



## EDITORIAL

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# Planning and implementing a research Study

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## INTRODUCTION

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Modern medicine is underpinned by evidence. Research that is well-conducted and well-presented is the foundation upon which medical knowledge and understanding is based upon.

Research is essentially three things: how to ask a question, how to answer the question, and then how to present the findings. In this manuscript, we will look at the planning and preparation of a research study; the implementation and conducting of research; and then the analysing, interpreting and presentation of results will be considered separately. This is aimed at healthcare professionals undertaking post-graduate training who have to do research as part of a degree; and others who are interested in conducting a research study, but are unsure how to approach the task.

## PLANNING AND PREPARATION

When considering a research project, it is worthwhile considering a few questions:

- a. How to decide on a research topic?
- b. How to conduct a good literature review?
- c. How to decide the right research method?

- d. How will the data be collected?
- e. How will the data be analysed?
- f. How to obtain ethical approval?
- g. How to finance a research project?

**a. How to decide on a research topic?**

While some healthcare professionals approach their research study with an already clear research question to address, others may start with many ideas, however with no clear and specific research question. As yourself:

- What is of interest to me - disease or topic of research?
- When will I do it (timing)?
- Where will I do it (location)?
- Why - so what is the relevance of this research?

Furthermore, you can talk to others to discuss your ideas and ask what research topics they are considering. A fully formed research question usually doesn't appear instantly. Often it is a process, and discussing

your ideas with others, and addressing their comments and questions may help to refine the focus and clarity of your research question.

**b. How to conduct a good literature or systematic review?**

While further considering your research topic, it is important to explore what others have written. You can begin by using a search engine (e.g. Google Scholar, Pubmed) to read through titles of research papers written on your research topic; and then read the abstracts of the most relevant and interesting articles.

Once you have a better idea of what literature is available, a more detailed literature review can be conducted to understand current research on the topic. Use key words; access good reviews; read more recent research papers. Undertaking a good literature or systematic review is summarised below.

	Literature Review	Systematic Review
<b>Definition</b>	Summarises what is known about a topic. Can be qualitative and quantitative.	Summarises evidence about a specific research question. The search is systematic and uses a defined protocol*.
<b>Purpose</b>	Give an overview about what is known	Reduce bias to answer a specific research question from available evidence
<b>Requirements</b>	General knowledge of topic. Search some database(s).	Understanding of research question. Search all relevant databases. Consistent data extraction. Perform suitable statistical analysis.
<b>Components</b>	Introduction Aim / Objectives Methods Results Discussion Conclusion Refs	Aim / Objectives Eligibility criteria Search strategy Assessment of validity of Results Interpretation of Results Refs
<b>Authors</b>	1 or more	3 or more
<p><b>*For Systematic Reviews</b>                      PICO – Population; Intervention; Comparison; Outcome                      PRISMA - Preferred Reporting Items for Systematic reviews and Meta-analyses guideline: 2009                      PROSPERA – Register 2011                      CONSORT - Consolidated Standards of Reporting Trials guideline: 2010</p>		

At this point in the preparation it should be possible to draft:

1. **RATIONALE:** why is this research relevant?
2. **RESEARCH QUESTION(S):** what is the main research question(s)?
3. **AIM / OBJECTIVES:** what will be achieved by the research?

**c. How to decide the right research method?**

When deciding the methodology of a research study, you need to ask what is the study design?

- Hospital based or community based or both?
- Qualitative or quantitative or both?
- Retrospective or prospective or both?
- Descriptive or analytic or both? Exploratory or explanatory?
- Is it a survey (prevalence); case-control (risk factors); cohort (longitudinal); or intervention (trial) study?
- Is it about efficiency – utilization of resources (personnel & finance)?
- Is it about patient perceptions and behaviour?
- The use of PICO may help:

- Population – who is being studied?
- Intervention – what is being evaluated?
- Comparison – is there a control group; or comparison before / after?
- Outcome – what is the outcome measure?

Selection bias is introduced by the selection of individuals, groups or data for analysis in such a way that proper randomization is not achieved, thereby ensuring that the sample obtained is not representative of the population intended to be studied and analyzed. Consider for your research method: what is the selection bias and how to avoid it?

Is a sampling strategy required (to give a representative sample)? Furthermore, is a sample size calculation required (to ensure sufficient confidence in result)?

