Identifying and defining research questions

In this article...

- How to choose the subject of your research
- Deciding on a relevant research question
- Generating applicable search terms and key words

Successful clinical research depends on a properly constructed research question on a topic that is relevant for study. Discover the best process of developing one.

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Research is vital to improving nursing practice and patient outcomes, and therefore a key aspect of nursing degree programmes. All student nurses must show they can undertake an independent learning project before they can graduate and become registered nurses. This article outlines processes that can be followed to select a research area and narrow it down to generate a specific research question. Methodologies and models can then be used to compile a list of search terms that can be used to get the research underway.

However, perhaps the biggest challenge is the fact that this is an independent module in which a lot depends on students’ motivation and willingness – they have to determine the focus and direction of their work. This is usually carried out on an individual basis, although some tutor support, supervision and direction is provided.

The module is also demanding because there is typically a substantial research component to the project requiring primary data to be collected and secondary or existing data to be analysed. Furthermore, students are expected to have a more prolonged engagement with the chosen subject than they do with standard coursework, such as essays or reports; the work is consequently required to be more in-depth than students are accustomed to (Todd et al, 2004).

Many students struggle to start their project because they simply do not know where to begin. The most critical question for many is “What should I study?” Deciding between a research project and a literature review depends on the type of degree course being undertaken. However, for most undergraduate nursing courses, students are required to carry out a literature review.

Pole and Lampard (2002) stated that curiosity is, or at least should be, the driving force behind the conduct of any research. Research questions are an attempt to “tame” curiosity, so they are not asked in a haphazard manner but in relation to what is already known about the topic of interest (White 2013). The process of framing, developing and refining these questions allows researchers to make connections with existing theories and previous empirical findings; this helps avoid...
There are seven steps to follow when conducting a literature review:
1. Formulate a research question
2. Identify a term/terms that will be used to search the literature
3. Create robust inclusion and exclusion criteria to select the most appropriate literature
4. Select the most relevant databases to interrogate the literature
5. Search the literature from a global perspective
6. Analyse, synthesise and critique the research articles
7. Present the findings

RCE: Wakefield (2015)

Ionesco (1969) stated that it is not the answer that enlightens, but the question. According to Graziano and Raulin (2004): “Questions are everywhere; all you have to do is observe and be curious”.

To carry out a literature review, it is necessary to:
- Have a basic knowledge of research processes and methodologies;
- Understand the origins of the evidence, primary and secondary sources;
- Understand the terminology used;
- Know how the various types of literature reviews vary (Conner, 2014).

It is well documented that student nurses tend to disengage with the research module (Ax and Kincade, 2001). Undergraduates find research boring, and may have difficulty understanding the language and experience cognitive shutdown (Porter et al, 2006); this may come back to haunt them in the final year when they attempt the literature review for their dissertation. Since the literature review is an integral part of the research process, it is crucial for students to engage with the research module.

Choosing a research topic
The starting point for any research project begins with the choice of topic. This should be a subject the student finds interesting, stimulating and worthwhile, as well as rewarding. While the initial topic selected may be broad, it must be narrowed down to a focused question (Playle, 2000).

The topic should already have been researched by others so it is possible to search for relevant literature to review. The most interesting topic in the world will not create a successful literature review if nothing has previously been written about it. Sometimes it is a good idea to come up with a few alternative ideas and carry out some preliminary research on each – that way, if there has only been limited exploration of the first choice, there is an alternative to fall back on.

Most research projects start with an idea that arises from clinical practice (Gelling, 2015). However, it is generally agreed that research topics narrow into focused questions arise from three basic sources:
- The literature;
- A theory;
- Experience (Springett and Campbell, 2006).

Using the literature
Sometimes studies raise far more questions than they answer so, when reading the literature on a particular topic, you may find new ideas are recommended for further investigation. For example, there may be observational studies that explain what is happening but not necessarily why. When reading the literature it is useful to bear in mind that:
- It is possible to replicate a study – this not only ensures its reliability but also provides additional information;
- Any recommendations made at the end of research articles may be followed up with another investigation;
- Sometimes there may be flaws in the original method used in a study, and the same question can be asked in a different way – this may then reinforce or challenge the findings of the earlier study.

