## Contents

*Foreword* vi  
*About the author* vii  
*Acknowledgements* viii  
*Introduction* 1  
1. *Introducing research* 3  
2. *Overview of qualitative methodologies* 22  
3. *Data collection methods and analysis in qualitative research* 41  
4. *Overview of quantitative methodologies* 60  
5. *Data collection methods and analysis in quantitative research* 84  
6. *Multiple methods, evaluation and action research* 105  
*Glossary* 120  
*References* 126  
*Index* 130
Acknowledgements

With thanks to Brenda Cooper, Senior Lecturer in the Faculty of Health and Social Care, London South Bank University, for her helpful feedback on early material for this book.
Chapter 6 examines the use of mixed methods and methodologies in research. It introduces the key ideas in evaluation research and the nature, scope and practice of action research in nursing, including data collection methods. This chapter establishes that there is often a need to employ mixed methodologies and methods in healthcare research in order to gain a more holistic view of some of the complex issues that surround the provision of nursing care.

**NMC Standards for pre-registration nursing education and Essential Skills Clusters**

The Nursing and Midwifery Council (NMC) has standards of competence that have to be met by applicants to different parts of the nursing and midwifery register. These standards are what they deem as being necessary for the delivery of safe, effective nursing and midwifery practice.

As well as specific competencies, the NMC identifies specific skills nursing students must have at various points of their training programme. These Essential Skills Clusters (ESCs) are essential abilities that students need to attain in order to practice to their full potential.

This book identifies some of the competencies and skills within the realm of research and evidence-based practice, which student nurses need in order to be entered on to the NMC register. These competencies and ESCs are presented at the start of each chapter so that it is clear which of them the chapter addresses. All of the competencies and ESCs in this book relate to the generic standards which all nursing students must achieve. This book includes the latest draft standards for all years onwards, taken from the *Standards for pre-registration nursing education: Draft for consultation* (NMC, 2010). For links to the pre-2010 standards, please visit the NMC website (www.nmc-uk.org).

**Activities**

At various stages within each chapter there are points at which you can break to undertake activities. Undertaking and understanding the activities is an important element of your understanding of the content of each chapter. You are encouraged, where appropriate, to reflect on your practice and how the things you have learned from working with patients might inform your understanding of research. Other activities will require you to take time away from the book to find out new information which will add to your understanding of the topic under discussion. Some activities challenge you to apply your learning to a question or scenario to help you think about a theme in more depth in order to add to your understanding. A few activities require you to make observations during your day-to-day life or in the clinical setting. All these activities are designed to increase your understanding of the topics under discussion and how they reflect on nursing practice.

Where appropriate, there are suggested or potential answers to activities at the end of the chapter. It is recommended that, where possible, you try to engage with the activities in order to increase your understanding of the realities of nursing research.
and methods have their strengths and weaknesses, and all research findings are open to being disproved or modified by later research. What is important about nursing research is that researchers try to answer, to the best of their ability, important questions about the care we give.

Using research to answer questions about the care we give is important because it allows us to develop increasing certainty about what we do. It allows us, as nurses, to be able to justify our practice; it provides, at least in part, an evidence base.

### Developing research questions

So far we have seen that the starting point for research is uncertainty about a question or questions that, in the context of this book at least, arise out of clinical practice. How then do we ask questions and what structures might we apply to the process?

Asking questions for research requires considerable thought, not only about the question itself but about whether the answer to our question already exists. It may be that the questions arise out of clinical observations or interactions that have occurred in practice. Such questions may lead us down one of two pathways. The first is to seek clarification of the state of knowledge by reading the existing literature within the area of interest. The second is to ask questions that as yet have no, or only limited, answers.

Reviewing the literature on a topic is itself a skill and one with which you may not be familiar. The existence of high quality, readily accessible bibliographic databases makes it increasingly easy to scrutinise the literature in order to find out the state of knowledge in a particular area. Online databases, such as the Cumulative Index of Nursing and Allied Health Literature (CINAHL), are a first point of call for many researchers. It is worth taking time and making the effort to learn and understand the processes by which these databases can be searched. Your university or hospital librarian will most certainly be able to help with this.

