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Appendix: BCA Assessment Guide

Module 1 Clinical Agreement

Module 2 Statistical Process Control

Module 3 Systematic Reviews and Meta-Analysis

Module 4 Diagnostic Tests
Study Guide

1. Introduction

This unit or course comprises four topics that are important for practising biostatisticians, especially those working in clinical settings or, more generally, evidence-based health care. Each topic is covered in a module designed to take 3 weeks to complete. Each module is more or less independent and comprises a study guide, readings, exercises and an assignment.

Assumed knowledge

The following BCA units are recommended pre-requisites.
- MBB: Mathematical Background for Biostatistics
- EPI: Epidemiology
- PDT: Probability and Distribution Theory

2. Contacts

The coordinator for this course Mark Jones whose contact details are:

School of Population Health, Public Health Building
University of Queensland
Herston Road, Herston QLD 4006
E-mail: m.jones@sph.uq.edu.au
Office phone: 07-3365 5116; Fax: 07-3365 5540

The lecturer for Module 1 is Annette Dobson whose contact details are:

School of Population Health, Public Health Building
University of Queensland
Herston Road, Herston QLD 4006
E-mail: a.dobson@sph.uq.edu.au
Office phone: 07-3365 5346; Mobile 0417 214 501; Fax: 07-3365 5540

The lecturer for Modules 2, 3 and 4 is Mark Jones – see contact details above

If you have difficulties contacting the coordinator or lecturer, or would like to discuss your BCA program in general, please contact the BCA Executive Office, Erica Jobling.
3. Objectives

The specific objectives of each module are as follows: on completion of the modules you should (be able to)

**Module 1 – Clinical Agreement**

- Explain the concepts of validity and reliability of measurements
- Explain how agreement or consistency between 2 or more measures differ from simple correlation or regression
- Use appropriate graphical and analytical methods to assess agreement between 2 raters using continuous, nominal or ordinal category measurements
- Select, calculate and interpret appropriate linear models and intra-class correlations for some simple situations involving more than 2 raters using continuous scale measurements

**Module 2 – Statistical Process Control**

- Understand the concepts of Continuous Quality Improvement and their usage
- Distinguish between Special Causes and Common Causes of variation
- Detect Special Causes of variation using a Shewhart control chart
- Detect Common Causes of variation using a CUSUM control chart
- Detect Common Causes of variation using a EWMA chart

**Module 3 – Systematic Reviews and Meta-Analysis**

- Explain the rationale for doing systematic reviews, rather than traditional narrative reviews
- Describe the steps involved in undertaking a systematic review
- Describe the biases that can affect systematic reviews
- Conduct a meta-analysis using statistical software
- Assess and measure heterogeneity across trials in a systematic review
- Use meta-regression in a systematic review

**Module 4 – Diagnostic Tests**

- Know how to translate the pre-test probability of disease for a particular patient into post-test, predictive values.
- Be able to plot and interpret a ROC curve.
• Know how to calculate sample size for a diagnostic test study.
• Be able to calculate the diagnostic odds ratio, know its advantages and disadvantages and understand its relationship to the ROC curve.
• Understand sources of heterogeneity in meta-analyses of diagnostic test and in particular heterogeneity due to differences in diagnostic threshold (cut-off point).
• Be able to meta-analyse sensitivity, specificity and diagnostic odd ratio.

4. Method of Delivery & Communication

The unit materials will be posted to you, with your copy of this guide. The material is also available on the BCA eLearning site, along with the data sets for exercises and assignments.

We would like to encourage the use of the discussion board facilities on the eLearning site, in order to try and reduce the isolation of studying by distance. Firstly, you will see a ‘Student Introductions’ forum on the discussion board. You can add your own information to this forum, if you wish, so that others in the course can contact you. For example:

Jonathan Bloggs
j.bloggs@ctc.edu.au
ph: 02-9999-9999
NHMRC Clinical Trials Centre, Sydney
Jonathan is a trainee biostatistician at the Clinical Trials Centre. He is currently working with trials of new medications for diabetes and heart disease.

This is entirely optional. If you would like to be part of the forum, but without your contact details, that will be fine as well.

When you log in to the eLearning site, you will see under ‘Discussions’ various forum headings. We will include some general discussion points in each module to encourage discussion amongst the group, but would like you to discuss matters and help each other as much as you can. Some students in the past have said they haven’t used the discussion board as much as they would have liked, as they didn’t want to be seen to be colluding in the preparation of assignments. We encourage discussion about the course material, and assignments, as long as worked answers are not given. Based on feedback from previous students we are no longer allocating any marks for participation in discussions.

Please send your assignments to us using the eLearning assessment icon. This will enable you to receive an automated acknowledgement of receipt. Assignments will be sent, and marks posted using the eLearning assessment tool.

