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# **How to Search and Critically Evaluate Research Literature**

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# 1. Introduction

The amount of health care research undertaken has grown enormously over the past two decades. More research is being done by more people in almost every professional group. This is due to a number of factors. They include:

- more health care staff undertaking research as part of academic studies
- increased funding for research
- pressure on academics in university health care faculties to undertake original research that can be written for publication.

At the same time, health care professionals are being encouraged to base their clinical practice on research based knowledge. Every year, hundreds of professional journals are published containing thousands of reports of research studies. The health care professional searching the literature for information on, for example, factors affecting patient uptake of screening services, is likely to reveal a bewildering number of research reports from a growing array of sources. The reports will vary in terms of quality, comprehensibility and relevance to practice. Surprising as it may seem, it is an unfortunate fact that not all published research is good quality. Many more studies, while being basically well researched studies, will have limitations due to aspects of research design. The technique of the literature review is to try to make all of the above more manageable.

The process of carrying out a literature review can be described by two main activities. These are searching and then critically evaluating research literature. In addition, the process and findings should be written-up as a complete record. These activities are outlined below and covered in later sections in more detail.

Searching the literature is a research method in its own right. The method uses specific technical terms and there are guidelines to follow that are designed to seek out the literature that is relevant to the defined area of study. The literature identified from the search should then be critically evaluated. The purpose of critical evaluation is to enable the practitioner to read research studies objectively: to identify the good points and bad points, the strengths and weaknesses, the usefulness of a report and the limitations. Additionally, critical reading of research reports increases the practitioner's understanding of the research process. Lastly, practitioners undertaking research of their own will benefit from developing their critical evaluation skills. It will assist them to appraise their own research projects and enhance their skills at all stages of the research process from project design to writing the final report.

This resource pack provides guidelines on how to both search for and then critically appraise research reports. It is intended for use by health care professionals with little or no previous research knowledge. Readers will be guided through the processes and provided with information on the factors that can affect the quality of the literature search and the research articles found. This will be supported by examples from health services research. Exercises will be used to reinforce the reader's understanding of the text.

## LEARNING OBJECTIVES

The aim of this pack is to provide an introduction to searching and evaluating research literature. After working through the pack you will be able to:

- Appreciate the role of the literature review in the research process
- Conduct a literature search
- Follow the sequence of a written research report.
- Systematically consider each section of a research report identifying strengths and weaknesses that may be present.
- Critically appraise the overall value of a research report and consider whether or not to apply future research findings to practice.
- Write a brief and well-structured literature review.

This pack defines some key terminology and presents an overview of the process of literature searching and critical evaluation.

