Comparison between Introduction to Statistics for Health Care Research and Essential Medical Statistics

Introduction to Statistics for Health Care Research	Essential Medical Statistics
Prerequisites	
There are no statistical prerequisites for this module.	This module assumes the students have at least some familiarity with the following: • Distinction between continuous and categorical variables • Interpretation of p values and statistical significance • Interpretation of confidence intervals • Concept of the Normal distribution *If you do not have these pre-requisites, the online module Introduction to Statistics for Health Care Research is recommended.*
Example statistical topics	

• Exploring data using graphs and summary statistics
  e.g. drawing histograms and calculating mean and standard deviation
• Simple associations between two variables
  e.g. correlation coefficients and linear regression
• Simple analyses of differences between two or more groups
  e.g. t-tests for continuous outcomes or chi-squared tests for categorical outcomes
• Complete datasets
• Single datasets of any size
	• Associations, adjusting for possible confounders
	  e.g. multiple linear regression
	• Analyses of differences between two groups allowing for possible confounders
	  e.g. multiple linear regression, analysis of variance and logistic regression
	• Meta-analysis of systematic review datasets
	• Time-to-event variables, in which some patients may finish the study before the event occurs ('censoring')
	• Ideas for dealing with missing outcome variables.
	• Single datasets of any size

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Example clinical applications

A student has measured ulnar nerve velocity (a continuous variable measured in metres per second) in 20 athletes and 20 non-athletes. She wishes to test whether ulnar nerve velocity is faster in athletes.

- She can use a *t* test, which is taught on the ISHCR module, to decide whether there is a real difference between two groups.
- She can report confidence intervals, also taught on the ISHCR module, for the difference in velocity between the two groups.

A student has data on ulnar nerve velocity (a continuous variable measured in metres per second) in 500 people, some of whom are athletes. She wishes to test whether ulnar nerve velocity is faster in athletes, allowing for possible differences such as age between the two groups.

- She can use techniques such as multiple linear regression which are taught on the EMS module, to decide whether there are real differences (allowing for age differences etc.) and to report confidence intervals.
- If there are some patients who have missing data for age or nerve velocity, the EMS module will briefly introduce some ideas on how to address missing data.

A student hopes to prevent migraine in office workers by modifying computer screens. He has randomized 50 patients to have a special computer screen at their office and 50 patients to be a control group, with their usual computer screen. He contacts all patients after exactly 6 weeks to ask if they have had migraine.

- He can draw a two-by-two table of treatment group by outcome and use methods such as the chi-squared test, taught on the ISHCR module, to decide whether there were significantly fewer (or more!) migraines in the treatment group.

A student hopes to prevent migraine in office workers by modifying computer screens. He has randomized 50 patients to have a special computer screen at their office and 50 patients to be a control group, with their usual computer screen. He contacts all patients every week to ask if they have had a migraine. During the study several patients drop out of the study for personal reasons unrelated to migraine or the study.

- He can use Kaplan-Meier plots, taught on the EMS module, to draw a graph of time to first migraine, even allowing for the patients who drop out of the study.
- He can use methods such as Cox proportional hazards, taught on the EMS module, to determine whether the time to first migraine is longer (or shorter!) in the treatment group, allowing for the patients who drop out, and allowing for the study to finish even before some patients have had their first migraine.