Theories
Theoretical concepts that may be tested in practice are the second major source of research questions. Theories such as the promotion of continence and self-care as a framework for nursing or mentorship, and student nurses’ performance, can be tested in practice. An example of a theory is: “Promotion of continence will result in better quality of life for patients”. Like many other theories in nursing, this can be investigated inductively or deductively. A quantitative experimental design uses deductive reasoning to arrive at a testable hypothesis. According to Coates (2011), this approach focuses on replicability, objectivity, prediction and control; the distinguishing feature is a collection of numerical data that can be subjected to statistical analysis. Qualitative research designs use inductive reasoning to propose a research statement about how people interpret and structure their lives. This kind of research is used to explore, understand and interpret experiences, feelings and beliefs (Gelling, 2015).

Experience
Research ideas can also stem from experience in clinical areas where nurses observe practice that may be a source of concern or simply “interest”. The research question need not be about something that is “wrong” but something that could be done better or has not been thought about before. Student nurses are taught critical analysis to encourage them to ask:
- Why is this being done in this particular way?
- What will happen if this is done differently?

These are important ways to explore more about nursing inductively as they stem from the real world of nursing.
From a clinical practice perspective, when a research question is carefully composed it aims to close the gaps between what is known and what needs to be known about nursing care, and resolve the discrepancy between the way things are and how they ought to be to result in better patient care. However, research does not always lead to definitive answers.

**Composing the research question**

Deciding on the research question is challenging, but is one of the most critical aspects of the research process. A carefully constructed research question helps to guide the project to hit its scholarly target. The question is the fundamental core of a research project, study or literature review. It focuses the study, determines the methodology and guides all stages of inquiry, analysis and reporting. It also acts as an aide memoire, and helps keep the researcher focused on the specific area of enquiry, which is particularly helpful when searching the literature (Lahlafi, 2007).

Beitz (2006) defined research questions as: “An explicit query about a problem or issue that can be challenged, examined and analysed, and that will yield useful new information.”

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Blakie (2007) argued that the use of research questions in the design and conduct of research is often neglected. The key to defining a research question is focus. If it is too broad (for example, “Does regular exercise prevent heart disease in adult men?”), the search strategy will become unstructured and many important articles may be overlooked (Wakefield, 2015). The end product should be a specific query that is explicit in what it is looking for. However, Denney and Tewksbury (2013) have also argued against having a research question that is too narrow (for example, “Do daily 30-minute exercise sessions reduce the incidence of myocardial infarction in 40-60-year-old Asian men?”) as it can limit the search strategy. An appropriate question on the topic in the examples above might be, “Does daily exercise reduce the incidence of myocardial infarction in men over 40 years of age?”

**Framing the research question**

The development of the research question is important as it sets the parameters of the research. It provides opportunities for a wide range of research methodologies as well as a structure and direction for the study. Hanson (2006) argued that there are three important phases of developing a study question destined for success:

- Defining the research question(s);
- Refining the research question(s);
- Converting the research question(s) into a specific aim(s).

Similarly, Lipowski (2008) proposed three steps in the formulation of a great research question:

- Ask interesting questions;
- Select the best question for research;
- Transform the research question into a testable hypothesis.

There are three types of research question:

- Descriptive: describing something, using a descriptive approach that can simply be an observation of something, with the researcher taking the role of the “witness” and answering the basic question of “what happened?”;
- Relational: a relational or correlational study exploring relationships between two or more variables using statistical analysis, and asking the question: “how are these linked?”;
- Causal: exploring cause and effect to determine whether one or more variables causes or affects one or more outcomes using an experimental approach (Trochim, 2006).