### Activity 1.1 Critical thinking

Make a list of the reasons, both clinical and political, why research is important in informing the practice of nurses. Don’t think just about the individual patient, think also about wider society and the greater good.

*There are some possible answers at the end of the chapter.*

### Activity 1.2 Research and finding out

The ability to search databases and identify literature is not only important in the design of research but also helps you to identify literature that can be used to inform practice as well as for writing academic essays. If you have some notes from previous training on searching bibliographic databases, review them now. If not, try to identify some time to go to the library at your hospital or university in order to attend some training.

*As this answer is based on your research, there is no outline answer at the end of the chapter.*
The ‘qualitative’ element of the paradigm refers to the fact that it seeks to understand things that cannot readily be measured or counted. It is more concerned with the quality of an experience and of understanding and belief. Qualitative research starts with a question, something that needs to be explored; it may be used to generate a hypothesis, but it does not start with one. Chapter 2 explores the approaches to enquiry used within this paradigm.

**Activity 1.6**

**Reflection**

Given that the qualitative research paradigm is concerned with things that cannot be counted, such as human experiences and understanding, think about what questions you could ask about where you currently work that fit this paradigm. What clinical problems might be best answered using this approach?

*Keep your notes on this safe and return to them in Chapter 2 where you will find many examples of this type of research to which you can compare your answer.*

Qualitative research is by its very nature inductive. That is, it generates ideas and theories from what is observed during the research. The data collected lead to the generation of ideas or hypotheses (hypotheses tested in deductive studies, as discussed above, are sometimes derived from inductive research). The researchers start with an enquiry not knowing what they will find; they allow the data collected to lead them to the creation of a new idea or hypothesis. Inductive research works from specific observations towards creating much broader generalisations. Sometimes described as ‘feature detecting’, it uses observations and interviews to detect the key features of a phenomenon. Figure 1.2 gives a diagrammatic representation of inductive research.

It is worth reflecting on the generic competency introduced at the start of this chapter that requires nurses to practise autonomously, applying ‘relevant theory and research to practice. This assumes that the nurse has an understanding of the theoretical basis of research and the variety and types of questions that research can be used to answer. Even at this stage of the book, you should already be in a position to

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**Figure 1.2: Representation of inductive research**

- **Inductive Research**
  - Theory
  - Tentative Hypothesis
  - Pattern
  - Observation
Disseminating research

Right at the start of the research process we saw how important it was to look into the existing literature about a topic in order either to inform an immediate change in practice or to design a research study. This means that there is an ethical need for researchers to make the findings of their work public. Withholding the findings of research has consequences for other researchers, who may set out to undertake research into an area that has already been explored, using time and money that could be better spent elsewhere.

There are a number of reasons why not all studies get published. Sometimes the research is undertaken as part of a course of study, and the student, on getting their award, feels that they have completed all they need to do. Sometimes the research comes out with a result that was unexpected – it disproves the hypothesis, perhaps. This may lead some researchers not to publish, especially where the research has been sponsored by an organisation that may be damaged by the negative findings. Another reason that research with negative findings does not get published is that it is rejected by publishers because it does not make good reading.

If we return to our guiding ethical principles, we can say that not publishing or making the findings of research known is potentially unethical for two reasons: it may inflict harm on others and it may lead to negative consequences. The ‘others’ on which harm may be inflicted include: the people who volunteered for the study who expected their sacrifice to benefit other people; researchers who subsequently design studies that are in the same area or contain the same flaws that may have been identified had they seen the previous research; and people who are current patients who may be subjected to care that research has shown does not work.

Other issues to take into account when designing a research project

As well as the research question and the ethical issues, there are a number of things a potential researcher is to take into account before starting on a piece of research. Some of these issues will be discussed in the following paragraphs.

Even the simplest study will have some cost attached to it. Interviewing participants for a study may involve travel, the cost of the recording device and often the cost of professional transcription of the interview tapes. Other costs that may need to be considered, depending on the study, are postage, printing and paperwork and telephone costs. Many novice researchers underestimate the time that a study will take to do and so may not cost out the time away from work that research grants are often designed to help with.

