

Cholera

In the mid-1800's, London had already suffered from two serious cholera outbreaks that had killed 14,137 people.

A third outbreak started in 1854. Due to the influence of John Snow (a physician) the pump handle from the broad street pump was removed.

This single act served to drastically reduce the number of cholera deaths.

John Snow is often called the Father of Epidemiology for his work in stopping the cholera outbreak.

So what are the details?

In August of 1854 a cholera outbreak started in Soho (a part of London).

John Snow started investigating the outbreaks and plotting (on a map) where each confirmed outbreak was.

This map is now famous - if we look at it we see a cluster of points around the broad street pump.

He also did a statistical comparison showing cholera mortality was 14 times higher around the broad street pump than another pump further upriver (and had cleaner water).

He did find one anomaly:

People who worked at the Broad Street brewery didn't contract cholera. They drank beer instead of water ("free beer!"), and since boiled water was used for making beer, this killed the bacteria (John Snow didn't know about cholera bacteria).

Incidentally - it is (and was!) well known that drinking beer or ale can be safer than drinking water.

He had to convince people that it wasn't "bad air". The prevailing theory at the time was that bad air ("miasma") caused cholera (and other diseases - "malaria" is named for bad air).

With his careful approach using maps and statistics he is, as mentioned, often regarded as the Father of Epidemiology.

A few miscellaneous details:

John Snow also made substantial contributions to anesthesiology. He was one of the first to use anesthetic (chloroform) to help women with childbirth (including Queen Victoria!)

Some of the cholera patients from Soho wound up at a hospital and tended to by Florence Nightingale (one of the founders of nursing and a well known statistician!)

Epidemiology has become an increasingly important field - how and why do diseases spread, and what can be done to control the spread and/or outbreak.

This is obviously important in the time of Covid-19; we will discuss this a little more when we talk about Covid-19.

So what do we know about cholera?

Cholera is caused by a rod shaped bacteria that gives a comma like appearance. There is a flagellum.

Gram-negative, facultatively anaerobic.

Often found in brackish water, but also many other places. It is possible to get cholera from contaminated seafood.

The bacteria was discovered by Robert Koch (although identified earlier, it wasn't really publicized).

Spread:

Cholera spreads by the fecal - oral route. Poor sanitation can cause cholera bacteria to show up in the water supply.

The broad street pump was later shown to have been pumping water from a “cess pit” (these were used until sewage systems came along - don't confuse them with cesspools which are actually okay if done right).

Casual contact usually does not spread cholera.

Symptoms:

Cholera has an incubation period of between 1/2 to five days.

Most people with cholera do not get symptoms (and can be asymptomatic).

Estimates are that you need about 100 million bacteria to be ingested (which isn't that difficult, actually).

Symptoms start suddenly with diarrhea and vomiting.

This can be severe - if untreated a person can loose 3 to 5 gallons of fluids due to diarrhea a day.

Untreated, about half of these people will die due to severe dehydration and the resulting imbalance of important ions (electrolytes) such as sodium, potassium, etc.

Electrolyte imbalance often leads to muscle cramps and then shock (drop in blood pressure/volume due to dehydration).

Infected individuals often turn blue-gray due to the extreme fluid loss.

Very wrinkled skin and sunken eyes are also very common (again, due to fluid loss).

During this time (and for the next 7 to 14 days - the exact number seems debatable) cholera bacteria are shed in the feces (even if you're asymptomatic (sound familiar?)).

Other symptoms can include:

Low blood sugar

Kidney failure

Some related risk factors include:

Low stomach acid (including people who are taking antacids or proton pump inhibitors (e.g., Nexium). Stomach acid often kills the bacteria.

Blood type O - for some reason people with blood type O are more likely to get cholera than other blood types.

Treatments:

The good news is that if properly treated, the mortality rate for cholera drops below 1%.

The basic treatment is rehydration. Either orally, or in extreme cases intravenously.

Rehydration solution is basically water with important electrolytes added. Think of "Gatorade", except much more precisely balanced.

Some patients may need as much as 1 1/2 gallons of rehydration solution just on the first day.

Antibiotics can help, but there are two problems - one is that rehydration is much more important, and second that there is antibiotic resistance in cholera.

It is recommended that testing is done to figure out if someone has a resistant strain before starting antibiotics.

Zinc is sometimes used in children - it's been shown to reduce diarrhea.

Prevention:

The best prevention is increased hygiene and education.

Some simple things like hand-washing and safe food handling can go a long way to reducing cholera outbreaks.

There is a vaccine

This must be given in two doses (one dose only gives very short term protection).

Provides protection for three years.

Vaccine is oral.

History:

Cholera has been around for a long time. It appears to have been endemic in India, particularly along the Ganges.

The first "pandemic" started in India (about 1817) then spread to the rest of the world (except the Americas).

The British Navy was probably responsible for spreading cholera through the world.

Numerous pandemics hit repeatedly. Eventually getting to the Americas as well.

There have been numerous outbreaks of cholera in the U.S., mostly in the 1800's.

Has killed tens of millions of people since these pandemics started, and it hasn't stopped yet.

The most recent outbreak is in Yemen, which has suffered from a civil war since 2014.

This has resulted in a complete breakdown of any decent infrastructure.

As of 2019, there have been 2,188,503 cases in Yemen, with 3,750 deaths.

Fortunately the international community has gotten involved, which is probably why the death rate has stayed low.