We encourage you to maintain regular contact with the coordinator and get in touch with her if you have any problems.
5. Unit Materials

The course consists of four modules. Each module has some brief notes to guide your reading and study. The modules usually begin with an overview paper, generally written from a more clinical perspective, in order to orient you to the significance of the topic, and to put it in context of real-world clinical problems. The rest of the readings in each module then give more statistical depth to the topic. We have chosen to present this course using mainly journal articles, rather than a textbook. Firstly, there is no textbook that covers all four of these topics. Secondly, reading journal articles and extracting the relevant information to the problem at hand is part of the real-world experience of a practising biostatistician. It is not an easy skill to develop! Many articles will have more detail than you require. We suggest you practise summarising what you did learn, and what you could not decipher from each article. Then go to the discussion board and see if you can work it out with your fellow students. In some cases we have deemed a subset of the readings as optional. This is because they cover similar material to other readings or they are not essential but present additional interesting or valuable material. It is suggested that students read the optional material if they have time or if they feel they need to obtain additional background information. Materials are changed from year to year in response to student feedback and unit reviews conducted as part of the continuous quality improvement processes of the BCA.

Each week we will upload a short video to go with the reading material for that week. The videos are power-point presentations with slides and an audio track that will hopefully enhance the written material. Each module concludes with exercises, for which outline solutions are provided or will be posted on the eLearning site for CLB.

6. Software

For this course you will need access to software that can perform the various analyses required for the exercises and assignments. Stata is recommended, although other students have successfully completed this course using R or SAS. Excel is quite useful for several modules. Stata commands given are in some modules. Data sets for the course are provided on the CLB eLearning site.

7. Textbooks

There is no recommended textbook for this course. Readings are provided for each module instead.

8. References

The main readings from journal papers and textbooks are provided with each module. Additional references are provided on the CLB eLearning site. Recently a textbook has been published that covers similar material to 3 out of the 4 modules of this course. We suggest it may be useful as background reading. The reference is:

9. Assessment

The assessment is based entirely on the assignments. There is no examination. Details of assignments are given in the modules. They are in the form of written reports. They must follow a logical form, be in correct English and contain relevant, well labelled tables and figures (but raw computer output is not acceptable). We suggest you consider writing your assignments in a similar fashion to a journal article, with clearly defined aims, methods, results and conclusions. The following two documents available on the BCA website as resources for current students may be helpful:

Guide for Reporting Statistical Results
Referencing Style Guide

They are available at www.bca.edu.au/currentstudents.html

The dates for submitting the assignments are listed below (see Timetable). For each module there is an assignment is worth 25%. All assessment must be submitted to pass the course.

Before commencing the course, you should read the BCA assessment guide (Appendix), and the information about the plagiarism policy of your home university.

Assessment deadlines are important.

Extensions or late submissions policy

Requests for an extension an assignment must be made in advance of the due date. Requests must be made directly to the module coordinator by email. The module coordinator will reply with the decision as to whether an extension has been granted and the new due date.

Extensions can cause delays in feedback for other students who submitted on time. Also due to prerequisites, late results may preclude you from studying subsequent units. Different universities have different result submission deadlines. BCA results have to be transmitted between universities, which shortens the available time.
10. Timetable

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Module</th>
<th>Co-ordinator</th>
<th>Due date for Assignment and end date for discussion of the Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>March 2 – 8</td>
<td>1</td>
<td>Annette Dobson</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>March 9 - 15</td>
<td>1</td>
<td></td>
<td></td>
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<td>3</td>
<td>March 16 - 22</td>
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<tr>
<td>4</td>
<td>March 23-29</td>
<td>2</td>
<td>Mark Jones</td>
<td>March 23 for Module 1</td>
</tr>
<tr>
<td></td>
<td>March 30-April 12</td>
<td>2</td>
<td>Semester break &amp; public holidays</td>
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<tr>
<td>5</td>
<td>April 13-19</td>
<td>2</td>
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<td>April 20-26</td>
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<td>7</td>
<td>April 27-May 3</td>
<td>3</td>
<td>Mark Jones</td>
<td>April 27 for Module 2</td>
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<tr>
<td>8</td>
<td>May 4-10</td>
<td>3</td>
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<td>May 11 –17</td>
<td>3</td>
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<td>10</td>
<td>May 18-24</td>
<td>4</td>
<td>Mark Jones</td>
<td>May 18 for Module 3</td>
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<td>May 25-31</td>
<td>4</td>
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<td>12</td>
<td>June 1-7</td>
<td>4</td>
<td></td>
<td>June 8 for Module 4</td>
</tr>
</tbody>
</table>

11. Complaints policy

Please see the BCA complaints policy in the Assessment Guide and in online assessment submission pages.

12. Summary of recent changes to materials and/or procedures

The main changes are:

- New assignments for the modules will be included
- Marks are no longer being given for contributions to on-line discussions
- A discussion and references have been added to Module 3 on limitations of fixed effects meta-analysis and the DerSimonian and Laird method with suggestions for alternatives

Feedback is always welcomed to improve the unit.
Appendix – BCA Assessment Guide

This can be accessed via the web at:

www.bca.edu.au/linked%20docs/Student%20resources/5_BCA_assessment_guide_student.pdf