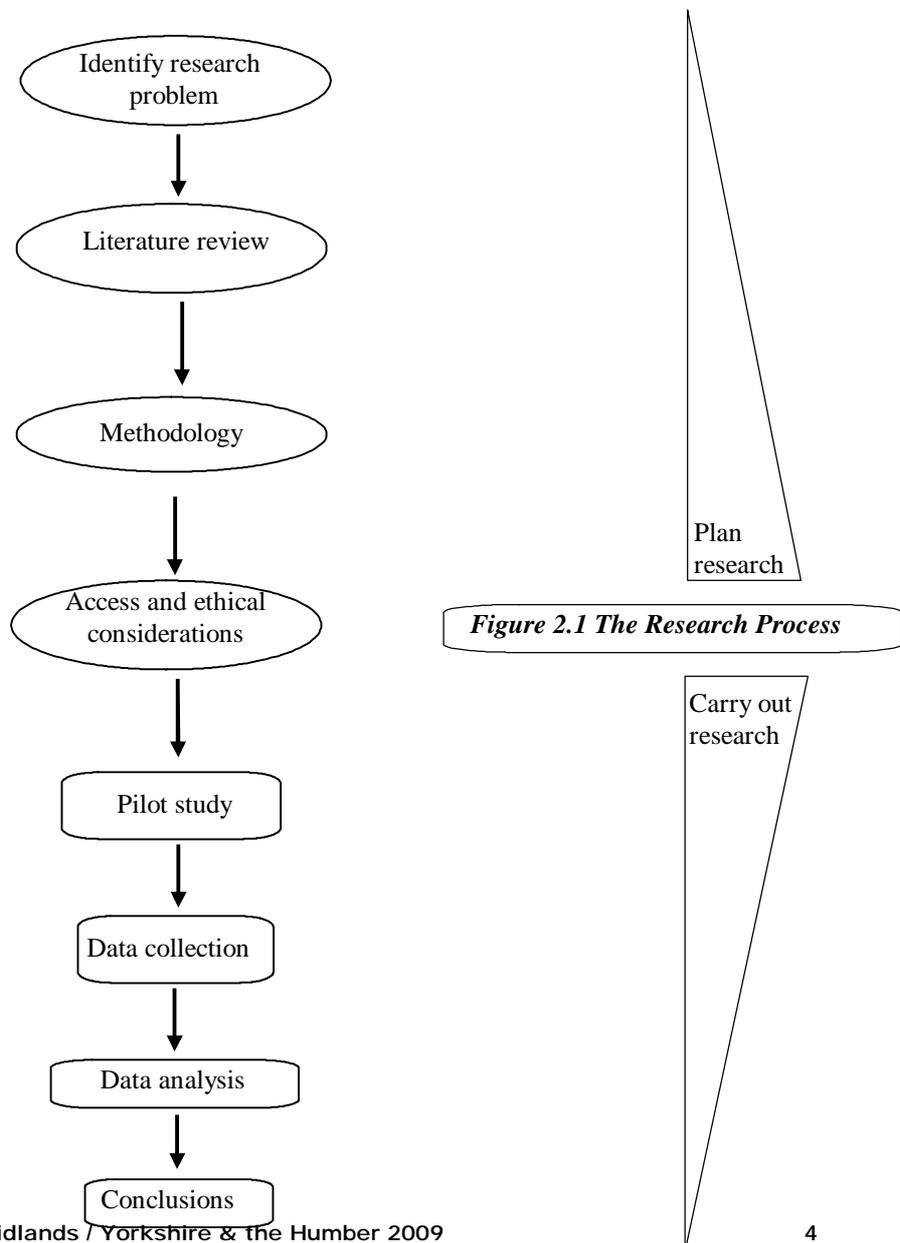
### 1.2 Summary

This section has presented an overview of searching and evaluating the literature. The following sections look in more detail at the process. Sections 2 and 3 examine the publication of health care research. They describe in more detail what is meant by the literature and how a piece of research becomes a part of this body of knowledge. Section 4 describes the methods that have been devised for selecting out particular subsets of the literature, and section 5 includes a step-by-step approach to planning and conducting a literature search. Section 6 provides guidance on how to process the results of your literature search, critically evaluate the research articles found and presents brief guidelines on how to write a literature review. To assist the learning process practical exercises are provided at the key stages of the pack. These take you through the essential steps of conducting your own review.

## 2. The Research Process

Thousands of books and articles have been written about research. It is an enormous topic and no one knows everything there is to know about it. But in order to search and read research literature critically, it is essential that the reader has a basic understanding.

Research is conducted in a systematic way. The process of research is made up of a number of stages, which the researcher must proceed through, for the research project to be completed satisfactorily. The main stages are presented in Figure 2.1 and are described in brief in this section. If you have no previous awareness of research at all you may find it useful to read The NIHR RDS EM / YH Resource Pack *An Introduction to the Research Process*, which provides more information about each stage in the process.



When deciding to carry out a research study the researcher starts out with an idea for which a plan of investigation is developed. In developing the plan the researcher takes into consideration things such as:

- what am I trying to find out?
- what sort of information do I need?
- what is the best way to collect the information?
- where can I get the information?
- how many people will I need to ask?
- how will I analyse and make sense of the information I collect?

Once the information has been collected and analysed the researcher has a responsibility to disseminate a report of the project. This includes:

- explaining how the research was conducted
- reporting the results
- highlighting the limitations of the research
- drawing out main conclusions
- identifying possible recommendations for practice and for further research.

The research process is the sequence of events that the researcher goes through in developing and disseminating the research project. Different textbooks list the sequence of events in slightly varying ways but they are essentially similar to the list shown in Figure 2.1. The remainder of this section provides a concise summary of each stage.

## **2.1 Identification of the Research Problem**

Every research project starts with an idea; something that the researcher is interested in knowing more about or is worried about; something that is perceived as a problem or as a knowledge gap that needs to be filled. At the outset, the research idea is often vague or too broad to be covered in one research project. It needs to be refined to make it manageable and researchable. The researcher needs to think the idea through and the thinking process is informed by the next stage.

