Foundation Standard 3

3.14 Explain the impact of emerging issues such as technology, epidemiology, bioethics, and socioeconomics on healthcare delivery systems.
What is epidemiology?

• Epidemiology is the study of health and disease in human populations.
• It’s all about public health.
Epidemiologists

- Investigate diseases or outbreaks
  - Where they started
  - Who affected
  - How to prevent it

- Epidemiologists study
  - Communicable disease
  - Cardiovascular disease
  - Cancer
  - Mental illness
  - Accidents
  - And more…. Literally – they “count”!
Epidemiologists Count

- For example, they count the number of times a condition (disease) occurs in relation to the total number of people.
- We call that PREVALENCE.
- So, if we counted the number of children with asthma in a community and determined that 5% had asthma, we could say that the PREVALENCE of asthma is 5% in this specific community.
Disease Detectives

• Epidemiologists investigate disease outbreaks.
• They determine where an outbreak came from, and how to prevent it.
• Think of them as “disease detectives.”

• What if…a number of students at your school become sick with a strange illness. What questions would you ask if you wanted to “investigate” the disease outbreak?
Surveillance

- Police watch a suspect or location to determine what is taking place.
- Epidemiologists also practice SURVEILLANCE, but they are searching for and documenting disease.
- SURVEILLANCE keeps track of a number of public health concerns, including abuse, violence, sexually transmitted diseases, and communicable disease outbreaks.
Monitoring

• MONITORING uses surveillance data to determine changes in the number of affected (or infected) people.

• MONITORING tells us if there is more or less of a particular disease/condition.

• These measurements are used to create a picture of how a disease is affecting society.

Photo courtesy of CDC/ Edward Baker, M.D., M.P.H. from the Public Health Image Library.
**Incidence**

- **INCIDENCE** is the number of new cases of a disease or event in a specific population.

- For example, epidemiologists might measure the incidence of influenza in children.

- Is there anything you could measure the INCIDENCE of in your school?
Morbidity

• The number of cases of a specific disease in a specific period of time per unit of population, usually described as a number per 1000.

• During an influenza epidemic, influenza MORBIDITY may reach 300/1000 in children.

Photo courtesy of CDC/ Dr. John Noble, Jr, from the Public Health Image Library.
Mortality

- A measure of the number of deaths in a given population.
- The Infant Mortality rate in America is 6.4 deaths per 1,000 live births.
- Is the data in this chart important? Why?

<table>
<thead>
<tr>
<th>Infant Mortality Rates 2007</th>
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<tr>
<td>Angola</td>
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Photo courtesy of CDC, from the Public Health Image Library.
Risk

• RISK is the likelihood that someone will become infected or develop a condition.

• RELATIVE RISK may change relevant to a specific factor.

• A study reports that smokers face a relative risk of dying from lung cancer 24 times higher than non-smokers.

Photo courtesy of CDC, Perry, from the Public Health Image Library.
Now You’re Talking Epidemiology!

In groups of 3-5, discuss:

• What do you think the impact of epidemiology is on the healthcare delivery system?
Emerging Diseases

• New diseases:
  – SARS (Severe Acute Respiratory Disease) 2003
    • Virus, started in China
  – Legionnaire’s Disease 1976, hotel in Philadelphia
    • Bacteria in air conditioning system, 29/189 died
  – Staph aureus discovered 1880
    • Methicillin developed 1940 (abx)
    • MRSA by 1961
Re-emerging Diseases

• Something we thought was eradicated or seldom occurred:
  – Tuberculosis (TB)
  – Can be dormant 10 years before sx appear
Emerging Zoonoses

• Diseases that are able to cross species:
• > 200 zoonotic diseases; most are not emerging
  – Rabies
  – Anthrax
  – HIV/AIDS 1981
    • Virus developed from non-human primates in sub-saharan Africa
Emerging zoonotic diseases

- Bovine spongiform encephalitis (BSE)- Mad cow disease (1980s)
  - A brain-wasting disease
  - From a prion
    - A normal part of a protein that misfolds on itself
  - When exposed to these types of prions, a person’s or animal’s own prions change to this deadly type

- Avian flu, virus in birds
  - Flu-like sx with severe respiratory problems, death
  - Highly contagious among birds, Hong Kong, 1996
  - 1997 first occurred in humans (bird to humans)
Zoonoses

75% of emerging/new diseases that affected humans over the last 10 years were caused by pathogens from animals (Source WHO - 2014)