Basic concept of Epidemiology

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What is Epidemiology?

“Epidemiology is the study of how disease is distributed in the populations and the factors what influence or determine this distribution.”

“Epidemiology is the study of the distribution and determinants of the health related states or events in specified populations and the application of this study to control of health problems.” – A Dictionary of Epidemiology, ed 2. New York, Oxford University Press, 1988.
WHO definition of Epidemiology

“The study of the distribution and determinants of health and disease in human populations to enable health services to be planned rationally, disease surveillance to be carried out, and preventive and control programs to be implemented and evaluated.”
The objectives of Epidemiology

1. To identify the etiology or the cause of a disease and the risk factors- that is, factors that increase a person’s risk for a disease.

2. To determine the extent of disease found in the community.

3. To study the natural history and prognosis of disease.
4. To evaluate both existing and new preventive and therapeutic measures and modes of health care delivery.

5. To provide the foundation for developing public policy and making regulatory decisions relating to environmental problems.
Hippocrates onward: miasma and health
Population mortality: 1600’s onwards
Quantitative methods: France in the 1800’s
English sanitary physicians: the 1800’s
The bacteriologic revolution: the 1800’s on
Infectious disease epidemiology: TB, malaria, HIV/AIDS, cholera, influenza
The rise of “chronic disease epidemiology”: 1950’s onwards
The speciation of epidemiology: from the 1970’s
New fields: Clinical epidemiology, genetic epidemiology, molecular epidemiology
History of Epidemiology

Pioneers

- John Graunt
- James Lind
- Charles-Alexander Louis
- William Farr
- John Snow
- Wade Hampton Frost
- A. Bradford Hill/Richard Doll
Changing patterns of community health problems

A sign in cemetery in Dudley, England, in 1839. (from Dudley Public Library, Dudley)
Epidemiology and prevention

- Identifying subgroups in the population who are at high risk.
  - Proper direction of preventive efforts
  - Identify modifiable and non-modifiable factors or characteristics
- Prevention
  - Primary
  - Secondary
- Approach
  - Population based
  - High-risk
Epidemiological approach

- Association between exposure to a factor and development of a disease
  - Is the association statistically significant?
  - Can it be explained by bias?

- Is the relationship causal?
  - Is the association consistent with other data?
  - Are the criteria for causality met?
Example

- Flouride and dental caries

Edward Jenner 1768 heard
- “I cannot take the smallpox for I have already had cowpox.” – A dairy maid

John Snow
- “Cholera was transmitted through contaminated water”
- The intake of water companies in London was in a very polluted part of Thames river
Figure 1-12 ▼ Photograph of John Snow. (From the Wellcome Historical Medical Museum and Library, London.)
Snow’s findings

<table>
<thead>
<tr>
<th>Water Supply</th>
<th>No. of Houses</th>
<th>Deaths from Cholera</th>
<th>Deaths per 10,000 Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwark and Vauxhall Co.</td>
<td>40,046</td>
<td>1,263</td>
<td>315</td>
</tr>
<tr>
<td>Lambeth Co.</td>
<td>26,107</td>
<td>98</td>
<td>38</td>
</tr>
<tr>
<td>Other districts in London</td>
<td>256,423</td>
<td>1,422</td>
<td>56</td>
</tr>
</tbody>
</table>

Epidemiology is an invaluable tool for providing the rational basis on which effective prevention programmes can be planned and implemented and for conducting clinical investigations that contribute to the control of disease and to the amelioration of the human suffering associated with it.
THANK YOU