Spotting the Study Design

The type of study can generally be worked at by looking at three issues (as per the Tree of design in Figure 1):

**Q1. What was the aim of the study?**
1. To simply describe a population (PO questions) ⇒ descriptive
2. To quantify the relationship between factors (PICO questions) ⇒ analytic.

**Q2. If analytic, was the intervention randomly allocated?**
1. Yes? ⇒ RCT
2. No? ⇒ Observational study
3. For observational study the main types will then depend on the timing of the measurement of outcome, so our third question is:

**Q3. When were the outcomes determined?**
1. Some time after the exposure or intervention? ⇒ cohort study (‘prospective study’)
2. At the same time as the exposure or intervention? ⇒ cross sectional study or survey
3. Before the exposure was determined? ⇒ case-control study (‘retrospective study’ based on recall of the exposure)

**Advantages and Disadvantages of the Designs**

**Randomised Controlled Trial**

An experimental comparison study in which participants are allocated to treatment/intervention or control/placebo groups using a random mechanism (see randomisation). Best for study the effect of an intervention.

**Advantages:**
- unbiased distribution of confounders;
- blinding more likely;
- randomisation facilitates statistical analysis.

**Disadvantages:**
- expensive: time and money;
- volunteer bias;
- ethically problematic at times.
Crossover Design
A controlled trial where each study participant has both therapies, e.g., is randomised to treatment A first, at the crossover point they then start treatment B. Only relevant if the outcome is reversible with time, e.g., symptoms.

**Advantages:**
- all subjects serve as own controls and error variance is reduced thus reducing sample size needed;
- all subjects receive treatment (at least some of the time);
- statistical tests assuming randomisation can be used;
- blinding can be maintained.

**Disadvantages:**
- all subjects receive placebo or alternative treatment at some point;
- washout period lengthy or unknown;
- cannot be used for treatments with permanent effects.

Cohort Study
Data are obtained from groups who have been exposed, or not exposed, to the new technology or factor of interest (e.g., from databases). No allocation of exposure is made by the researcher. Best for study the effect of predictive risk factors on an outcome.

**Advantages:**
- ethically safe;
- subjects can be matched;
- can establish timing and directionality of events;
- eligibility criteria and outcome assessments can be standardised;
- administratively easier and cheaper than RCT.

**Disadvantages:**
- controls may be difficult to identify;
- exposure may be linked to a hidden confounder;
- blinding is difficult;
- randomisation not present;
- for rare disease, large sample sizes or long follow-up necessary.

Case-Control Studies
Patients with a certain outcome or disease and an appropriate group of controls without the outcome or disease are selected (usually with careful consideration of appropriate choice of controls, matching, etc) and then information is obtained on whether the subjects have been exposed to the factor under investigation.

**Advantages:**
- quick and cheap;
- only feasible method for very rare disorders or those with long lag between exposure and outcome;
- fewer subjects needed than cross-sectional studies.

**Disadvantages:**
- reliance on recall or records to determine exposure status;
- confounders;
- selection of control groups is difficult;
- potential bias: recall, selection.

Cross-Sectional Survey
A study that examines the relationship between diseases (or other health-related characteristics) and other variables of interest as they exist in a defined population at one particular time (i.e., exposure and outcomes are both measured at the same time). Best for quantifying the prevalence of a disease or risk factor, and for quantifying the accuracy of a diagnostic test.

**Advantages:**
- cheap and simple;
- ethically safe.

**Disadvantages:**
- establishes association at most, not causality;
- recall bias susceptibility;
- confounders may be unequally distributed;
- Neyman bias;
- group sizes may be unequal.
Qualitative Study
Research that derives data from observation, interviews, or verbal interactions and focuses on the meanings and interpretations of the participants.

Advantages:

- Provides depth and detail: looks deeper than analysing ranks and counts by recording attitudes, feelings and behaviours
- Creates openness: encouraging people to expand on their responses can open up new topic areas not initially considered
- Simulates people's individual experiences: a detailed picture can be built up about why people act in certain ways and their feelings about these actions
- Attempts to avoid pre-judgements: if used alongside quantitative data collection, it can explain why a particular response was given

Disadvantages:

- Usually fewer people studied: collection of qualitative data is generally more time consuming than quantitative data collection and therefore unless time, staff and budget allows it is generally necessary to include a smaller sample size.
- Less easy to generalise: because fewer people are generally studied it is not possible to generalise results to that of the population. Usually exact numbers are reported rather than percentages.
- Difficult to make systematic comparisons: for example, if people give widely differing responses that are highly subjective.
- Dependent on skills of the researcher: particularly in the case of conducting interviews, focus groups and observation.

From:

http://www.cebm.net/index.aspx?o=1039
http://learnhigher.ac.uk/analysethis/main/qualitative1.html