy (TSE), (e.g., Bovine Spongiform Encephalopathy/ Encephalitis [BSE], Variant Creutzfeldt Jakob Disease [vCJD], and Scrapie)	Prion diseases or transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. They are distinguished by long incubation periods, characteristic spongiform changes associated with neuronal loss, and a failure to induce inflammatory response. Prion diseases are usually rapidly progressive and always fatal.	vCJD: Transmitted via exposure to food contaminated with BSE. BSE: Cattle. Scrapie: Sheep, goats. Other animal TSE's: Elk, deer (Chronic Wasting Disease, CWD), mink (Transmissible Mink Encephalopathy, TME), felines (Feline Spongiform Encephalopathy, FSE)	vCJD: United Kingdom, France, Ireland, Canada, Italy, United States. BSE: United Kingdom, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Liechtenstein, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Spain, Switzerland, and Slovenia. Two cases of BSE were confirmed in the United States in 2005. In addition, BSE due to animals imported from the United Kingdom: Canada, the Falkland Islands, and Oman. Scrapie: Europe, Asia, and North America.

Additional Naturally Occurring Diseases			
Disease	**Symptoms**	**Animal Carrier/Reservoir**	**Endemic Area/Occurrence Rate**
Rabies	Rabies virus infects the central nervous system, causing encephalopathy and ultimately death. Early symptoms of rabies in humans are nonspecific, consisting of fever, headache, and general malaise. As the disease progresses, neurological symptoms appear and may include insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucinations, agitation, hypersalivation, difficulty swallowing, and hydrophobia (fear of water). Death usually occurs within days of the onset of symptoms.	Dogs, cats, horses, wildlife carnivores, bats, etc.	Eliminated as significant public health risk in most parts of developed world. Control and elimination efforts focused particularly in Asia, Africa, Central and South America, and the United States (every state except Hawaii). Over the last 100 years, rabies in the United States has changed dramatically. More than 90% of all animal cases reported annually to CDC now occur in wildlife; before 1960 the majority was in domestic animals.
Rocky Mountain Spotted Fever (*Rickettsia rickettsii*)	Initial signs and symptoms of the disease include sudden onset of fever, headache, and muscle pain, followed by development of rash. The disease can be difficult to diagnose in the early stages, and without prompt and appropriate treatment it can be fatal.	American dog tick. Dogs and medium-sized mammals are the preferred dog tick hosts; however, they do feed regularly on larger mammals and humans.	It is now recognized that this disease is broadly distributed throughout the continental United States, as well as southern Canada, Central America, Mexico, and parts of South America. Between 1981 and 1996, this disease was reported from every United States state except Hawaii, Vermont, Maine, and Alaska.
Shigellosis (Shigella spp.)	Most that are infected with *Shigella* develop diarrhea, fever, and stomach cramps starting a day or two after they are exposed to the bacterium. The diarrhea is often bloody.	Person to person, Foodborne; Flies, and Water.	*Shigella sonnei*, also known as "Group D" *Shigella*, accounts for over two-thirds of the shigellosis in the United States. Other types of *Shigella* (besides Group D) are rare in the United States, though they continue to be important causes of disease in the developing world. One type found in the developing world, *Shigella dysenteriae* type 1, has caused deadly epidemics.
West Nile Virus (Flavivirus)	About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness, and paralysis. Up to 20 percent of the people who become infected have symptoms such as fever, headache and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach, and back. Approximately 80 percent of people (about four out of five) who are infected with WNV will not show any symptoms.	Mosquitoes; Can affect birds, horses, other mammals, and humans.	Eastern Hemisphere: Africa, Europe, and western Asia. Kunjin virus is a subtype of West Nile virus that occurs in Australia. In the United States, in 2006, 3660 cases were reported. Of the 3660, 112 were fatalities.
CDC (http://www.cdc.gov/), WHO (http://www.who.int/en/), and E medicine (www.emedicine.com) websites; and U.S. Food and Drug Administration, *BSE Commonly Asked Questions*.			