The amount of time needed to undertake research often comes as a surprise to the first-time researcher. Time needed for a study will include the time taken to read text books regarding research design as well as the time taken to undertake a literature review of the topic under research. The study will then need to be written up for ethical and, potentially, research and development review (that is, a review of the scientific quality of the study as well as what the study may mean in terms of the use of facilities and staff time within the organisation within which it is set). There is a need to write participant literature, undertake the data collection (whatever form that takes), review and analyse the data and then write the study up. What surprises many new researchers is that the time taken to prepare to undertake the study and the time taken to analyse the findings are both often far in excess of the time taken to actually do the study itself.


**Useful websites**

http://www.rlo-cetl.ac.uk:8080/open_virtual_file_path/i2529n6682t/index.html An animated and spoken introduction to qualitative and quantitative research paradigms.

www.nres.npsa.nhs.uk/ UK NHS research ethics committee’s website.

www.niehs.nih.gov/research/resources/bioethics/whatis.cfm An overview of research ethics including case studies.
Qualitative research methodologies have their roots in various associated academic disciplines and philosophical schools of thought. One of the common and enduring features of qualitative research is that the philosophies underpinning the methodological approach are evident in the design and execution of the study. When reading qualitative research studies it is not uncommon to see the researcher discuss the philosophical position they have adopted in the preamble to the study or at the very least state who or what has informed their approach.

Because of the human focus of both nursing and qualitative research, the focus of the NMC competency on practising autonomously and applying relevant research applies well within the qualitative paradigm. In order to continue their development as competent professionals, nurses should familiarise themselves with the messages that qualitative research adds to the cumulative knowledge underpinning modern nursing practice.

The ESC that suggests nurses should be able to respond to feedback from a wide range of resources so that they may improve the quality of the services they provide reflects closely the messages learned within qualitative research. The issues that qualitative research often highlights are to do with the quality of the experience of care, so gaining an understanding of qualitative research methodologies links back closely to the potential for improving the care that nurses provide.

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Qualitative research methodologies are common to many sociological, anthropological and psychological forms of enquiry. Often the academic discipline that underpins a qualitative method provides clues to the sort of questions that the methodology is used to answer (see Table 2.2).

It is worth thinking for a moment about the philosophy underpinning qualitative research methodologies before exploring the questions they attempt to answer and the methods they employ. Qualitative research asks questions about the nature of reality; it regards reality as being both subjective and multiple. This means that qualitative

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Academic roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnography</td>
<td>Sociology, cultural anthropology</td>
</tr>
<tr>
<td>Grounded theory</td>
<td>Sociology (specifically symbolic interactionism)</td>
</tr>
<tr>
<td>Phenomenology</td>
<td>Philosophy, psychology, sociology</td>
</tr>
<tr>
<td>Case study research</td>
<td>Social sciences</td>
</tr>
</tbody>
</table>
Phenomenological studies often use either unstructured or semi-structured interview methodologies (as opposed to the more rigid structured interview that might be undertaken as part of market research). More flexible interviewing structures allow the interview to explore the issues that are of importance to the interviewee. This exploratory interview method fits better with the aims of phenomenological research, which are to explore the meaning or essence of an experience (such as living with hepatitis C) for the individual. Open questions are used (also called open-ended questions).

Some researchers have used focus groups as a means of collecting data for phenomenological studies. While these are quicker than a series of one to one interviews, the disadvantage is that they collect a group consensus view and may not always gain insight into the actual feelings or interpretations of the individuals present. These difficulties may be more acute when the topic being researched is in a sensitive area.

Case study/biographic research

Creswell (1998: 61) defines case study research as: an exploration of a ‘bounded system’ or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context. While this definition is correct, it may appear to be misleading since Creswell is using the term ‘bounded system’ to refer to any of the following: an individual, a collection of individuals, a system, an organisation or an intervention.

Case study research is perhaps the least well understood approach to qualitative research. It is a widely held view among the research community that case study research is not useful as an insight into a wider group or other systems and that its usefulness is restricted to the early stage of qualitative enquiry to hypothesis generation to be tested by subsequent larger-scale investigation.

