

Title

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Abstract

During the fourteenth century, the bubonic plague or Black Death killed more than one third of Europe or 25 million people. Those afflicted died quickly and horribly from an unseen menace, spiking high fevers with suppurative buboes (swellings). Its causative agent is *Yersinia pestis*, creating recurrent plague cycles from the Bronze Age into modern-day California and Mongolia. Plague remains endemic in Madagascar, Congo, and Peru. This history of medicine review highlights plague events across the centuries. Transmission is by fleas carried on rats, although new theories include via human body lice and infected grain. We discuss symptomatology and treatment options. Pneumonic plague can be weaponized for bioterrorism, highlighting the importance of understanding its clinical syndromes. Carriers of recessive familial Mediterranean fever (FMF) mutations have natural immunity against *Y. pestis*. During the Black Death, Jews were blamed for the bubonic plague, perhaps because Jews carried FMF mutations and died at lower plague rates than Christians. Blaming minorities for epidemics echoes across history into our current coronavirus pandemic and provides insightful lessons for managing and improving its outcomes.

Keywords: Bioterrorism, Black Death, Bubonic plague, COVID-19, Evolutionary adaptation, Familial Mediterranean fever (FMF), Pneumonic plague, Pylori, *Yersinia pestis*

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I. Introduction

The notorious Black Death, which tore through Europe between 1346-53 was a pandemic of bubonic plague that wiped out more than half the continent's population. Plague has been used as an agent of biologic warfare, as early as 1346 when the Tartar army launched infected corpses over the walls of Kaffa in their effort to conquer the important port city. In World War II, a branch of the Japanese army attempted a biological warfare program by dropping millions of plague-infected fleas throughout China. Thousands of people fell ill as a result of the plague exposure.



Define plague

Plague is an illness you get from *Yersinia pestis* bacterium. You usually get the most common form (bubonic plague) from flea bites, but you can get pneumonic plague from someone who's infected. Plague caused deadly pandemics in the past and still exists in many countries today. You can survive plague if you're treated with antibiotics quickly.

Three types of plagues

The three types of plague — bubonic, septicemic and pneumonic — are each named for the part of your body that gets infected.

Bubonic plague

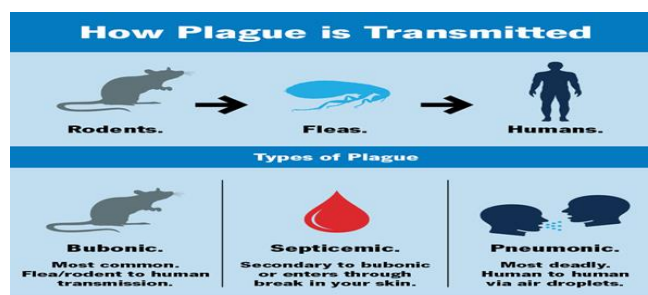
Bubonic plague is the most common form of plague. It's also the most survivable. With quick antibiotic treatment, you have about a 95% chance of recovering from bubonic plague. Bubonic plague makes one or more lymph nodes painful and swollen. The affected lymph nodes are usually near where an infected flea bit you.

Septicemic plague

When *Y. pestis* gets into your blood, you have septicemic plague. It destroys your tissues, leading to gangrene and organ failure. You can get septicemic plague from: A flea bite. Body fluids of an infected animal getting into a break in your skin. *Y. pestis* moving to your blood from another part of your body (secondary infection).

Pneumonic plague

You get pneumonic plague when *Y. pestis* bacteria gets into your lungs. It's the least common and most dangerous type of plague. Pneumonic plague can spread from person to person through coughing and sneezing, just like the common cold. You can also get it from close contact with infected animals or from bacteria moving to your lungs from another part of your body (secondary infection). Pneumonic plague causes severe pneumonia and respiratory failure. If not treated, most people with pneumonic plague die within days.



How does plague spread?

- The bacterium that causes plague, can spread to people from animals or other people. You can get plague:
- By getting bitten by fleas or lice. Fleas bite rats or other animals infected with pestis, and then bite you.
- Directly from an infected animal. You can get infected with *Y. pestis* by touching body fluids or tissues of an infected animal.
- From another person. If someone has *Y. pestis* in their lungs (pneumonic plague), you can get infected if they cough or sneeze on you.
- Animals can also get plague from other animals.

Signs & symptoms

- Fever, Chills.
- Headaches and body aches.
- Weakness and fatigue, Dizziness
- Nausea, vomiting and diarrhea.
- Swollen, painful lymph nodes (bubonic plague).
- Abdominal pain and bleeding from your nose, your mouth or under your skin (septicemic plague).
- Shortness of breath, chest pain, cough and bloody or watery mucus (pneumonic plague).

Management and treatment

How is plague treated?

Plague needs to be treated with antibiotics right away. Your healthcare provider will give medication to you either through your veins (IV) or in a pill to take. Depending on your symptoms and risk, you may start antibiotics even before your provider has your test results.

Medications are used to treat plague

Take antibiotics by mouth or through your veins to treat plague. Your healthcare provider might prescribe one or more of these antibiotics:

- Ciprofloxacin.
- Levofloxacin.
- Moxifloxacin.

- Doxycycline.
- Gentamicin.
- Streptomycin.
- Chloramphenicol.
- Trimethoprim-sulfamethoxazole.

Prevention of plague

- To reduce the risk of plague by avoiding flea bites and being careful around animals that could be infected.
- Clear piles of brush, wood, trash or other places where wild animals might make a home. Don't leave pet food out or feed wild animals.
- Wear bug spray with DEET.
- Pet dogs and cats can spread plague.
- Wear gloves if you have to handle animals that could be infected. This includes living and dead animals.

Vaccine for plague

Vaccines aren't widely used to protect against plague.

Complications

- Tissue death and loss of limbs from gangrene.
- Inflammation of the lining of the brain (meningitis).
- Organ failure.
- Respiratory failure.

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