## **2.2 Review of the Literature**

Before embarking on a research project the researcher should search and review existing literature. The process of searching and evaluating research literature is detailed in subsequent sections of this resource pack. However, it is useful at this stage to provide descriptions of some key concepts.

*What is a literature review?*

A literature review is a self-contained piece of written work that gives a concise summary of previous findings in an area of the research literature. It reflects an author's knowledge and interpretation of the area of interest. It has a reference section that lists

the individual pieces of work referred to in the review. Like all pieces of written research output it should include a description of the methods used to create the work.

Literature reviews vary considerably in their depth and breadth, as well as style of presentation, depending on the purpose intended by the author. This may range from a superficial search of the literature to give a researcher an insight to an area of potential research through to a scientifically rigorous 'systematic review'.

Researchers committed to writing a review, however, should be encouraged to go beyond superficial searches and simply listing research works; they will inevitably get a biased or incomplete view of the research area under investigation. Instead, they should develop skills that will enable them to systematically search for literature and critically review the research uncovered by the search. This pack aims to help health care professionals achieve these skills.

### *Why do a literature review?*

A preliminary review of the literature will help in further identifying and clarifying your research problem. A little further down the line it may provide the theoretical input to your research idea and help in the formulation of the research question. More specifically, a literature review will:

1. provide an up-to-date picture of the research area of interest and show which areas have been investigated and the results obtained
2. identify methods of investigation that could be used in further research
3. give indications of problems that might be encountered and possible solutions
4. reveal common findings among studies
5. reveal inconsistencies between studies
6. identify factors not previously considered
7. provide suggestions for further research.

In summary, completion of the literature review enables the researcher to revisit the original research idea and define the exact focus of the research problem.

### *Published literature reviews*

Examples of published literature reviews include: Chalmers and Pearson (2005) on oral hygiene care for residents with dementia; Richardson *et al.* (2005) on indoor environment and asthma; and Lui *et al.* (2005) on effective problem-solving interventions for caregivers of patients with stroke.

## **2.3 Research Methodology**

## *Methodology*

Methodology refers to matters regarding the structure and design of the research study. It deals with such issues as: the type of information required; the research design; the method of collecting data; and the source of information, which is known as the sample.

### *Type of information*

This depends on the original research idea. If the researcher wants to collect measurable information about a topic this is referred to as quantitative research. It looks at how big a problem is, how many people are affected by it, how often something occurs, whether one thing is more or less important than another. If the researcher is trying to understand something in more detail or to describe a situation so that people can understand it better, this is usually qualitative research. In qualitative research, attention is focused on answering questions such as why? in what way? what are the implications? Rather than, how many? how often? how much? as occurs in quantitative research.

### *The research design*

This refers to the type of research. There are many different types of research design. Research can be carried out using experiments, surveys, case studies, action research, ethnography, grounded theory, and phenomenology. The glossary in Section 2 contains a concise definition of each of these research designs.

### *The method of collecting data*

The most commonly used methods of collecting information are interviews, questionnaires and observation. Interviews are usually conducted on a one-to-one basis but some studies may use group interviews or focus groups. Interviews can be highly structured, semi-structured or unstructured. The degree of structure affects the flexibility of the interview. Questionnaires comprise a written set of questions, which are answered by all respondents in a study. Observation is a technique for collecting data through visual observation of events. It requires the nature of the data to be observable.

### *The sample*

In any research the researcher has to identify the population under study. If a School Nurse wants to carry out research about school children she needs to decide if this means any school child or is she interested in a particular section of the school population. Furthermore, if she eventually decided that the research was actually about, for example, "poor attendees" a criterion standard for poor attendance should be identified. If the target population is large it may not be feasible to include everyone in the research so a sample has to be selected. There are different ways of sampling such as random sampling, convenience sampling, purposive and cluster sampling. Brief definitions of these are included in the glossary at the back of the pack. There are reasons to use different approaches to sampling and each approach has strengths and weaknesses.

## **2.4 Access and Ethical Considerations**

In trying to access the sample the researcher has to consider how this can practically be achieved and whether any permission must be sought. Access to patients normally requires permission from the responsible medical officer or the NHS organisation. Access to staff requires permission from their manager. When seeking permission the researcher can usually secure practical help and advice in accessing subjects.