Key features

According to Yin (2003), a case study approach to qualitative questioning might be considered when: the point of the study is answering ‘how’ and ‘why’ questions; it is not possible to manipulate the behaviour of the individuals involved in the study; the boundaries between the phenomenon and context are unclear; it is desirable to study the contextual conditions because it is believed that they are of relevance to the phenomenon being studied.

Sampling in case study research

In common with most qualitative methods, the starting point for the sample for the research are individuals who constitute the system being researched or have experience of the intervention of interest. What is clear in case study research is that a lot of thought needs to go into what exactly one is studying because there is a world of difference between studying an individual and studying a process or organisation.

Methods used in data collection

A feature of case study research is the use of multiple sources of data. Potential sources of data include documentation, interviews, archived records, objects, observation and pictures. Unlike other qualitative research methodologies, case study researchers can use quantitative data in order to gain a fuller insight into a phenomenon being studied. Data from the many different sources are then joined together in the analysis, rather like putting together the pieces of a puzzle.
Further reading

A great text for understanding the differences between the qualitative research methodologies.

Chapter 4 is a very useful introduction to the principles of qualitative research.

Chapters 1 and 2 provide a very accessible introduction to the philosophy and conduct of qualitative research.

Useful websites

www.qualres.org/ A comprehensive website covering all aspects of qualitative research.
www.phenomenologycenter.org/phenom.htm An easy to use site regarding phenomenological research.
www.analytictech.com/mb870/introtoGT.htm An introduction to grounded theory.
http://faculty.chass.ncsu.edu/garson/PA765/ethno.htm A basic guide to ethnography.
little bit easier. It allows there to be some consistency within a research process that involves one researcher but also in studies that involve more than one person in the data collection.

**Cumulative knowledge**

Structured interviews are in some respects similar to the documents used when undertaking an assessment of a patient on admission to a ward. It is important that all of the same data are collected in the same manner so that everyone who is later involved in the patient’s care has access to the data in a structured and consistent manner. Deviating from the assessment process, neglecting to collect some pieces of information, or failing to include all of the usual documentation in the assessment leads to confusion and the potential for something important to be missed. Within the structured interview protocol, failure to gather data in the same way on each occasion means the data will not easily be compared and that there is confusion about what questions the research has actually answered.

It is easier when writing up a study involving structured interviews to include in the research paper the list of questions asked and the order in which they were asked. This has the advantage of making it clear to readers exactly what was asked, so they can then compare this to the answers given and decide for themselves if the findings of the study, as presented by the researcher, appear reasonable.

The main disadvantage of structured interviews is that they tend to gain less full responses from the interviewees, as the answers they can give are constrained by the type and nature of the questions asked. Structured interviews are sometimes used as a method of data collection in quantitative research where there is a requirement for all of the data to be collected in the same way using the same questions in order to maintain the consistency (reliability) of the data collection.

**Activity 3.4**

When you next work clinically, pay attention to the way in which people answer the questions you pose to them. Pay special attention to the length and quality of the answers given when you are collecting very well-structured data (as you might on admission, or when preparing someone for surgery). Compare the quality (what we have identified as depth and richness) of the answers you get from people when you ask them more unstructured questions when interacting with them on a more social level, perhaps at mealtimes or when doing clinical observations.

As this answer is based on your observations, there is no outline answer at the end of the chapter.

**Semi-structured interviews**

Semi-structured interviews are interviews in which the key questions have been decided before the interview commences. In most cases the same questions are asked, but there is freedom within the interview protocol for the researcher to explore some of the answers given. The sequence of delivery of the questions varies from interviewee to interviewee and is guided by the responses the interviewees give (Dearnley, 2005).
together the themes and ask the participants to rank them in order of importance while they are still together. This means that as well as data collection, the focus group can also be used to start the analysis of the study.

**Disadvantages**

Peterson and Barron (2007) identify a number of potential problems with focus group interviewing, not least among which is getting everyone in the group involved with the discussion. There are always individuals within the group who are more confident and perhaps have more to say than the rest of the group, and their opinions then tend to rise to the forefront of the discussion. Peterson and Barron (2007) suggest using sticky notes to collect people’s ideas, either collectively or individually before the focus group, and then using these as a stimulus to further discussion.

