John Snow’s Contribution to Modern Epidemiology

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Outline

1. Who is John Snow?
2. Cholera
3. 1854 London Outbreak
4. Conclusion
The Illness

- Acute diarrheal illness caused by intestinal infection by the bacterium, *Vibrio cholerae*
- Leads to rapid loss of body fluids and ultimately to dehydration and shock
- Without treatment, death can occur within hours [CDC08]
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The Discovery

- Bacterium discovered by the Italian physician Filippo Pacini in 1854
- This discovery of Dr. Pacini was all but ignored by 19th century scientists
- Snow never learned of Pacini’s discovery
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- Miasma theory – diseases arise spontaneously from swamps and decomposed material... Theory was rejected by Snow
- Germ theory – disease is caused by activities of microorganisms, prevailing within the body... Theory was accepted by Snow
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Communication

Snow utilized case studies as a medium to study the disease.

Some conclusions of Snow in case study of John Barnes:
- Hypothesized the incubation period of the disease to be three days.
- Physical contact with an infected victim could lead to the onset of disease.

Subsequent case studies helped Snow learn of other ways of communication.
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Six week period, beginning August 19, 1854

- More than 575 deaths
- “... Mortality in this limited area probably equals any that was ever caused in this country, even by the plague.” [Sno36]
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John Snow’s Rendition of the CF Cheffins Map [Fre99]
The Epidemic

Temporal Distribution of Cholera Incidence/Death

- Incident cases of cholera
- Deaths from cholera
- Broad Street Pump Handle Removed

August

September
Snow’s Hypotheses

- Cholera is transmitted from person to person via fecal-oral route
- Incubation period is 24 to 48 hours
- The drinking water of the Broad Street Pump was the cause of the cholera outbreak
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Snow’s Testing Procedure

- Tested the water of the Broad Street Pump on September 3rd, and on several occasions over the two subsequent days
- Obtained a list of registered cholera deaths from the General Register Office
- Conducted interviews of survivors, to the extent of victims drinking from the water of the Broad Street Pump
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Snow’s Action to Control the Epidemic

- Utilized his map and empirical evidence, to convince the Board of Guardians remove the handle of the Broad Street Pump

- A mere 48 fatal attacks occurred, following the removal of the handle of the Broad Street Pump, indicative that the water feeding the Broad Street Pump could be the source of the cholera epidemic
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Relative Locations of Deaths/Pumps
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John Snow’s actions during the August/September 1854 London cholera epidemic, were truly that of an Epidemiologist

- Snow proposed several hypotheses, including how the disease is spread, and the source of the disease.
- He then examined the General Register’s list of registered deaths from cholera, and examined the drinking habits of both infected and non-infected persons.
- Utilized graphical and empirical evidence to persuade the Board of Guardians remove the handle of the Broad Street Pump.

Epidemiology: “The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems” [Las00]
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