

BMS1042 – Epidemiology

FOUNDATIONS

Epidemiology is the study of the distribution and determinants of the health and disease in populations and the application of this study to control health problems.

Causation – something that either alone or in combination with other things produces an outcome. Cause must precede event.

Causation – sufficient and necessary

- A risk factor is **sufficient** if the presence of this factor alone is enough to result in the disease. Components can make things sufficient but there is a necessary cause across different components
- A risk factor is **necessary** if the disease is never present when the factor is not present
- Smoking is neither necessary nor sufficient for development of lung cancer
- E.g. Chicken salad may be sufficient for salmonella but the salmonella bacteria is a necessary cause
- E.g. It is necessary to be exposed to mycobacterium tuberculosis to get TB but exposure is not sufficient for disease as poor immune also contributes
- E.g. Ebola virus is necessary and sufficient for Ebola fever
- If there is an **association** between a possible cause and effect, there could be a confounding variable influencing the association, it could be biased or be due to chance

Risk Factors

- Risk factors are used to describe factors associated with disease but not casual.
- Few diseases have a single cause and therefore, contributing factors are called **risk factors** e.g. repeated exposure, age, sex, exposure

Factors in causation – Some/all may be necessary, rarely one is sufficient

- **Pre-disposing:** age, sex, previous infection, certain genetic traits
- **Enabling/disabling:** low income, poor nutrition, inadequate access to health care = disabling. Circumstances that may aid recovery = enabling.
- **Precipitating** – exposure to a disease agent
- **Reinforcing** – repeated exposures, environmental conditions, physical stress

Attributable fraction – quantifies the likely preventive impact of eliminating a specific casual factor. E.g. removing smoking will probably decrease lung cancer

Causation establishing evidence

- **Temporal relationship** – cause must precede the effect. **Necessary for causation.** Exposure occurs before the disease
- **Plausibility** – consistent with other knowledge (but other evidence may just be lacking and can be from animal studies)
- **Consistency** – several studies giving the same finding (more than one study)