Acquiescence, or passive agreement, with the main group consensus can also be a problem within a focus group. There are two problems with a submissive group that tends to agree with what is being said because it is easier to do so than to challenge an opinion that appears to be popular. The first is that the consensus view may in fact not be the consensus: it may represent the views of the most vocal or powerful people in the group. The second problem is that the researcher also wants to hear and understand minority views and opinions in order to gain a more complete insight into the topic being studied.

The issues of acquiescence and non-involvement can both be designed out by carefully selecting focus groups that consist of people with similar degrees of power within an organisation, for instance. A good example of keeping the power of the groups even would be using separate staff and patient focus groups to investigate feelings about changes to service provision within a hospital department.

There are also problems associated with the technology needed to capture all of the data produced in the focus group setting. While in an interview it is easy to place a voice recorder between the interviewer and interviewee, in the focus group setting this is not so easy. The recording of a group conversation is not only technically difficult; it can be difficult to catch what is being said if more than one person talks at once. It may also be hard to catch the quieter members of the group.

Transcription has the potential to change the meaning of what is said in either the focus group or interview setting. Although the interviewer should be able to ascribe meaning to comments made in the one to one setting, this can be quite hard to do in the focus group as different words have different meanings depending on the context and intonation used at the time of speaking. Writing up the body image and capturing the gestures and eye contact within the group is an important role of the co-facilitator as this allows such notes to be transposed onto (added to) the typed transcript of the focus group.

**Observation**

Observation may seem to be an unusual way of collecting data for research. Observation is something we associate with our day-to-day lives and also with the surveillance of patients in the clinical setting. Observation is, however, a powerful data collection method, and the ways in which it is undertaken, the amount of time it is undertaken for, and the location in which the observation takes place have a large impact on the outputs from the research process.

The process of data collection using observation is not unique to qualitative research. Observation is used in quantitative research, but there it tends to be more structured than in the qualitative methodologies. The things to be observed and noted
Cross-sectional studies usually measure one of two types of prevalence: point prevalence (Do you have a headache at the moment?) and period prevalence (Have you had a headache in the last week?). For chronic diseases (diseases that last a long time – such as asthma or diabetes) there is little difference between the two measures of prevalence, while for short-lived diseases (such as a cold or a headache) the two may be vastly different.

A cross-sectional study is essentially a snapshot of a phenomenon at a point in time and cannot, therefore, be used to demonstrate the incidence of an exposure or an outcome, unlike the prospective methods discussed earlier. Unless they are focused on high-risk groups, cross-sectional studies are not very useful for studying rare diseases. Cross-sectional studies are useful for planning the delivery of a service and for estimating future need.

**Sampling in cross-sectional studies**

The sample for a cross-sectional study is usually drawn from a population in which the exposures or outcomes of interest are known to be fairly prevalent. For example, Ellis and Cairns (2001) studied the prevalence of renal disease among older people with hypertension and/or diabetes in two GP practices. The purpose of this study was to ascertain the prevalence of early renal disease in order to inform the debate about whether screening for renal disease among this population was a worthwhile exercise.

**Methods used for data collection**

Data for cross-sectional studies are often drawn from pre-existing data, such as blood test results, data held on hospital or GP databases, or data held by local authorities. Such data may be supplemented during the course of a study by taking biological samples, by using questionnaires or by conducting structured interviews.
See Chapter 3 on quantitative designs, Chapter 11 on experimental design and Chapter 13 on questionnaires.

**Useful websites**

www.medicine.ox.ac.uk/bandolier  This is an online evidence-based medicine journal. The glossary, extended essays and the new learning zone are of great use to students of research.

www.socialresearchmethods.net/kb  The Research Methods Knowledge Base is a comprehensive web-based textbook that addresses all of the topics in a typical introductory undergraduate or graduate course in social research methods. The section on experimental and quasi-experimental design is quite useful.

www.intute.ac.uk/socialsciences  Intute is a free online service providing you with a database of hand selected web resources for education and research. This URL provides links to many websites about quantitative study designs if you type ‘quantitative research health’ into the search box.
Chapter 5
Data collection methods and analysis in quantitative research

Draft NMC Standards for Pre-registration Nursing Education

This chapter will address the following draft competencies/elements:

Domain: Professional values
10. All nurses must practise independently, within their own limitations, and apply relevant theory and research to their practice. They must also recognise how different research methods are used to increase knowledge in nursing.

