**Data Collection, Analysis and Representation**

1. Show slideshow of plague history, symptoms, conditions during middle ages, ways to travel through Europe
	* + Topic Research phase of Challenge
2. Altered Game Rules (eliminate Cholera from the game)
	1. Two types of routes LAND/WATER
	2. Each student receives a route plan and a skull (in case of death).
	3. Students must travel to the cities in the order of their route plan.
	4. At each city, students roll the die to see how many nights they will stay in that city. They then draw a bean from the bag for each day they are staying.
		* A white bean means they were not infected with the plague during their stay, record number of days stayed at each city and any comments (ex. Lots of infected people this round. Or “Ahas.”) on travel plan. They may stay one more day if they choose. They then travel to the next city.
		* A black bean means they are infected with plague bacteria. They then travel to the next city on their travel plan. Tape a skull to themselves, mark on the master map where they contracted the plague. They will travel to the next two cities on their itinerary without pulling beans and roll a die at the second city. If they roll a 1,2 or 3 they add a plague bean to the bag. If they roll a 4,5,6 they add 2 plague beans to bag. Put a skull on the bag and die (which you will have). These people return to main area wait for others to finish.
		* At the end of the players game, return to the classroom and students put a big dot on the appropriate graph for their route recording where they died , how many cities did they visited, and how days did they stay in each city before they died. On the world map they put a red little dot where they died.
3. Play game
	* + 1. Data Collection phase of Challenge
			2. \*\* In your supply box you have:
				1. black beans to give out to the infected
				2. masking tape to tape skull on if they die
				3. small skulls to tape to bag when city has been infected
				4. pens/or pencils
				5. student travel plans (6 different routes, many copies of each)
				6. dots to put on graphs
				7. graphs
				8. teacher lesson plan
				9. Beans in labeled bags in appro proportion, labeled containers, dice
4. Have students add dots to appropriate graph after game.
5. Discussion of Results
	1. Why use dice in the game? Concept of Randomness. More accurate method to represent Susceptibility and realistic. Models need it which will help results in the end to be more realistic.
	2. What patterns do you see
6. Rest of Slideshow
	1. What is different? Why was it an epidemic in the Middle Ages and not now? What conditions are different?
	* Sanitary conditions
	* Fleas carrier of bacteria
	* Antibiotics for treatment
7. Designing an appropriate model for the question.
	1. What question can we ask?
		* 1. Does the method of travel effect how the spread of the disease?
			2. What type of trip might be more dangerous, Why?
			3. Is it better to spend more time in a less number of cities or be able to travel to many towns in a short time?
			4. What specific condition speed the spread of the disease?
			5. What would have been the best method of containing the disease?
8. Discuss appropriate research that still needs to be done to Validate Model
9. Discuss appropriate Visualization for data
10. After students leave remember to go out to bags and pull all black beans out of bags.
	1. Then replace these black bean amounts.
		* Marseilles – 3 black beans
		* Bastia- 6 black beans
		* Genoa – 3 black beans
		* Venice – 3 black beans
		* Rome – 6 black beans
		* Cagliari- 9 black beans
		* Marsala – 6 black beans
		* Tunis – 9 black beans
		* Algiers – 3 black beans
		* Barcelona – 2 black beans
		* Lisbon – 2 black beans
		* Remaining bags begin all white beans.

Background information

###### GLOBAL HEALTH

# United States Ranks 11th in Plague Cases Worldwide

The United States now ranks 11th in the world in cases of plague, according to a new survey of the disease.

With 57 cases in a decade, it is far below the hardest-hit countries, Congo with 10,581 and Madagascar with 7,182. Still, it is the only wealthy country on the list; 97 percent of cases are in Africa.

The [survey](http://www.ajtmh.org/content/early/2013/08/22/ajtmh.13-0191.full.pdf%2Bhtml) was published Monday by The American Journal of Tropical Medicine and Hygiene.

The Black Death killed a third of Europe in the 14th century, but cases are no longer found there, probably because cities keep rat populations down, said the author, Dr. Thomas C. Butler, a plague expert at Ross University Medical School in the West Indies. By contrast, in the American Southwest, the bacteria have shifted into rural squirrels and prairie dogs.

Most cases come from flea bites, but in the United States a national parks biologist died after inhaling the bacteria while doing a necropsy of a mountain lion, and a 60-year-old geneticist in Chicago died, apparently after being careless with a research strain he believed was safe.

