

Course: Statistics, Analysis and Research

Trainer: John Varlow

Course Outlines:

Session 1: Understanding Statistics for Critical Appraisal

Critical appraisal training focussing on understanding and interpreting the results of research papers, primarily based around experimental design. The concepts of statistical significance and inference will be discussed in detail.

Session 2: Data Insight

A session looking at data from first principles. Understanding the data we collect, how it is defined and what we can do with it. Exploring the best ways to analyse and present information to others in order to accurately reflect performance over time. This session focusses solely on descriptive statistics.



Session 1:

Understanding Statistics for Critical Appraisal

- A paper to be reviewed of your choice (preferably based around an RCT design)
- Preliminary feedback on the paper (good vs bad points)

- Introduction to critical appraisal, what it is and why we do it
- Introduction to the principles and an appraisal toolkit
- What makes a good randomised controlled trial?
 - Randomisation methods
 - Blinding
 - Following intention to treat
 - The placebo effect, and how to control for it
- Identifying the research question (PICO)

- Looking at outcomes and how they are measured
 - Nominal, ordinal and interval data
 - Measures of central tendency
 - Percentages, rates and ratios
- Data distributions, and the importance of normality
- The two major study designs
 - Independent groups (Independent measures)
 - Before and after (Repeated measures)
- The role of chance
- The role of power, and the importance of the outcome
- The most common statistical tests
- Identifying whether the correct statistical test has been used based on the stated outcome
- Interpreting the results
 - P values
 - Confidence Intervals
- Why the study result isn't the most important statistic
- Forest plots (or the blobbogram) and their importance in systematic reviews

- Key points for consideration in critical appraisal
- Review of paper in groups
- Feedback session and work through results tables
- Comparison of findings to those at the beginning

Session 2

Data Insight

- Introduction to data
 - How do we use data currently
 - How is data used by the media
 - How we can misunderstand the data we see
- How do we measure data
 - Nominal, ordinal, interval and ratio data
- Summary Measures (Measures of central tendency)
 - Modes, Medians and Means
 - Associating summary measures with different data types
- Percentages, rates and ratios
 - Relationship between percentages and rates
 - Numerators and denominators in rates
 - Prevalence and Incidence rates
 - The relationship between prevalence and incidence
- Measures of spread (Measures of dispersion)
 - Why dispersion measures are important
 - Percentages and percentiles,
 - Range, interquartile range
 - Variance and standard deviation
- Distributions and their importance
 - The normal distribution
- Analysis rules
- Stratification of data
- Standardisation of data
 - Direct standardisation
 - Indirect standardisation
- Time series
 - Run charts
 - Moving averages
 - Smoothing methods
- Correlations and cause and effect
 - Scatterplots
- The line of best fit – simple forecasting
- Statistical process control
 - Natural and special variation
- Presentation
 - Presentation rules
 - Chart types and their relationship to data types