**TABLE 1 RESEARCH QUESTION TYPES**

<table>
<thead>
<tr>
<th>Broad topic area</th>
<th>Narrow topic area</th>
<th>Focus</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older people’s health</td>
<td>Older people and malnutrition</td>
<td>Older people and malnutrition in hospital</td>
<td>Is there a link between duration of stay in hospital and malnutrition in older people?</td>
</tr>
<tr>
<td>Women’s health</td>
<td>Women and mental health</td>
<td>Women, mental health and miscarriage</td>
<td>What are the psychological effects of miscarriage among 35-40-year-old women?</td>
</tr>
<tr>
<td>Drug errors</td>
<td>Drug errors and nurses</td>
<td>Drug error, nurses and mathematical skills</td>
<td>What is the association between poor mathematical skills and drug errors among newly qualified nurses?</td>
</tr>
<tr>
<td>Teenagers’ health</td>
<td>Teenagers and bulimia</td>
<td>Teenagers, modelling and bulimia</td>
<td>What role does modelling play in the development of bulimia among teenagers?</td>
</tr>
</tbody>
</table>

**FIG 1. GENERATING SEARCH TERMS FROM A RESEARCH QUESTION**

Question: “Does patient-controlled analgesia provide better pain relief than injection-administered analgesia by nurses following major surgery?”

- **P = Patient/population**
  - Surgical patient
  - Patient with major operation
  - Surgery

- **I = Intervention**
  - Patient-controlled analgesia (PCA)
  - Self-pain management

- **C = Comparison**
  - Injection of analgesia given by nurses
  - Nurse-controlled analgesia

- **O = Outcome**
  - Pain relief
  - Management of pain
in the research question formulation process, researchers are encouraged to narrow their topic down to a more focused and manageable area. This is done to ensure that the research question is clear, simple, relevant, manageable, and feasible. Research questions should be:
- Relevant;
- Manageable in terms of research and in terms of the individual’s own academic abilities;
- Substantial and with originality: rather than previously addressed topics, students should use their imagination and come up with ground-breaking ideas that can be turned into research issues or developed into a dissertation;
- Able to confirm or refute previous findings, extend or build on previous findings, or provide new findings;
- Consistent with the requirements of the assessment;
- Clear and simple;
- Interesting and worthwhile;
- Feasible or able to be answered.

**Framing models**

Having selected a broad topic, the next step is to narrow it down. There are several frameworks that can be used to structure a sound research question in a strategic manner (Bettany-Saltikov, 2010); two models are PICO and SPICE (Box 2). Offredy and Vickers (2010) mentioned four stages in the research question formulation process, illustrating the process of narrowing the topic by focusing on surgery.

- Broad topic area – surgery;
- Narrow broad topic area – surgery and pain relief;
- Focused topic area – surgery, pain relief and patient-controlled analgesia;
- Research question.

In the fourth stage, when the focused topic area is converted into a research question, PICO or SPICE is used. According to Ellis (2013), PICO is useful when generating quantitative questions, whereas SPICE is most commonly applied to research aimed at exploring qualitative phenomena. However, not all components may be relevant when formulating a question.

**Generating search terms**

Once the question has been composed, it is essential to generate several key search terms or words, from which synonyms are identified, that can be entered into one or more databases. These key terms are combined using Boolean Operators such as “OR”, “AND” and “NOT”.

**Fig 1** indicates the process by which search terms have been generated from the research question using the PICO model. These terms are entered in the databases for a comprehensive literature search and a number of articles will be found. Wakefield (2014) suggests that establishing and adhering to inclusion and exclusion criteria will ensure the most appropriate literature is selected, which addresses the research question.

**Conclusion**

Clinical practice is the main arena from which nurses can seek ideas for research, but those ideas can stem from experiences, theories and the literature. With the advent of the internet and the increasing volume of articles being published, students can spend a lot of time sifting through the resources. Developing a research question, therefore, is an important systematic activity that provides a “road map” for a successful literature search.

Tools such as PICO or SPICE can be used to structure a sound research question. Not only is valuable time saved but the most appropriate articles are selected for review. Formulating a focused question is a disciplined method to beginning a research project.