The researcher must also consider any ethical implications of the research. At the very least this involves issues of confidentiality and anonymity but there may be other factors to consider which unless resolved could potentially have negative implications for the subjects directly or indirectly. The researcher should seek formal permission to undertake the study from the local research ethics committee.

## **2.5 Pilot Study**

Once the researcher is ready to undertake the study he should carry out a small pilot study to check that the methodology has been correctly thought through. The pilot is the study in miniature and gives the researcher an opportunity to identify any problems and to modify the research method before embarking on the main study.

## **2.6 Data Collection**

At last the researcher reaches the stage of conducting the interviews, sending out the questionnaires or recording observations.

## **2.7 Data Analysis**

The researcher reviews the data that has been collected and systematically analyses the responses of subjects. Data are described, summarised and, if quantitative in nature, statistically analysed in order to produce the results of the study.

## **2.8 Conclusions**

The researcher reviews the results and identifies the main conclusions. Crucially it is important to return to the original research question to see whether it has been answered. Ways in which the results could be considered for application to practice are recommended, as are areas where further research is needed. An important part of this stage is recognition of the limitations of the study so that readers who may consider acting on the results of the study can take them into consideration.

## **2.9 Summary**

This section presents an overview of the research process and places the literature review within this context. The next section looks at how the research literature is developed.

## 3. Research Literature

This section takes the reader through the notion of the 'research literature' in further detail; it describes how research is published and how it is made accessible to researchers and practitioners.

### 3.1 What is meant by the 'Literature'?

In professional and academic disciplines the term 'literature' is used to describe all the published work on a particular subject. Within this definition, no judgement is made regarding the quality of any single piece of work.

The main body of the literature lies within academic and professional journals. It has been estimated that over 20,000 journals published each year carry articles that are relevant to the disciplines of the medical and health sciences. In addition to journal articles, research is also published in books, reports, conference proceedings, theses and dissertations. The different elements of the research literature are described below.

#### *Journals*

The result of the research process (Figure 2.1, Page 6) is a document that needs to be made accessible to the relevant research community. This is necessary for two main reasons. First, so that the findings are open to critical examination by others, and second, that they are accessible to all who might benefit from them. The traditional vehicle for publishing research findings is journals; traditionally these are magazine-sized publications containing articles but increasingly they are being published in electronic form for access via the world wide web.

Journals are published in issues at regular intervals usually weekly, monthly or quarterly. Because of the regularity of publication they are also known as periodicals or serials. This regularity means that each new issue contains articles that describe the latest research findings; this is a distinct advantage over other publication media such as books that take longer to produce and update.

The publication of an article in a journal involves a number of steps:

1. Writing the article: this requires the author or authors to present their research findings in a broadly scientific style. The layout of the article may also need to conform to a particular style laid down by the editorial board of the journal; this may require the authors to include a summary (or abstract) of their work, or to keep within a specified word limit for example.
2. Submission of the article to a journal: usually via the journal's editor.
3. Refereeing: some journals require articles to be critically reviewed by experts in the field prior to publication. This process is also known as 'peer-review'. Referees may suggest amendments to the original text before publication can proceed, or may reject the article outright if they argue the work is fatally flawed in some way.

4. Changes to the original text: if indicated by the referees.
5. Publication: if, or when, the editor accepts the article.

There are basically two main types of journal:

- Research journals
- Professional journals.

Research journals publish peer-reviewed articles. A few examples of the many thousands of research journals available include the British Medical Journal, the Lancet and the British Journal of General Practice. In contrast, professional journals publish articles on professional issues, service developments, the use of research findings in practice and some short research articles. They are primarily written for practising health care professionals rather than researchers. Examples include the Health Visitor Journal, the Journal of Community Nursing and Practice Nurse.

### *Reports*

Research reports appear in many different shapes and sizes. In general, however, they will give a more detailed account of a piece of research than that found in a journal article. Reports of original research may arise from many different sources including health authorities, professional organisations and pharmaceutical companies. The publicity and distribution of some reports may be very limited making it difficult to know of them or obtain copies.

### *Theses and dissertations*

Theses and dissertations are very detailed and comprehensive accounts of research work. They are usually submitted for a higher degree at a university. Like reports their publicity and distribution may be very limited.

### *Conference proceedings*

Conference proceedings comprise brief summaries of research work presented at conferences. A more detailed and complete account of the work may appear at a later date in a journal article, report or thesis. Researchers often use conferences to present preliminary findings of their work.

