# STRATEGIES FOR DATA ANALYSIS: RCT = RANDOMISED CONTROLLED TRIALS IN COMMUNITY INTERVENTIONS

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- Definition:
- RCT: a means to evaluate clinical treatments, preventive screening manœuvres and health and educational interventions
- Randomisation: study subjects are assigned to treatment or control groups randomly:
  - to reduce selection bias and prevent confounding subjects should have the same probability of being included in the Tt or control groups

- Bias: a systematic error that contributes systematically high or low compared to the real value
- Two main types:
  - Selection bias: bias introduced in the course of selecting the cases or controls
  - Confounding bias: also called confounding variables = confusion of effects. The statistical association observed does not correspond to the biologic, pathologic or etiologic reality but is explained by a third factor

- Sources of bias
  - Inclusion and exclusion criteria
  - Sensitivity and specificity of dg tests
  - Selection of controls
  - Design
  - Analysis

- Strategies for the prevention of bias:
  - Randomisation during experimental studies
  - Matching and or
  - Restriction to those cases without confounding factors

- Properties of randomisation
  - Reduces selection bias
  - Provides study groups with known statistical properties
  - Provides statistical bases for tests of significance

- Uses of RCTs
  - Evaluate Tts or interventions for important clinical diseases
  - Evaluate cases where  there is uncertainty regarding the effectiveness or available Tts or forms of care
  - Evaluate psychological and social interventions

- RCTs are not useful in:
  - Cases where all confounding factors are known
  - Where prognosis is certainly  known
  - When expected Tt effect is very large

- The randomisation process
- Basic subjects of randomisation are:
  - Individuals or patients allocated to a Tt, placebo or a new form of care
- The research unit in charge of randomisation is centrally located
- Clinicians communicate with it by fax or telephone, e-mail
- Once a subject agrees to participate he/she is randomised and Tt starts

- Selection of randomisation method depends on circumstances of the research project
- Important issues to be considered in the process must be
  a. Formal
  b. Unpredictable
  c. Reproducible
  d. Secure
  e. Have mathematical properties

- Methods of allocating subjects in RCTs in increasing order of rigorousity:
  - Cointossing
  - Coloured beads
  - Alternate allocation
  - Even/odd birthdates
  - Even/odd medical /records
  - Sealed envelopes

- Sealed envelopes / third party
- Numbered plain ampoules
- Computer
- Fax, telephone

- Study design
  - An important point in the avoidance of moderate bias and random error
  - The statement of the objective must be clearly specified
  - The anticipated effect of the main outcome is well specified
  - Possible candidates for enrolment are screened using a list of inclusion/evaluation criteria

- Obtain basic descriptive information from those excluded before randomisation
- NB: this data will be used to evaluate the representativeness of the study population
- Subjects randomised cannot be excluded from the final analysis and should be part of the follow up experience

- Subjects excluded before randomisation affect the composition of the study population (external validity) and the generalisation of the study results
- Homogeneous study population, selected using restricted entry criteria have less generalisation of results
- Subjects lost after randomisation affect the comparability of the groups or Tts (internal validity)

- The following points are considered in the design of RCTs:
  - Source of participants and eligibility criteria should be considered
  - The participants included
  - Those who met the eligibility criteria but did not enter into the study (this information is to ensure that the representativeness of the participants differ from the non-participants)

- Detailed description of the alternative forms of care is needed to ensure the reproducibility of the Tts in any new trial or control
- Randomisation method clearly described
- Administration of alternative forms of care should be blinded to avoid bias
- Assessment of the principal and secondary outcome measures should be blinded to those carrying out this phase

- Avoid compliance with the protocol
- Any cross over to the alternate Tt is reported
- Possible side -effects and complications should be described

- Baseline comparisons:
  - Randomisations does not necessarily produce comparable groups
  - There can be minor and sometimes major differences in the baseline variables
  - Evaluate baseline differences between groups but not using statistical tests

- Use descriptive statistics such as standard deviation, range and selected centiles as well as the mean or median to evaluate the distribution of baseline variables
- Avoid standard errors and confidence intervals

# Description of materials and methods (1)

1. Is there an adequate description of the source of participants (hospital, outpatients clinic, etc.) and the timing and duration of recruitment?
2. Is there an adequate description of the entry and exclusion criteria?
3. Has the method of approach to potential participants and the information given to them been described?
4. Is there a satisfactory description of the actual way in which the treatment was assigned, and the use of prognostic stratification, if any?

# Description of materials and methods (2)

5. Have the forms of care compared (the treatment regimens), both experimental and control, been described in sufficient detail to allow replication?
6. Has the degree of masking (‘’blinding’’), if any, of participants and investigators been described?
7. If a placebo was used, was there an assenssment of its success in ‘’making’’ the nature of the treatment

# Description of materials and methods (3)

8. Have the methods used to measure outcome been described, specifying whether or not the assessor knew the treatment allocation (‘’degree of masking’’)?
9. Has the objective been specified in terms of a quantified effect on a defined primary measure of outcome?
10. Is there an explanation of how the final sample size was chosen and a statement on statistical power in respect of the quantified effect on the primary measure of outcome?

# Description of materials and methods (4)

11. If there were any interim analyses, have the arrangements and methods used been described?
12. Have all the statistical methods been identified and is there a description of any statistical techniques used which are not in common use?

# Evaluation of the impact of the treatment

- If no Tt effect, and randomisation well conducted with adequate sample size, the incidence of the main outcome should be similar in both groups
- A sample comparison among incidence of the main outcome should be similar in both groups
- A simple comparison among incidence rates in both groups, rate ratio the ratio of the two incidence rates), and confidence intervals of the rate ratios is sufficient to present the results.