



Epidemiology for Beginners

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Introducing the basics and explaining the terminology

Take Home Messages:

Epidemiology describes the risk of disease, injury or death. It predicts disease based on risk factors or exposure. It is a tool used to assess populations and improve the health of the general public.

Better understanding of the terminology, types of studies and study analysis can assist occupational health nurses in the workplace. For more information about epidemiology, see our 'Summary of article information' below.

Why the article matters:

Epidemiology is the study of distribution and determinants of injury and disability. It describes the health status of populations, explains the causes of disease and is used to predict the occurrence of disease in the future.

Epidemiology is a common topic presented by the media. There are many reports about outbreaks and chronic health problems. Many occupational health nurses are often asked their



opinion on such issues. They must be able to sufficiently assist workers in interpreting these reports. They must also be able to recognise situations in the workplace that warrant further investigation and intervention.

This paper talked about the basics of epidemiology and its application in the workplace.

Summary of article information:**Common Terminology**

Epidemiology uses a special vocabulary to describe the frequency and occurrence of disease. Below, are some commonly used terms.

- Incidence – number of new events in a specific population during a specific time period. Eg. the incidence of tennis elbow is 4% per annum means that in any one year four percent of the population develops a new case of tennis elbow;
- Prevalence – number of existing cases in a given population at a given time. eg. The prevalence of back pain in the community is 25% means that at any one time 25% of the population reports they have back pain. Commonly used with chronic disease; and
- Ratios – a comparison between two groups that are not necessarily related to one another.

Examining patterns of person, place and time

Gathering information about person, place and time is helpful in establishing patterns of injury and illness. Patterns assist in identifying whether a risk factor is necessary and sufficient to cause disease.



A true association between risk factor (causal agent) and disease must possess three features:

1. A link between causal agent and disease should be clearly seen;
2. The causal agent must come before the disease; and
3. The causal agent may lead to the disease, but not vice versa.

There are nine guidelines that assist in determining if a risk factor is a cause or contributing factor to a disease:

1. Strength of association – the higher the risk the higher the chance of the disease occurring;
2. Consistency – the same finding is noted in a range of studies. Consistent findings increase the likelihood of a risk factor causing the disease;
3. Specificity – a cause leads to a single effect and a specific effect only has one cause;
4. Temporality – exposure to the risk factor happens before the disease occurs;
5. Biological gradient – consequences are greater with increased exposure;
6. Plausibility – being able to answer the question “Does this make sense?”;
7. Coherence of explanation – findings should not conflict with known facts;
8. Experiments – fewer ‘by chance’ factors influence the outcome; and
9. Analogies – comparable situations exist and outcomes are similar.

Study Designs

Different types of research studies are used in epidemiology. Each study design has its pros and cons.

- Correlation study – studies relationships between variables. Used when little is known about a situation and funds are limited;
- Case study – descriptions of a single case;
- Cross-sectional study – gathers information about a population at a specific time and analyses the information;
- Case-control study – compares patients with a disease to those without a disease. A relatively quick, easy and cost effective way to study rare diseases;
- Cohort study – a large study that uses randomly selected subjects from a whole



population; and

- Intervention study – an experiment where something is done to one group of subjects and nothing is done to another group of subjects.

Study Analysis

- Odds ratio – describes the probability of exposure among cases compared with the probability of exposure among controls. A ratio of 1.0 means that the probability of exposure is the same for cases and controls;
- Relative Risk ratio – compares the risk of getting the disease among the exposed to the risk of getting the disease among the unexposed.

Bias in studies Every study has limitations. Researchers attempt to minimise bias through careful study design. Some common sources of bias are:

- Selection bias – occurs when every individual in a population being studied does not have an equal opportunity to participate in the study;
- Information bias – occurs when individuals are asked to recall information, due to varying degrees of memory;
- Misclassification – occurs when a clear, defined standard for placing a subject into one category or another is missing; and
- Confounding – distortion of risk factor effect on the outcome caused by another factor that is associated with both the risk factor and the disease.

Original research:

Epidemiology Basics for Occupational Health Nurses

Lukes E.

AAOHN J. 2007 Jan;55(1):26-31



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