	<b>Qualitative approach</b>	<b>Quantitative approach</b>
<b>Use</b>	Find out what to investigate. When ideas are needed. Emphasis on understanding. Focus on understanding from respondents' point of view.	Know what to investigate. When results are needed. Emphasis on testing and verification. Focus on facts and/or reasons.
<b>Approach</b>	Flexible and informal. Do not need to know in advance all topics or questions – these should can 'emerge'. Small sample size.	Structured and formal. Must know in advance what questions to ask/areas to cover – they are 'imposed'. Large sample size.
<b>Techniques</b>	Participatory - In-depth interviews (one to one) - Focus group discussions (one to many) Document analysis (diaries, letters). Observation (e.g. ethnographic studies). Case-studies.	Surveys: [Structured interviews and Questionnaires.] Non-participant observation. Experiments. Tests.
<b>Responses</b>	Explanatory and give depth. Verbal, text. Less easy to process. Unlimited possible responses	Not explanatory and lack depth. Mainly numerical. More easily processed, for example, coding. Possible responses limited
<b>Outcome</b>	Explanations, hypotheses and ideas. Not measurable, focus is on describing and understanding No absolute truth.	Statistics (frequencies, means, odds ratios, etc) Can be quantified. Interpretation more objective.

For qualitative: BMJ "Qualitative research review guidelines – RATS"

**d. How will the work to be done and data be collected?**

Be sure to have planned adequately before beginning data collection. Ensure that you have clearly defined your research question, and the extent and limitations of your research study. Consider:

- What data is required?
- What protocols / questionnaires are required?
- Who is needed in the research team to do what?
- How will it be collected – forms and data entry?
- How will one ensure good data collection – training and quality control?
- What are the logistics - how much work can be done each day?

**e. How will the data be analysed?**

Again, before data collection starts, be sure you have planned and laid out, consider:

- What tables will be used (you can prepare dummy tables)?
- What statistical tests (specific tests or software) will be used?
- How will qualitative data be analysed?

Now check – will the methodological design of the study answer the research question(s) and objectives?

At this point in the preparation it should be possible to draft:

- 4. **METHODS:** including study design, data collection and analysis.

**f. How to obtain ethical approval?**

Almost all research will require some level of ethical approval. Check with your hospital, university or other local or national institutional research ethics committee what may be needed. The first principle is do no harm; participants / community should benefit.

You will also need to consider and clarify:

- Who needs to give permission?
- What is the process / timeline for approval?
- How will “Informed Consent” be addressed?
- How will the population receive an appropriate service / benefit?
- Special considerations

- Research with children;
- Research with other vulnerable groups e.g. persons with disabilities;
- Taking blood or other tissue samples;
- Any invasive techniques, examinations;
- Possible adverse effects.

**g. How to finance a research project?**

Funding of a research study may range from simple to complex and expensive.

- How much will it cost? – prepare a draft budget including: salaries / per diems / equipment / transport / office costs / disseminating results
- How will it be funded? – medical research funding bodies; governments; NGOs; industry; philanthropists.

At this point one should be ready to start conducting the research project.

**IMPLEMENTING AND CONDUCTING THE RESEARCH WORK**

Now that you have planned and prepared your research question, objectives, methods, funding, and ethical approval; you can begin to implement and conduct the research study.

**Questions**

- a. How to conduct the research work?
- b. How to ensure accurate / good data collection?

**a. How to conduct a research dissertation?**

At the outset of the research study, meet with and explain the research to relevant stakeholders. Together with them, consider the following steps:

- What is observation / information bias and how to avoid it?
- What is the impact of the researcher, context and process on data?
- Finalise who in the research team will do what?
- Identify and train any research assistants - standardisation
- Field test (pilot) the data collection forms and daily work load
- Develop a practical feasible time-plan for the study

**b. How to collect data?**

High quality data and data-integrity are at the heart of good research. As the saying goes: “bad data in, bad data out”. In other words if you don’t ensure that data is collected correctly, entered accurately, and then checked for data-integrity; then the results of the study will be all but useless. For data collection: consider:

- Tools – paper, laptop, mobile devices
- Data entry – double entry or automatic checks; recording & transcription
- Qualitative methods – open questionnaires (semi-structured or unstructured); focus groups
- Qualitative – questioning/probing style

**SUMMARY**

This is an overview of the planning and preparation, as well as implementation and conducting of a

research study. There is still to consider the analysing, interpreting and communicating of the results of the research.

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