Domain: Leadership, management and team working
10. All nurses must draw on a range of resources to evaluate and audit care, and then use this information to contribute to improving people’s experience and outcomes of care and the shaping of future services.

Draft Essential Skills Clusters

This chapter will address the following draft ESCs:

Cluster: Organisational aspects of care
9. People can trust the newly registered graduate nurse to treat them as partners and work with them to make a holistic and systematic assessment of their needs; to develop a personalised plan that is based on mutual understanding and respect for their individual situation promoting health and well-being, minimising risk of harm and promoting their safety at all times.

For entry to the register:
xiv. Applies research based evidence to practice.
Nurses are familiar with undertaking treatments and care regimes that are broadly similar and that work when we apply them time and time over different patients. Such regimes are often the product of quantitative research that informs the provision of care, the outcomes of which are broadly speaking predictable. This is the first and most important premise of quantitative study design: it informs future practice. As such, it is easy to see how quantitative research might reflect the aspirations of the Nursing and Midwifery Council’s (NMC) draft competencies and ESCs. These include using research to underpin nursing practice, as well as using research to evaluate the quality of the care that is currently provided.

When discussing the qualitative methods, we saw that the researcher is seen as a tool of data collection and that this provides a depth and richness to the process. This personal engagement with the collection of data was identified as necessary to the need to understand the human interactions that form the basis of qualitative research. We also identified that, because of the interactive nature of the data collecting methods in qualitative research, it is hard to eradicate bias in qualitative research.

The collection of data within the quantitative methodologies requires researchers to be one step removed from the process, so that they remain objective and their approach to the process is consistent. This detachment ensures that the quality of the data collected is high and that there is less room for bias (the introduction of systematic errors) to creep into the data collection process.

The rest of the chapter explores the use of the quantitative data collection methods that are most commonly used in nursing research: questionnaires, surveys and clinical (physiological) data. In order to understand the processes involved in the design and delivery of surveys and questionnaires, the principles of how questions are chosen and worded, and methods for answering the question selected are explored first. The chapter concludes by examining approaches to data presentation and analysis in quantitative research.

Concept summary: generalisability

Generalisability is an important feature of quantitative research because it allows the researcher to have a fair degree of certainty that the findings of the research apply to people that have the same, or broadly similar, characteristics as the people involved in the study. Think of it this way: as nurses working in the clinical setting it is important that we feel the care we deliver to a patient will work. For example, it is important for us to know that the dressing that we apply to a particular wound or the ways in which we prevent the formation of pressure sores are going to be effective. This knowledge is generated by research that has been carried out to demonstrate this. That research has involved people who are broadly similar to the patients we care for, so we have some certainty that the information we apply from the research will be relevant to our patients.

Research into the treatment of venous ulcers applies to people with venous ulcers. The same research will not apply to the treatment of people with ulcers of a different aetiology (cause) or different type. The research may have taken place in only 100 people with venous ulcers, but it applies to all patients with venous ulcers who are broadly similar to the people who took part in the research. The research is generalisable to people with venous ulcers and only those people.
Questionnaires do not write themselves and there are a number of routes to checking the quality of a questionnaire you have written yourself. Using experts in the topic being studied to help write the questions can be fruitful as they often know the sort of ideas and misconceptions that people have.

The length of a questionnaire will impact on the response rates achieved. A shorter tick box questionnaire will always gain more responses than long, more complex ones. It would be wrong to think that a long questionnaire is necessarily of better quality than a short one that is better focused.

The order in which questions appear has an impact on whether or not people decide to fill in a questionnaire, as do the quality and nature of the questioning involved. Once people have committed some time to filling in a questionnaire they are more likely to finish it. The general rules for sequencing questions are summarised below.

