

1. Module Title: Clinical Biostatistics		
2. Module Code: 2648011	3a. Version No.: 2	3b. Date Approved:
	3c. Date last revised: September 2005	
4. Module Leader and Teaching Team: (indicate by * for module leader) Martin Bland*		
5. Timing of Module Once per week, Summer Term, am Wednesday for 2004 intake OR pm Tuesday for 2005 intake.		
6. Name of Pathway/Branch/Course: MSc Evidence Based Practice		
7. Module Status: Compulsory	8. Level: M	9. No of Credits: 10
10. Professional Body Requirements: None		
11. Pre-requisite(s): None	12. Co-requisite(s): None	13. Barred Combinations: None
14. Aims of Module: To equip students with the necessary skills and knowledge to allow interpretation and critical understanding of analysis of data with an awareness of effect modification and confounding. The course will focus on the interpretation and correctness of statistics in published healthcare research.		
15. Synopsis of Module: For this module the student is guided through a range of standard statistical techniques, ranging from frequency tables to Cox's regression. Special attention is paid to the conditions under which the technique may or not may be applied.		
16. Learning Outcomes: Students will be able to: o read research papers with critical understanding of the main statistical methods used.		
17. Teaching & Learning Strategies (including sizes of groups taught, e.g. full, seminar etc) Each session consists of a lecture and a practical exercise. Exercises will be based on published research, either using extracts and précis of papers or full papers.		

18. Allocation of Teaching & Learning Time (100 hours total per 10 credits)								
a. Lectures	b. Seminars	c. Tutorials	d. Lab/ Practical	e. Directed Study	f. Private Study	g. Other	h. Formal Exams	i. Total
8		12			75		5	100
19. Delivery Details		19a: Principal Teaching Site: University of York		19b: Max No Students per module intake: 30		19c: No Intakes per year: One		
20. Assessment Strategy Practical skills and the appropriate application of knowledge will be tested by a series of questions on the interpretation and underlying reasoning behind the analysis of research papers, under examination conditions (2 hours). The exam will be open book and the papers will be provided in advance.								
21. Indicative Content/ Sessions Outline								
Session 1: Descriptive statistics Type of data, frequency, distribution, histograms and other frequency graphs, symmetry and skewness, median and other quantiles, mean, range, inter-quantile ranges, variance, standard deviation								
Session 2: Estimation, standard error and confidence intervals Normal distribution, sampling variation and sampling distributions, standard error, confidence intervals								
Session 3: Significance tests Sign test as an example, principles of significance tests, hypotheses, types of error, presenting P values, multiple testing, one- and two-sided tests								
Session 4: Comparing means Large sample Normal methods, two sample t method, checking assumptions, Normal plot, deviations from assumptions, Satterthwaite correction, paired t methods, checking assumptions, deviations from assumptions, analysis of variance, checking assumptions, deviations from assumptions, comparison of means after anova.								
Session 5: Transformations Need for transformations, frequently used transformation, logarithms, logarithmic scales, interpreting transformed data in a single sample, choosing transformation when comparing samples and interpreting transformed data, transformations for paired data, data which cannot be transformed, are transformations a valid approach?								
Session 6: Categorical data Chi-squared and Fisher's tests, Yates' correction, chi-squared test for trend, relative risk, odds ratios, number needed to treat.								
Session 7: Correlation and regression Correlation coefficients, regression lines, multiple regression, categorical predictors, regression and t tests, use of regression in clinical trials, logistic regression, interactions, minimum samples sizes for regression.								
Session 8: Survival data Time to event data and censoring, Kaplan Meier estimates and survival curves, logrank test, Cox regression, checking assumptions.								

Learning Objectives

1. Students should understand the principles of the statistical methods described, particularly their appropriate use and their limitations.
2. Students should be able to read papers of the type published in the British Medical Journal, understanding the statistical methods employed, their rationale and interpretation, and comment on their appropriateness.

Session 9 Assessment

This will be a two hour examination in which students will be asked a series of questions about published papers. The papers will be provided in advance. The exam will be open book and students will be allowed to bring any notes or books they wish to the exam, but it will be conducted under the usual exam conditions.

22. Teaching & Learning Resources:**22a Reading List**

Bland M. An introduction to medical statistics. Oxford University Press, 2000
 Altman DG. Practical statistics for medical research. London: Chapman and Hall, 1995.

22b. Journals

-*British Medical Journal*, available on-line

22c. Websites and other electronic sources/

-All teaching material will be available on the Web.
British Medical Journal on line.

22d. Other useful resources

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22e. Staffing Requirements

Lecturers with necessary knowledge.