### *Books*

Textbooks generally provide comprehensive overviews of a particular subject. In doing so they may refer to, sometimes extensively, the research literature found in journal articles, reports, conference proceedings or theses. They are not usually used to present new research findings. There are, however, a few exceptions to this and some very important and influential research findings have been published in book format. These are sometimes known as research monographs.

## 3.2 Summary

Health care research is published in a variety of formats including journal articles, books, reports, conference proceedings, theses and dissertations. The first stage of the literature review is to locate all the research findings on a particular subject from the literature, regardless of the publication format. The next section shows how this can be achieved.

### Exercise 1

#### *The publication process*

Locate one or two journals that present articles written by health care professionals or researchers. Look for information on the publication of articles within each journal (this may be presented as instructions for authors or may be found with the general information about the journal or editors located on the front inside cover).

Use the information to answer the following questions:

- Is there a limit to the number of words each article must not exceed?
- Are the articles peer-reviewed?
- Should each article include an abstract?
- How should references be presented?
- Can the article be submitted to the journal's editor electronically?

#### *Relevant literature*

List any journals you know of that are likely to contain articles relevant to your profession. Add to the list any relevant reports, theses, conference proceedings and books that you know of.

## 4. Using Databases to Locate Published Research

A key stage in the literature review is to search out all the research literature on a particular subject. This may at first seem an impossible task given the huge volume of research literature published worldwide. This problem, however, has long been recognised and considerable effort has been made to simplify and speed up the process. The results of this effort are available through on-line, web-based databases, also known as bibliographic databases. These offer facilities for searching for published research. In this respect they differ from other web-based search engines like Google that offer access to huge amounts of information but do not necessarily find research articles that have had some degree of quality control. This section describes the main bibliographic databases used to locate published research and how to use them. The databases give references to journal articles and conference papers, giving you the bibliographic details of each published paper e.g. author(s), article title, journal title, volume and year, and often include an abstract or summary of contents.

### 4.1 Bibliographic Databases

At the time of writing the NHS has an agreement with the suppliers of a number of databases such that these resources are available to all NHS staff. Similar arrangements are made for staff employed by universities. The databases are available either through the service provider 'Athens' ([www.athens.nhs.uk](http://www.athens.nhs.uk)) or through the National Library for Health ([www.library.nhs.uk](http://www.library.nhs.uk)). A username name and a password are required and your local NHS or university library should be able to provide these.

NHS staff can access the following databases:

- Medline
- Cinahl
- Psycinfo
- Embase
- AMED (Allied and Complementary Medicine)
- British Nursing Index
- DH-Data
- King's Fund.

A brief description of these databases is provided in Table 4.1 below.