The biggest outbreaks were among gold and diamond miners in Congo.

Outbreaks were also traced to infected camel meat — one animal in Afghanistan infected 83 people. A 2009 outbreak among herdsmen in China was unusual because it was traced to infected dogs, who had been thought to be plague-resistant.

Diagnoses can now be done with a rapid dipstick test and a vaccine may be available within a decade, Dr. Butler said. **DONALD G. McNEIL Jr.**

NY times

**Third Pandemic** is the designation of a major [Bubonic plague](http://en.wikipedia.org/wiki/Bubonic_plague) [pandemic](http://en.wikipedia.org/wiki/Pandemic) that began in the [Yunnan](http://en.wikipedia.org/wiki/Yunnan) [province](http://en.wikipedia.org/wiki/Province_%28China%29) in [China](http://en.wikipedia.org/wiki/China) in 1855.[[1]](http://en.wikipedia.org/wiki/Third_plague_pandemic#cite_note-Cohn-1) This episode of bubonic plague spread to all inhabited continents, and ultimately killed more than 12 million people in [India](http://en.wikipedia.org/wiki/India) and China alone. According to the [World Health Organization](http://en.wikipedia.org/wiki/World_Health_Organization), the pandemic was considered active until 1959, when worldwide casualties dropped to 200 per year.

[Bubonic plague](http://en.wikipedia.org/wiki/Bubonic_plague) is an infectious disease that is widely thought to have caused several [epidemics](http://en.wikipedia.org/wiki/Epidemic) or [pandemics](http://en.wikipedia.org/wiki/Pandemic) throughout history, including two previous pandemics commonly designated as the [Plague of Justinian](http://en.wikipedia.org/wiki/Plague_of_Justinian) and the [Black Death](http://en.wikipedia.org/wiki/Black_Death).[[2]](http://en.wikipedia.org/wiki/Third_plague_pandemic#cite_note-china-2)

Casualty patterns indicate that waves of this late-19th-century/early-20th-century pandemic may have been from two different sources. The first was primarily bubonic and was carried around the world through ocean-going trade, through transporting infected persons, [rats](http://en.wikipedia.org/wiki/Rat), and cargoes harboring [fleas](http://en.wikipedia.org/wiki/Flea). The second, more virulent strain, was primarily pneumonic in character with a strong person-to-person contagion. This strain was largely confined to Asia, in particular [Manchuria](http://en.wikipedia.org/wiki/Manchuria) and [Mongolia](http://en.wikipedia.org/wiki/Mongolia).

## What Is the Cure for the Bubonic Plague? -- An Overview

The best cure for [**the bubonic plague**](http://plague.emedtv.com/bubonic-plague/the-bubonic-plague.html) is preventing it in the first place. Early [**plague treatment**](http://plague.emedtv.com/plague/plague-treatment.html) offers the best chance for recovery if a person does become infected with the bacteria that causes the disease (Yersinis pestis). [**The plague**](http://plague.emedtv.com/plague/the-plague.html) vaccine is no longer commercially available in the United States.

 What Is the Cure for the Bubonic Plague? -- Prevention

It is likely that [**plague**](http://plague.emedtv.com/plague/plague.html) will continue to exist in its many localized geographic areas around the world, and plague outbreaks in wild rodent hosts will also probably continue to occur. Attempts to eliminate wild rodent plague are costly and futile; therefore, plague prevention is directed toward reducing the threat of infection in humans in high-risk areas through three techniques:

* preventative drug therapy
* Environmental management
* Public health education.

##

## What Is the Cure for the Bubonic Plague? -- Early Treatment

[**Bubonic**](http://plague.emedtv.com/bubonic-plague/bubonic.html) plague is a rapidly progressive illness that can result in death within one week of symptoms occurring; therefore, it is important that bubonic plague be diagnosed and treated early. In 85 percent of cases, early treatments offer a cure for the bubonic plague. Without treatment, the body is only able to effectively fight off the [**plague bacteria**](http://plague.emedtv.com/yersinia-pestis/plague-bacteria.html) (***[Yersinia pestis](http://plague.emedtv.com/yersinia-pestis/yersinia-pestis.html%22%20%5Co%20%22)***) in 10 to 50 percent of cases.

