TOP TIPS

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Statistics

Health research often involves descriptive and inferential statistics. It would be impossible to conduct research on all individuals with the characteristics we are interested in (target population), however inferential statistics allows us to draw conclusions about our target population by using data from a selection of those people (a sample).

Statistics needn't be a scary process if you follow a basic step-by-step guide. This leaflet provides handy top ten tips on **planning** and **performing** your statistical analyses.

Tip 1 – Planning

Plan your analysis before starting data collection. This will help to ensure that your data (and your proposed sample size) can actually answer your research question.

Where possible, seek advice from a statistician.

Tip 2 – Hypotheses

Establish your hypotheses at the planning stage with clearly defined independent and dependent variables. An independent variable is the factor you wish to test (e.g. an intervention or time) against any observable change in your dependent variable (i.e. your outcome measure). This will help to inform the analysis and will avoid 'data fishing' which can lead to erroneous conclusions.

Tip 3 – Levels of Measurement

The term level of measurement refers to the characteristics of your data. For example, nominal data is categorical but cannot be ranked in order, such as gender; ordinal data is also categorical but can be ranked e.g. likert scales; interval and ratio data are number on a continuous scale e.g. height, weight. Identifying the level of measurement will help you select the correct descriptive and inferential statistics.

Tip 4 – Data Errors

Eyeball (i.e. look at) your dataset for errors BEFORE starting any analysis. Investigate and extreme results (outliers), potential mistyped numbers or unlikely results and rectify.

Tip 5 – Data Management

Back-up your data and perform your analyses on a copy of the original data set. Your raw data is precious so this will protect it from accidental deletion or alteration.

Tip 6 – Statistical Assumptions

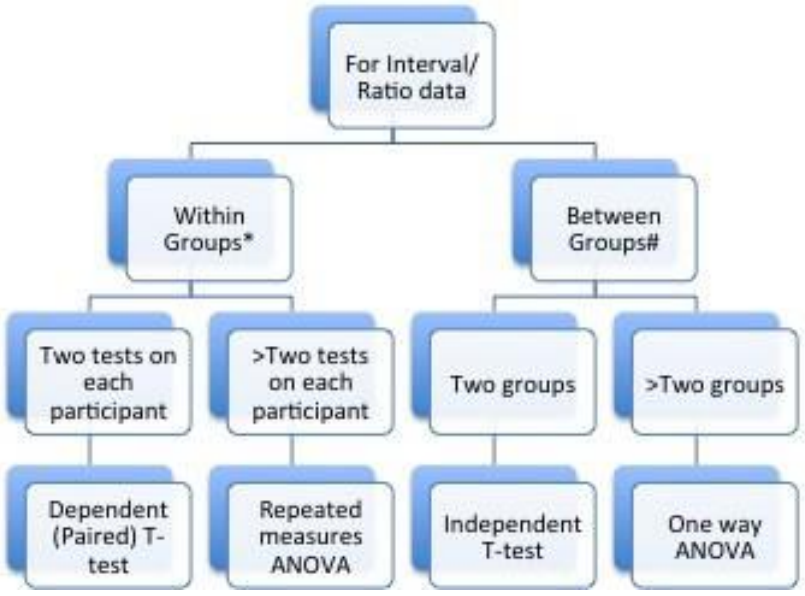
Check that your data meets the appropriate criteria (or assumptions) for your chosen statistical test. Interval or ratio level data should be checked for normality of distribution. This can be achieved by either observing a histogram or using the statistical tests e.g. Shapiro-Wilks test for samples of <50, Kolmogorov-Smirnov test for samples of >50 is a good rule of thumb.

Tip 7 – Descriptive Statistics

Use appropriate descriptive statistics to describe the data before going on to perform the more complex statistical tests. Interval or ratio level data that is normally distributed is usually described using the mean and standard deviation. Ordinal level data is usually described using the median and inter-quartile range.

Tip 8 – Inferential Statistics

Decision trees can be useful for identifying the right test. For example:



*comparing measurements from one group, over several time-points
comparing one measurement from different groups

Tip 9 – Powers and Errors

Be careful performing sub-group analyses. They use smaller datasets, which reduces the power to detect a different. This increases the risk of type 2 errors i.e. failing to detect a true difference.

Use as few tests as possible. Too many analyses on the same dataset increases the risk of type 1 errors i.e. erroneously finding a difference between groups.

Tip 10 – Clinical Significance

Consider both statistical and clinical significance. Statistical interpretation alone cannot answer clinical research questions. Use your clinical experience to determine a minimal clinically important difference (MCID) and present your findings with 95% confidence intervals to aid application to clinical practice.

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