**Table 4.1**  
**Key features of the Main Bibliographic Databases**

<b>Database Name</b>	<b>Subject coverage</b>	<b>Types of sources covered</b>	<b>Years covered</b>
MEDLINE	Medline covers the whole field of medicine including dentistry, veterinary medicine and medical psychology, clinical medicine, anatomy, pharmacology, toxicology, genetics, microbiology, pathology, environmental health, occupational medicine, psychology, biomedical technology, health planning and administration, space life science, and many other related subject areas.	Journal articles	1950 -
CINAHL (Cumulative Index to Nursing and Allied Health Literature)	Cinahl covers all aspects of nursing and allied health disciplines. Seventeen allied health disciplines are covered: cardiopulmonary technology, dental hygiene, emergency services, medical/laboratory technology, medical assisting, athletic training, occupational therapy, optometry, physical therapy and rehabilitation, the physician's assistant, radiological technology, respiratory therapy, social service in health care, speech-language pathology, nutrition and dietetics, audiology and surgical technology. Journals from biomedicine, alternative therapy, health sciences, librarianship, health promotion/education, and consumer health are also scanned for relevant articles.	Journal articles, pamphlets, pamphlet chapters, books, book chapters, masters theses & dissertations.	1982 -
PsycINFO (Psychological Abstracts)	Psychology practice and research and psychological aspects of related clinical disciplines including medicine, psychiatry, nursing and pharmacology, drug and behavioural therapy, treatment of disease, drug addiction, developmental psychology, and educational psychology, as well as the psychological aspects of such areas as linguistics, social processes, pharmacology, physiology, nursing, education, anthropology, business and law.	Journal articles, book chapters, dissertations	1806 -
EMBASE	EMBASE covers the whole world's biomedical literature whilst concentrating in particular on European sources. The emphasis of the database is on the pharmacological effects of drugs and chemicals. Over 40% of current data is drug-related. Other subjects: human medicine and biological sciences relevant to human medicine, health affairs (occupational and environmental health, health economics, policy and management), drug and alcohol dependence, psychiatry, forensic science, pollution control, biotechnology, medical devices and alternative medicine.	Journal articles	1974 -
AMED (Allied and Complementary Medicine)	Complementary or alternative medicine: acupuncture, herbalism, reflexology, homeopathy, holistic treatment, iridology, hypnosis, traditional Chinese medicine, moxibustion, chiropractic, occupational therapy, meditation, osteopathy, physiotherapy, yoga, psychotherapy, rehabilitation, healing, research, diet therapy, ayurvedic medicine, Alexander technique.	Journal articles, newspapers and books	1985 -
BNI (British Nursing Index)	Nursing and midwifery plus medical, health management and allied health fields relevant to UK nurses and midwives. Covers mostly UK nursing and midwifery journals although a representative number of non-UK specialist journals are also covered. Examples of subject areas covered: accident & emergency nursing, breast cancer, evidence based practice, learning disabilities, midwifery, nurse practitioner, orthopaedic nursing, perinatal & neonatal mortality, psychiatric nursing, reflective practice, student nurses, theatre nursing, wounds.	Journal articles	1994 -
DH-DATA Health Administration and Medical Toxicology	Core subjects: health service and hospital administration, with an emphasis on the British National Health Service, including planning, design, construction and maintenance of health service buildings; medical equipment and supplies; public health, nursing and primary care; occupational diseases; social policy; and social services for children, families, people with disabilities and elderly people. Other topics: medical toxicology and environmental health including chemicals in food and other consumer products, and the environment; pesticides; industrial chemicals; health consequences of smoking, radiation and noise; air and water pollution; and radiation biology.	Journal articles, books, reports, pamphlets, administrative circulars and other official Publications.	1983 -

Database Name	Subject coverage	Types of sources covered	Years covered
King's Fund database	The database reflects the King's Fund's focus on improving health and health care, covering policy and management of health and social care services in the UK rather than clinical issues and treatments. Core subjects include NHS management, social care, health inequalities, urban health and regeneration, race and health, partnership working, primary care, mental health, public involvement, and workforce development in the NHS.	Journal articles from English-language journals, books, reports, pamphlets, web publications, strategic planning documents and government circulars. Official UK health policy documents and 'grey' literature from health and social care organisations.	1979 -
SOCIAL SCI SEARCH	Social Sci Search is a multidisciplinary index to the international literature of the social sciences providing complete bibliographic data, author abstracts and dated references. It corresponds to the social sciences citation index. Subjects covered include Anthropology, Archaeology, Economics, Hygiene and Public Health and many other areas.	Journal articles, book reviews, discussions, editorial, meetings.	1972-

The databases noted in Table 4.1 are referred to as indexing or abstracting databases. This is because they provide the basic index information about an article such as author(s), article title etc, or in the case of an abstracting database the abstract or summary of each article is provided where available.

Other useful resources to be found at [www.library.nhs.uk](http://www.library.nhs.uk) include:

- BioMed Central

140+ open access, peer-reviewed ejournals covering the whole of biology and medicine.

- E-books

On-line access to the full text of over 400 eBooks including titles from World Health Organisation and major publishers. The national collection focuses on mental health.

- Proquest

Search over 1500 full text journals online.

- Pubmed

PubMed is a service of the U.S. National Library of Medicine that includes over 16 million citations from MEDLINE and other life science journals for biomedical articles back to the 1950s.