## Causes of Bubonic Plague: An Overview

[**Bubonic plague**](http://plague.emedtv.com/bubonic-plague/bubonic-plague.html) is the most common form of [**plague**](http://plague.emedtv.com/plague/plague.html). The causes of[**bubonic**](http://plague.emedtv.com/bubonic-plague/bubonic.html) plague are bacteria called ***[Yersinia pestis](http://plague.emedtv.com/yersinia-pestis/yersinia-pestis.html%22%20%5Co%20%22)***. This bacteria also causes the other two forms of plague: **[septicemic plague](http://plague.emedtv.com/septicemic-plague/septicemic-plague.html)** and[**pneumonic plague**](http://plague.emedtv.com/pneumonic-plague/pneumonic-plague.html) (see[***Types of Plague***](http://plague.emedtv.com/plague/types-of-plague.html)).

## Causes of Bubonic Plague: Yersinia Pestis

[***Yersinia***](http://bacteria.emedtv.com/yersinia/yersinia.html)pestis bacteria are usually only found in certain parts of the world, such as Africa, Asia, and South America. Approximately 1,000 to 3,000 cases of bubonic plague are reported each year. Between 10 to 20 of these cases are in the United States, most commonly in rural areas of the Southwest.

 Yersinia pestis is most commonly found in rats, but can also occur in other animals. Other animals known to carry Yersinia pestis can include:

* [**Lice**](http://skin.emedtv.com/lice/lice.html)
* Fleas
* Chipmunks
* Mice
* Prairie dogs
* Dogs
* Cats
* Squirrels
* Wood rats.

## How Are Causes of Bubonic Plague Transmitted?

The bacteria that are the causes of bubonic plague are typically transmitted through the bite of an infected flea or rodent. In rare cases, Yersinia pestis bacteria on a piece of contaminated clothing or other material used by an infected person can enter through an opening in your skin. Bubonic plague is rarely spread from person to person.

 Once inside the body, Yersinia pestis travel to the lymph nodes and begin to multiply. (The lymph or lymphatic system is a major component of your body's immune system. The organs within the lymphatic system are the tonsils, adenoids, spleen, and thymus.)

Within two to six days of exposure, [**bubonic plague symptoms**](http://plague.emedtv.com/bubonic-plague/bubonic-plague-symptoms.html) will develop, such as:

* Weakness
* [**Headache**](http://headache.emedtv.com/headaches/headaches.html)
* Fever
* Chills
* Swollen, tender lymph glands (called buboes, hence the name bubonic).

When [**bubonic plague**](http://plague.emedtv.com/bubonic-plague/bubonic-plague.html) is suspected, the person is often hospitalized and placed in isolation and treatment is started even before lab tests come back. Treatment for [**bubonic**](http://plague.emedtv.com/bubonic-plague/bubonic.html) [**plague**](http://plague.emedtv.com/plague/plague.html) usually involves antibiotics and supportive care. Supportive care means treating symptoms and complications that occur as a result of the disease. It's also important for people who have been in close contact with an infected person to be identified and evaluated for possible treatment.

Specific antibiotics used as bubonic plague remedies include:

* Streptomycin
* Gentamycin.

The best [**cure for bubonic plague**](http://plague.emedtv.com/bubonic-plague/cure-for-bubonic-plague.html) is preventing it in the first place. However, if a person does develop bubonic plague, early treatment offers a cure in 85 percent of cases. Left untreated, the body is able to cure bubonic plague in 10 to 50 percent of cases.

## Prevention as a Cure for Bubonic Plague

Plague will probably continue to exist in its many localized geographic areas around the world, and plague outbreaks in wild rodent hosts will likely continue to occur. Attempts to eliminate wild rodent plague are costly and futile; therefore, plague prevention is directed toward reducing the threat of infection in humans in high-risk areas through three techniques:

* Environmental management
* Public health education
* Preventive drug therapy.

**The Black Death held a massive mortality rate of between 30 and 40%. Victims had no idea what had caused the disease. And neither did the doctors in the Middle Ages. The Black Death was treated by lancing the buboes and applying a warm poultice of butter, onion and garlic. Various other remedies were tried including arsenic, lily root and even dried toad. During a later outbreak of this terrible plague, during the Elizabethan era, substances such as tobacco brought from the New World were also used in experiments to treat the disease. Black Death Symptoms
The symptoms of the Black Death were terrible and swift:**

* **A victim would die quickly - victims only lived between 2 -4 days after contracting the deadly disease**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |
|  |
|  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  |  |  |  |