### General rules about sequencing questions

- Go from general to specific.
- Go from easy to harder.
- Go from factual to more abstract.
- Start with closed format questions (scaled).
- Start with questions about the main subject.
- Don’t start with personal or demographic questions.

### Administering questionnaires

There are many ways of administering a questionnaire. The choice of delivery will tend to be driven by the nature of the questions and the sample being questioned. Self-administered questionnaires may be posted in the mail, be placed online (perhaps in a clinical area), be e-mailed, or be left in a pertinent clinical area, perhaps. Interviewer-administered questionnaires may be undertaken face to face, over the telephone or even via the internet.

There are a number of pros and cons of each approach, and these need to be considered before launching into the questioning process. Table 5.3 summarises the pros of each approach.

### Table 5.3: Pros of self- and interviewer-administered questionnaires

<table>
<thead>
<tr>
<th>Self-administered questionnaires</th>
<th>Interviewer-administered questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick, cheap, easy to administer, convenient to respondent, confidentiality and anonymity easily preserved, easily standardised format and limited researcher input needed.</td>
<td>Interviewer can clarify questions, allows participation by people who are illiterate, virtually guarantees a high response rate, quality and completeness of questionnaires may be higher.</td>
</tr>
</tbody>
</table>

### Presenting and analysing quantitative data

By their very nature quantitative studies produce outputs - findings - that are quantifiable. This means that the findings of a quantitative study include data that use
Different data types can be presented in different ways using descriptive statistics. Table 5.5 shows the measures of central tendency (types of average) that can be used to describe different data types.

**Table 5.5: Measures of central tendency that can be used with specific quantitative data types**

<table>
<thead>
<tr>
<th>Type of average</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinal</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Interval/ratio</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Parametric/non-parametric data**

Before applying any inferential statistics to a data set it is important to ascertain whether the data need to be analysed using parametric or non-parametric statistical tests. Parametric data are data that when plotted on a histogram present a bell-shaped curve. Such data are said to be normally distributed (Altman, 1991). Normal distribution is most often achieved in data sets that are large and that contain naturally occurring measurements (such as heights of a group).

Data that are normally distributed (i.e. produce a bell-shaped curve) have at their peak the mean of the data with about 68 per cent of the data values lying within one standard deviation of the mean, 95 per cent within two and 99.7 per cent within three (see Figure 5.9). As well as plotting the distribution curve, there are statistical tests that can be applied to data to see if they are normally distributed and therefore whether parametric tests can be used in the analysis of the data.

Because parametric tests tend to be the preferred form of statistical testing because they produce more powerful results, generally speaking, they are more powerful because their results are more likely to be significant when they are significant. However, the incorrect use of parametric tests in small data sets, or with data that are not normally distributed, can lead to misleading results.

**Figure 5.9: The normal distribution curve**
The exact choice of test to be used with different forms of data is a matter of careful consideration that is best decided before data for a study are collected, and this is best decided in conjunction with a statistician. Given the variety and number of statistical tests available, it is beyond the scope of this book to present these here. For further information on how to select an appropriate statistical test please see the further reading and useful websites sections.

This chapter has introduced you to the key methods used in data collection in the types of quantitative research that nurses most frequently undertake, that is, questionnaires and surveys. Such methods are often used to answer questions about the perceptions and attitudes of participants to the care they have received.

We have established that the validity and reliability of the data collected are affected by the ways in which questions are worded and presented. Validity, which is about ensuring that a research tool measures what it sets out to measure, is affected by the choice of questions used, while reliability is ensured when the data have been collected in a way that is readily reproducible.

We have seen that there are a variety of ways that both surveys and questionnaires can be undertaken and that the choice of approach is affected by the type of question being asked. Sometimes the nature of the questions asked requires a sensitive face-to-face delivery, while on other occasions the sheer volume that can be achieved by a self-completion questionnaire enables a study to attain a high degree of statistical significance.

We have seen how to present and analyse the data from a quantitative study and that decisions about how to analyse and present data need to be made before data collection has started. We have seen that numerical data can be dealt with in two ways, descriptive statistics – which merely describe the data – and inferential statistics – which make inferences about the data that go beyond the data collected. Making inferences about the data that go beyond the sample mean that the findings of the study become more generalisable, with the likelihood of the finding being a result of chance being represented by the p value calculated.

