WM00P-15 Epidemiological and Statistical Methods for Quality Improvement

20/21

Department
Warwick Medical School
Level
Taught Postgraduate Level
Module leader
Daniel Todkill
Credit value
15
Module duration
7 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

The module aims to give students a systematic understanding of epidemiological methods, their applications, strengths and weaknesses and current methodological issues; and comprehensive knowledge of the application of medical statistics to the assessment of risk and disease impact.

Module aims

Epidemiological trends are seen as key drivers that shape health service utilization and in turn, the health care sector. This module introduces the basic concepts of epidemiology and statistics from a public health perspective and their influence on the health care sector. The module will provide an understanding of principles and methods applied in epidemiology, along with the use of data and statistical approaches that are used to describe and understand health of populations. Module materials will examine the relations between risk factors and diseases and their impact on health service utilization. The module will also examine some of the legal and ethical issues that must be addressed when dealing with epidemiologic events. Some specific aims include:

--Understand the relationships between epidemiology and statistics as applied to the improvement of health and prevention of quality problems.

--Understand how the relationship between epidemiology and statistics influences service delivery.

--Examine various data analysis techniques and conduct basic descriptive level statistical analysis

--Critically review relevant epidemiological concepts and statistical methods to understand factors that shape service utilization.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1. Risk factors and diseases.
2. Types of data, descriptive statistics, probability and conditional probability.
3. Introduction to R software for statistical analysis.
4. Role of epidemiology in the design of quality improvement processes
5. Populations, sampling procedures, principals of inference, and sample size calculation.
6. Impact of epidemiology on national and local policy.
7. Inference in practice for different types of data.
8. Associating risk factors with disease incidence
9. Influence of epidemiology on ethical and professional issues
10. Evaluating the role of bias and confounding; Causation
11. Multiple linear regression, logistic regression

Learning outcomes

By the end of the module, students should be able to:

- Upon successful completion of the module, participants will be able to apply concepts and principles of epidemiology and statistics to understand how they shape the organization of care in a given community for the improvement of health. Students will be able to: • Critically review the impact of epidemiology on health policy and quality improvement specifically.
- Understand the different types of data, and how to generate appropriate descriptive and inferential statistics for each.
- Develop an in-depth understanding about measures of association in identifying risk factors of diseases, and the role of bias and confounding.
- Describe criteria for characterizing the causality of associations.
- Describe in detail the different types of experimental designs, and how sample sizes are estimated.
- Conduct and interpret multiple linear regression, logistic regression.

Indicative reading list

Basic statistics and epidemiology: a practical guide Book by Antony Stewart; Taylor an
An introduction to medical statistics Book by Martin Bland
Statistical questions in evidence-based medicine Book by Martin Bland; Janet Peacock 2000

Subject specific skills

By the end of the module you should understand the following concepts and features that are encountered in epidemiological studies.
Measures of disease
Use of routine statistics
Direct and indirect standardisation, years of life lost, life expectancy and Disability
Adjusted Life Years
Absolute and relative measures of risk
Causality, bias and confounding
Methodologies: analytic and observational, cross-sectional, case control, cohort, clinical trials, ecological studies Numbers needed to treat (NNT)
You should also be able to understand the following statistical principles and be able to use them to analyse epidemiology studies
Probability theory
Statistical distributions
Principle of inference from a sample
Measures of location and dispersion of data
Hypothesis testing, type I and II errors, calculating power
Parametric and non-parametric tests for comparisons
Estimation and confidence intervals

Transferable skills

Communication (written, verbal, and graphical)
Numeracy and analysis
Use of information technology (statistical analysis software)
Ability to learn with and from others (teamwork

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (10%)
Seminars	15 sessions of 1 hour (10%)
Practical classes	5 sessions of 1 hour (3%)
Private study	115 hours (77%)
Total	150 hours

Private study description

Self study to complete the two part written assignment

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A1

	Weighting	Study time
Report	100%	

Written assignment comprising 2 parts. Overall 50% pass mark Part 1: A 2000 word write up of an epidemiological study design (50% of module mark) Part 2: Written short responses to set statistical questions (50% of module mark). There is to be compensation between the two parts; i.e... a combined pass mark of 50% is required to pass the module. If a student scores below 50% for one part of the module (part A or B), but above 50% for the other part and the combined average is more than 50% this will constitute a pass. Should the combined average be below 50%, this will constitute a fail.

Feedback on assessment

Written feedback using a standardised rubric.

Availability

Courses

This module is Core optional for:

- Year 1 of TWMS-B9AA Postgraduate Healthcare Operational Management