Alpha and Beta errors

Alpha (Type I) errors are false positives: that is, the results suggest that a treatment works, when in fact it does not work. Beta (Type II) errors are false negatives: that is, the results suggest a treatment does not work, when in fact it actually does.

Association

A known link, or statistical dependence, between two or more conditions or variables: eg, statistics demonstrate that there is an association between smoking and lung cancer.

Bias

Something that introduces a difference or trend that distorts (or could distort) results of a study.

Blind(ed) study

Study where the observer(s) and/or participants are kept ignorant of the group to which the participants are assigned. Where both observer and participants are kept ignorant, the study is termed double-blind. If the statistical analysis is also done blind the study is triple-blind. The purpose of blinding is to remove bias

Case-control study

Compares people with a disease or condition ("cases") to another group of people from the same population who don't have that disease or condition ("controls"). A case-control study can identify risks and trends, and suggest some possible causes for disease, or for particular outcomes.

Case-series

A report on a series of patients with an outcome of interest. No control group is involved.

Cochrane Collaboration

The Cochrane Collaboration is an international effort by researchers, practitioners and consumers to sift through research on the effects of health care. The Collaboration prepares, maintains and disseminates systematic reviews of the effects of health care. The reviews are published in the Cochrane Database of Systematic Reviews one of the components of The Cochrane Library.

Cohort (study)

A cohort is a group of people clearly identified: a cohort study follows that group over time and reports on what happens to them. A cohort study is an observational study and it can be prospective or retrospective.

Confidence interval (CI)

Confidence interval is the range within which the true size of effect (never exactly known) lies with a given degree of assurance. People often speak of a "95% confidence interval" (or "95% confidence limits"). This is the interval which includes the true value in 95% of cases.

Confounding variable

A variable that is not the one you are interested in but which may affect the results of the trial

Cross-over trial

A trial where each of the groups will receive each of the treatments, but in a randomised order: that is, they will start off in one arm of the trial, but will deliberately cross over to the other arm(s) in turn.

Cross sectional study

Also called prevalence study. An observational study, taking a view of a group of people at one point in time and seeing the prevalence of diseases, for example, in that population.

Decision Analysis

The application of explicit, quantitative methods to analyse decisions under conditions of uncertainty

Ecological survey

A study based on aggregated data for some population as it exists at some point in time; to investigate the relationship of an exposure to a known or presumed risk factor for a specific outcome.

Effectiveness (Clinical Effectiveness)

The extent to which an intervention does people more good than harm. An effective treatment or intervention is effective in real life circumstances, not just an ideal situation.

Efficacy

The extent to which an intervention improves the outcome for people under ideal circumstances. Testing efficacy means finding out whether something is capable of causing an effect at all. Heterogeneous (geneity) The opposite of homogeneous. If a set of studies on the same subject have varied or conflicting results, the results of the group of studies are heterogeneous. Examining and explaining this heterogeneity is an important part of reviewing the research on a particular subject.

Incidence

The number of occurrences of something in a population over a particular period of time: eg, the number of cases of a disease in a country over one year.

Intent(ion) to treat analysis

Analysing the results according to the intended treatment to which someone was allocated in a randomised controlled trial (as opposed to the treatment they actually received in the end).

Meta-analysis

Meta-analysis is a statistical technique which summarises the results of several studies into a single estimate, giving more weight to results from larger studies.

Number needed to treat (NNT)

One measure of a treatment's clinical effectiveness. It is the number of people you would need to treat with a specific intervention (eg, aspirin for people having a heart attack) to see one occurrence of a specific outcome (eg, prevention of death).

Odds

A term little used outside gambling and statistics. It is defined as the ratio of the probability of an event happening, to that of its not happening: The risk.

GLOSSARY

Odds ratio (OR)

One measure of a treatment's clinical effectiveness. If the OR = 1, then the effects of the treatment are no different from those of the control treatment. If the OR is greater (or less) than 1, then the effects of the treatment are more (or less) than those of the control treatment. Note that the effects being measured may be adverse (eg, death, disability) or desirable (eg, stopping smoking).

