

Health Research Methods and Biostatistics Hong Kong Course

Oct 2008

Conducted by Prof Karen Grimmer-Somers

Centre for Allied Health Evidence

University of South Australia

Australia

Course aims

- To provide students with structured opportunities to develop as educated consumers of health sciences research

On completion of this course students should be equipped

- To understand quantitative research designs and their application to research questions, with particular reference to clinical practice
- To understand different types of quantitative research data
- To undertake basic data analysis for quantitative research
- To demonstrate an understanding of statistical aspects of research publications with particular reference to clinical practice

Course timetable

The course consists of five intensive days of didactic lectures, practical computer-based tutorials, practicals in which published research is read and discussed in terms of research methodology, statistics and interpretation, and practical group assignments.

Timetable

<p>Wed 15th Oct</p>	<p>1. Excellence in clinical practice Aims of lecture</p> <ul style="list-style-type: none"> • <i>To introduce quality assurance principles within a quantitative research paradigm</i> • <i>To introduce quality assurance/ improvement studies</i> <ul style="list-style-type: none"> – <i>Case note audits</i> – <i>Clinical indicators</i> – <i>Benchmarking</i> – <i>Clinical guidelines</i> <p>2. Introduction to measurement Aims of lecture</p> <ul style="list-style-type: none"> • <i>to review quantitative measures</i> • <i>to discuss the usefulness and application of different types of quantitative measures</i> <p><i>to examine foundations of statistical analysis</i></p> <p>Practical</p> <p>3. Outcome measures Aims of lecture</p> <ul style="list-style-type: none"> • <i>To explore different types of outcome measures</i> • <i>To understand statistics related to outcome measures</i> <p><i>To identify opportunities for outcome measurement in clinical practice</i></p> <p>Practical</p> <p>4. Psychometric Properties of Outcome Instruments Aims of lecture</p> <ul style="list-style-type: none"> • <i>To introduce the concepts underlying psychometric properties (validity, reliability, sensitivity to change)</i> • <i>To consider validity from perspectives of availability of Gold Standard measures and no Gold Standard</i> • <i>To consider reliability from perspectives of instrument & measurer error, and subject variability</i> • <i>To consider error in terms of effect of intervention</i> <p><i>To consider sensitivity to change in terms of discrimination between patients, and their capacity to improve</i></p>
<p>Practical interspersed with lectures Day 1</p>	<p>Practical 1 Reading and discussing clinical improvement papers</p> <p>Practical 2 Excel dataset analysis</p> <p>Practicals 3 & 4 Discussing chosen outcome measures, their clinical use and their psychometric properties</p>

Thurs 16 th Oct	<p>5. Exploring the two main quantitative paradigms in the hierarchy of evidence Aims of lecture</p> <ul style="list-style-type: none"> • To introduce key concepts of experimental and observational study designs • To examine critical elements of study quality • To explore key statistical features of study elements <p>6. Experimental studies: group designs Aims of lecture</p> <ul style="list-style-type: none"> • To explore the theory of experimental group research design • To consolidate measurement theory relative to group experimental studies • To consider basic group experimental statistics <p>To commence critical appraisal of experimental studies</p> <p>7. N=1 (single case) studies A special type of experimental study Aims of lecture</p> <ul style="list-style-type: none"> • To explore the design and analysis of N=1 experimental studies • To consolidate measurement theory relative to N=1 experimental studies • To consider basic experimental statistics for N=1 studies
Practical interspersed with lectures Day 2	<p>Practical 5 Read and discuss selected experimental studies (RCT, CCT, Case series, N=1</p> <p>Practical 6 Design N=1 study for clinical application including outcome measures and statistical approaches</p>
Friday 17 th Oct	<p>8. Data analysis: Comparative data sets equal interval data Aims of lecture</p> <ul style="list-style-type: none"> • To consider data organisation prior to calculating and comparing effects from intervention • To introduce statistics that compare effects from interventions • To consider comparative statistics relevant to equal interval data <p>9. Data analysis: Comparative data sets_ categorical data Aims of lecture</p> <p>To consider comparative statistics relevant to categorical data</p> <p>10. Sample size calculation Aims of lecture</p> <ul style="list-style-type: none"> • To consider the elements underpinning sample size calculation • To consider samples in terms of Types I and II error <p>To consider sample size calculation in terms of hypothesis generation</p> <p>11. Individualising treatment decisions from known treatment effects Aims of lecture</p> <ul style="list-style-type: none"> • To consider statistically and clinically significant outcomes from intervention studies • To calculate Number needed to Treat • To calculate effect size <p>To introduce decision-tree concepts</p>
Practical interspersed with lectures Day 3	<p>Practical 7 Ms Excel data analysis using equal interval and categorical data</p> <p>Practical 8 Re-read studies from Day 2 with special attention to statistics</p> <p>Practical 9 Calculate sample sizes using sample size calculators and post hoc calculators</p> <p>Practical 10 Calculate NNT from selected studies</p>

Sat 18 th Oct	<p>12. Epidemiology: <i>Descriptive (prevalence) studies</i> Aims of lecture</p> <ul style="list-style-type: none"> • <i>To introduce students to the concepts of epidemiology</i> <ul style="list-style-type: none"> – <i>Prevalence</i> – <i>Cause and effect</i> – <i>Confounding</i> • <i>To discuss sampling issues for descriptive studies</i> <p><i>To discuss basic epidemiological measures</i></p> <p>13. Epidemiology: <i>Observational studies</i> Aims of lecture</p> <ul style="list-style-type: none"> • <i>To introduce students to the concepts of cause and effect</i> • <i>Relationships and associations</i> • <i>To discuss causal pathways</i> • <i>To present statistical methods of dealing with confounding and effect modification</i> <p>14. Epidemiology: <i>considering confounding and modification</i> Aims of this lecture</p> <ul style="list-style-type: none"> • <i>To explore confounding and effect modification within a causal pathway</i> • <i>To outline statistical methods of dealing with confounding and effect modification</i>
Practical interspersed with lectures Day 4	<p>Practical 11 Statistical analysis of epidemiological data</p> <p>Practical 12 Read and discuss selected epidemiological papers</p>
Sun 19 th Oct	<p>15. Developing and using surveys Aims of lecture</p> <ul style="list-style-type: none"> • <i>To introduce the concepts of survey instrument development</i> • <i>To look at common design faults in survey construction</i> • <i>To consider the analysis of survey data</i> • <i>To consider reporting from surveys</i> <p>16. Course revision in Question and Answer Session</p>
Practical interspersed with lectures Day 5	<p>Practical 13 Design a survey instrument</p> <p>Practical 14 Consider what testing is required to establish its validity</p> <p>Practical 15 In small groups, design a study protocol using a choice of research questions. Present this to the class</p>
External Assessment	<p>Two weeks after the course, students should complete a 2 hour written exam testing the intent and constructs of the course based in practical readings, data analysis tests and research design</p>