ID Snapshot: Human plague cases reported worldwide, including in U.S.
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The largest epidemic of plague occurred between 1348 and 1351 in Europe. Medieval ships returning from Asia were swarming with infected rats that climbed ashore once in port. The infection spread from rats to fleas and from fleas to rats. Infection spread to humans after large numbers of infected rats died, forcing hungry fleas to bite other hosts.

Dressed in a gown made of heavy, waxed fabric, the plague doctor also wore goggles and a mask with a beak that contained pungent substances to purify the air and help relieve the stench. The person also carried a pointer or rod to keep patients at a distance. Illustration courtesy of the U.S. National Library of Medicine This pandemic of the Black Death (named after the purpuric lesions associated with disseminated intravascular coagulation) in the 14th century spread to every country in Europe killing one-third of the population.

Doctors wore a costume (see illustration) when visiting patients. The mask and hat were intended to look like a deity to scare off the disease. The beak was filled with herbs and perfumes to offer protection against the unbearable stench. The long waxed raincoat and gloves were designed to prevent physical contact with a patient.

One theory suggests the epidemic ended when the rodent reservoir in Europe (black rat) was replaced by the brown rat, which was not as prone to transmit the infection.

Which one of the following statements about plague is not accurate?
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a) Plague is a rare, life-threatening, flea-borne zoonosis caused by *Yersinia pestis*.

b) Transmission of *Y. pestis* to humans occurs through the bite of infected fleas, direct contact with infected body fluids or by inhalation of respiratory droplets from ill people or animals.

c) The mortality rate for untreated plague is greater than 60%, and antibiotic therapy reduces the mortality rate to less than 20%.

d) Almost all human cases in the United States occur in New Mexico and Arizona.

e) Sylvatic plague refers to plague in wild animals, including rabbits, prairie dogs, bobcats, coyotes and squirrels.

Answer: d) is an incomplete answer. Most cases of human plague in the United States occur in rural areas of New Mexico, Arizona, Colorado, Utah, California, Oregon and Nevada and are associated with sylvatic reservoirs.

Studies suggest that *Y. pestis* evolved from *Y. pseudotuberculosis*, an enteric pathogen. The evolution from an organism living in the human intestine to a flea-borne pathogen resulted from acquisition of plasmids that enabled the organism to survive in the flea gut and the blood of mammalian reservoirs.

The last plague epidemic in this country occurred in 1924 in Los Angeles. Plague spread from urban to rural rats and soon became entrenched in areas of the western United States.

In recent decades, fewer than 20 cases of human plague have occurred annually in the United States. Through August 2015, 11 cases of human plague had been reported from six states. Two of the cases have been linked to exposure at Yosemite National Park in the Sierra Nevada Mountains.

The World Health Organization reports between 1,000 and 2,000 cases per year with the largest number of human cases occurring in Africa. However, the actual number of cases worldwide and the mortality rate are difficult to assess in developing countries because the disease may not be diagnosed reliably.

The most common sign of bubonic plague is the rapid development of exquisitely tender lymphadenitis (bubo) in a person with fever, chills and weakness who has lived in or traveled to an endemic region or state. A history of a flea bite heightens suspicion of plague. The bubo develops in close proximity to the flea bite. Meningitis is more common in children than adults and is associated with incompletely treated bubonic plague.

Septicemic plague may develop from untreated bubonic plague and is associated with endotoxemia, hypotension and multiorgan failure.

Pneumonic plague develops from inhalation of infectious droplets or may be a complication of septicemic plague. A patient with pneumonic plague requires respiratory droplet precaution. Transmission to humans may occur by inhalation of respiratory droplets from an infected animal, including domesticated cats or dogs.

*Y. pestis* on gram stain shows a bipolar, gram-negative coccobacillus with a "safety pin" appearance. Appropriate specimens for culture include lymph node aspirate, blood, sputum or bronchial washings in a patient with pneumonic plague. Laboratory workers should be notified about possible *Y. pestis* because of the danger of laboratory transmission.
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Therapy should begin as soon as the diagnosis is suspected. Gentamicin and fluoroquinolones are the antibiotics of choice. Doxycycline and chloramphenicol also are effective. Cases of plague should be reported to the National Notifiable Diseases Surveillance System. *Y. pestis* is considered a Category A agent of bioterrorism, especially strains engineered to be resistant to standard antibiotics.

To reduce the risk of plague, the Centers for Disease Control and Prevention recommends gloves while handling or skinning potentially infected animals; use of repellent to reduce exposure to rodent fleas especially in endemic areas; use of flea control products to protect pets; keeping rodents out of homes and trailers in endemic areas; and not allowing pets that roam free to sleep in bed with children. In certain settings, prophylaxis of children exposed to infectious people may be indicated.

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