Probability (P) value

The findings of a study may be just an unusual fluke. Calculating the p value can determine whether or not the results of the study are likely to be a fluke or not. The p (probability) value shows whether or not the result could have been caused by chance. If the p value is less than 0.05, then the result is not due to chance. A result with a p value of less than 0.05 is statistically significant. The 0.05 level is equal to odds of 19 to 1 (or a 1 in 20 chance). (See also confidence interval, power and probability).

Power (Statistical power)

A study needs to have a specific level of power in order to be able to reliably detect a difference that a treatment might cause. The study needs to have enough participants, who experience enough of the outcomes in question, to be able to come up with statistically significant results.

Prevalence

The proportion of a population having a particular condition or characteristic: eg the percentage of people in a city with a particular disease, or who smoke.

Probability

Probability is the chance or risk of something happening (see also p value).

Publication Bias

A bias in a systematic review caused by incompleteness of a search, such as omitting non-English language sources or unpublished trials (inconclusive trails are less likely to be published than conclusive ones but are not necessarily less valid)

Quasi-random

Methods of allocating people to a trial which are not strictly random, eg, allocation by the person's date of birth, the day of the week, by medical record number, or just allocating every alternate person. Quasi-random allocation may look random, but it is not because the group to which a person will be allocated is predictable and thus people can manipulate who enters the group. For example, if someone wants to be in the experimental group, but not the control group, they can be placed in the experimental group if their number has come up, and simply excluded from the trial if it doesn't. One, other or both arms of the trial can then be biased. (See also randomised controlled trial).

Randomised controlled trial (RCT)

A RCT is a trial in which subjects are randomly assigned to two groups: one (the experimental group) receiving the intervention that is being tested, and the other (the comparison group or controls) receiving an alternative treatment. The two groups are then followed up to see if any differences between them result. This helps people assess the effectiveness of the intervention.

Relative risk (RR)

Also called the risk ratio,the RR is a common way of estimating the risk of experiencing a particular effect or result. A RR>1 means a person is estimated to be at an increased risk, while a RR<1 means a person is apparently at decreased risk. A RR of 1.0 means there is no apparent effect on risk at all. eg If the RR=4.0, the result is about 4 times more likely to happen, and 0.25 means it is 4 times less likely to happen. (See also confidence interval, odds ratio).

Risk difference

Also called absolute risk reduction. It is literally the difference in size of risk between two groups. eg If one group has a 15% incidence of a disease, and the other has a 10% incidence of the disease, the risk difference is 5%.

Sensitivity analysis

A process of testing how sensitive a result would be to changes in the factors such as baseline risk, susceptibility or the patients' best and worst outcome etc.

Spectrum Bias

A bias caused by a study population whose disease profile does not reflect that of the intended population (eg, if they have more severe forms of the disorder).

Standard deviation

A set measure of how far things vary from the central result (average). The mean is the central (average) measure. The standard deviation (SD) is a way of describing how far away from this centre, or average, the values spread, eg, a mean waiting time in a hospital emergency room might be 2h, but to cover most people's waiting time, you might have to give or take an hour: the waiting time is therefore 2 ±1 hour. That extra 1h is the standard deviation. A person who waited 4 hours to be seen would therefore be 2 SD from the mean.

Statistical significance

The findings of a study may be just an unusual fluke. A statistical test can determine whether or not the results of the study are likely to be a fluke or not. That test calculates the probability of the result being caused by chance providing a probability (p) value.

Systematic review

A review in which evidence on a topic has been systematically identified, appraised and summarised according to predetermined criteria (an 'overview').

Validity

The soundness or rigour of a study. A study is valid if the way it is designed and carried out means that the results are unbiased ie, it gives you a true estimate of clinical effectiveness.

Note: some of the definitions are derived from those originally provided at http://www.cochrane.org/consumers/