Activities: brief outline answers

Activity 5.5: Research and finding out (page 100)

p=0.2 means 20 per cent or 1/5th chance
p=0.05 means 5 per cent or 1/20th chance
p=0.01 means: 1 per cent or 1/100th chance
p=0.001 means: 0.1 per cent or 1/1000th chance
Chapter 6

Multiple methods, evaluation and action research

Draft NMC Standards for Pre-registration Nursing Education

This chapter will address the following draft competencies:

Domain: Professional values
10. All nurses must practise independently, within their own limitations, and apply relevant theory and research to their practice. They must also recognise how different research methods are used to increase knowledge in nursing.

Domain: Leadership, management and team working
10. All nurses must draw on a range of resources to evaluate and audit care, and then use this information to contribute to improving people’s experience and outcomes of care and the shaping of future services.

Draft Essential Skills Clusters

This chapter will address the following draft ESCs:

Cluster: Organisational aspects of care
16. People can trust the newly registered graduate nurse to safely lead, co-ordinate and manage care.

For entry to the register:
iii. Bases decisions on evidence and uses experience to guide decision-making.
say, the people who will have to take the medication or be subjected to the intervention must regard its benefits as outweighing any potential or actual side effects (Gomm, 2000a).

There are a number of approaches to triangulation that all serve not only to enrich the quality of the data collected but also to verify it is a true reflection of reality (i.e. it is valid), as the participants see and experience it. These include layering data collection so that the different approaches to data collection become progressively more detailed or probing in what they seek to elicit. So, for example, a brief questionnaire might lead to a focus group, which might lead to a one to one interview. Using such techniques not only allows the richness of the data collected to be increased but also enables the weaknesses of the individual methods to be compensated for. An example might include understanding the quality of life of patients on dialysis. A questionnaire might be used that would elicit some quantitative data. This data might then be explored in the focus group setting where participants could elaborate on some of the issues raised in the questionnaire. Further individuals, perhaps those most or least typical in their contribution in the focus group, might be interviewed one to one to gain even more detail.

Lukkarinen (2005) used questionnaires to ascertain the Health Related Quality of Life (HRQoL) of 280 patients in a study following their treatment for coronary artery disease. Subsequently 19 of the original group underwent qualitative interviews in order to gain a more in-depth understanding of the scores attained during the HRQoL questionnaire phase of the study. This triangulation of the study enabled Lukkarinen to describe the reasons for the differences in the answers to the HRQoL questionnaire given by different groups in the initial phase of the study with a degree of confidence because a number of the respondents themselves had been engaged in the process of explaining the initial findings. This use of triangulation, with questionnaires and interviews, demonstrates how the use of methods of data collection from within the two research paradigms (qualitative and quantitative research) can be used to enhance the validity of a study.

In her study of the use of immunosuppressants in the management of inflammatory bowel disease, Holbrook (2007) collected data on the value of the information given to patients at the start of the new treatment regime from the point of view of the patients and the doctors involved. This provided triangulation about the value of the information given from two different perspectives and therefore provides useful insights into the quality of the information sharing process. In tandem with using triangulation of sources of data – patients and doctors – the data collection included questionnaires with space for the respondents to provide free text clarification of their answers (that is, respondents are allowed to elaborate on their answers using their own words). This free text was used to explore the reasoning behind the answers given and provided a reference point for understanding why respondents had answered in the way they had – that is, it triangulated the data collected.

As well as methodological and methods-based triangulation, there can also be theoretical triangulation within a study. Theoretical triangulation occurs when the underlying philosophy of the research is informed by more than one school of thought. For example, the structuralist view of ward life may be more focused on the nurses or the patients as a group in terms of the relationships between them and how they interact. An interactional view, on the other hand, is more interested in the individuals within the groups and their view of the world and how they function and interact within it.

Theoretical triangulation is therefore about exploring a concept, experience, attitude or interaction from more than one standpoint, and like methodological triangulation, it is about gaining multiple insights into the same issue by taking more than one philosophical starting point. Practically, this is achieved by using more than one data


