MAST10011 Course Summary Notes

Table of Contents:

Chapter 1 – Epidemiology and Study Design

<u>Basic Principles</u>

- To reduce error (confounding) through **validity** and **reliability**:
    - Reliability – consistency of results
    - Validity – how truthful conclusions and inferences are (must be reliable to be valid)
        - Internal – how accurately results represent study group
        - External – how accurately results represent overall population
- Methods:
    - 1. Control
        - Neutral effect, baseline for comparison (often placebo)
    - 2. Randomisation
        - Weakens link between C and D by evening out effect of uncontrolled confounding variables over all subjects (more balanced subject pool)
            - Human randomisation – generally not very random
            - Non-human – should state computer software used
        - Can only do for clinical trials (cohort/case-control studies require selected samples)
    - 3. Replication
        - Increasing number of individuals in study (sample size) to increase validity
    - 4. Balance
        - Ensuring control and experimental groups are of similar size to achieve more accurate results
    - 5. Blocking/Stratification
        - Chunking by a group of similar study units (parameters: age, gender, socio-economic category)
        - Failure to do so = systematic error (non-bell curve sample)
            - Systematic as would cause same error across entire study
    - 6. Blinding
        - Makes control more effective by reducing confounding variables and allowing placebo effect to occur
        - Blind study – patients are kept in the dark as to treatment (placebo or real drug)
        - Double-blind study – both patients and doctors and kept in the dark
- Terms:
    - Experimental unit – sample/study group used in experiment (should represent population as best as possible)
    - Stratified sample – one which has been selected so as to be representative of a larger population
    - Confounding variable – a variable that affects the relationship between the factor and outcome we want to measure (C)
    - Lurking variable – a confounding variable we don't even know exists
    - Explanatory/treatment variable – the variable we want to measure (E)
    - Response variable – the effect/outcome (D)
    - Point estimate – picking a single value (eg: mean) to use as a prediction of entire population
    - Incidence – the rate at which people contract the disease
    - Prevalence – how many people have a condition in a population at a moment in time

factor C

?

factor E → outcome D
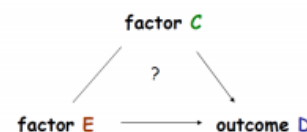
Exposure (EDDA p1)
{drugs, immunisation, gene, treatment, radiation, …}

Disease outcome (EDDA p1)
(bad)   (good)
death   recovery
get disease remission
recurrence improvement

<u>Types of Studies</u>

- Experimental – clinical study (drug is administered/explanatory variable is controlled)
- Observational – just observing, not controlling, explanatory variable
- Cohort study
    - Following a designated group of individuals who are followed over a period of time
        - Select an accurate representation of the study group required