## 4.2 On-line Searching

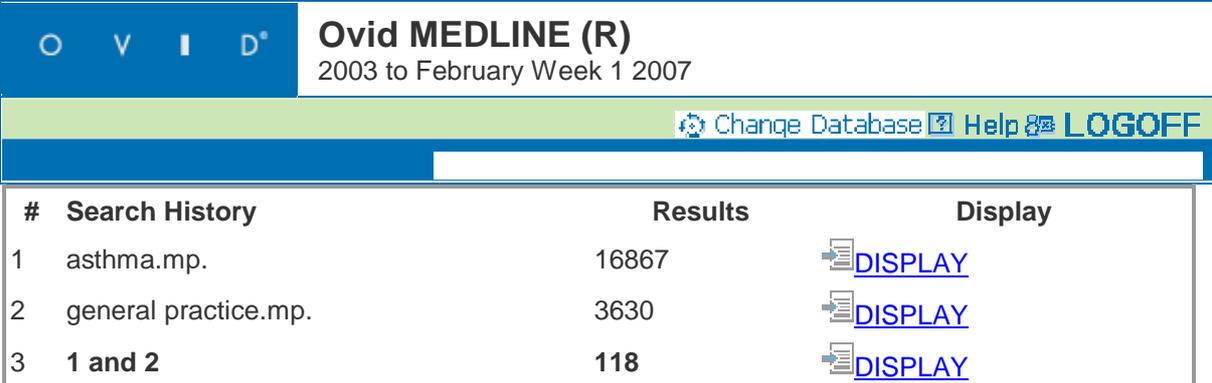
On-line searching of databases is an interactive process. The searcher types in a keyword on the keyboard, and the computer displays the result as the number of references retrieved. The references themselves can be seen when the user issues a 'display' or 'print' command. Usually the commands are available via an on-screen link. The OVID online interface links it search across a number of the bibliographic databases noted in Table 4.1. An example of a basic search is shown below

**Subject:** The management of asthma in general practice

The following **keywords** were entered in turn and then **combined**:

- asthma
- general practice

The following is **displayed on the screen**:



The screenshot shows the Ovid MEDLINE (R) search interface. At the top, there is a blue header with the OVID logo and the text "Ovid MEDLINE (R) 2003 to February Week 1 2007". Below the header is a green navigation bar with links for "Change Database", "Help", and "LOGOFF". The main content area is a table with three columns: "#", "Search History", "Results", and "Display". The table contains three rows of search results.

#	Search History	Results	Display
1	asthma.mp.	16867	 <a href="#">DISPLAY</a>
2	general practice.mp.	3630	 <a href="#">DISPLAY</a>
3	1 and 2	118	 <a href="#">DISPLAY</a>

For each keyword entered the computer generates a result that indicates the number of articles found. The final line requests that the first two keywords are combined in one search. That is, find only those articles that appear under both subject headings. If the result is still very large it may be necessary to select subheadings to the keywords or add additional keywords to refine and narrow-down the search.

Each search set can be displayed which shows the reference to each article found together with the abstract. References and abstracts can be selected and printed out, or transferred electronically to other computer software such as databases and word processing packages.

Searching these databases can be a daunting task for the beginner. There are a large number of techniques available to optimise the search e.g. combining as shown above, but these are not always obvious to the novice searcher. If you are unfamiliar with these it is recommended that you work with a librarian who is trained in on-line searching.

## 4.3 Summary

This section has introduced the main tools for finding research literature. These are the bibliographic databases that are designed to facilitate effective and efficient searching through the vast amounts of literature in order to find the articles that are of interest to you. However, before sitting down in front of a computer it is advisable to have a plan of the literature search you wish to conduct. Guidelines to help construct and implement a search plan are presented in the next section.

# 5. Planning and Conducting a Literature Search

The objective of a literature search is to retrieve as much accurate information on a given subject as is possible from suitable sources. It is clear from this and the preceding sections that the novice reviewer is faced with a difficult task. The pool of available research literature is huge and only a tiny fraction of it, the particular subject of interest, needs to be located. Help is at hand of course in the form of bibliographic databases, but which ones should you use?

This section presents some basic guidelines to follow when tackling a literature search. Like all types of investigation, an effective search requires careful planning. A badly organised search is likely to yield little relevant information and waste time.

## 5.1 General Points

A search takes time to complete, even for the experienced reviewer. A reasonable continuous period of time should be set aside for task; an hour here or there is not sufficient. It is important to be systematic and record each step of your search. While there are no hard and fast rules for the period of the search it would be unwise to restrict it to recent years e.g. publications from the last 2 years. Finally, decide on your subject of interest and stick to it during the search. When searching on-line databases many interesting looking titles will appear - don't get side tracked.

## 5.2 Bibliographic Databases

The choice of bibliographic databases may well depend on the subject of interest and potential coverage by the different databases on offer. The main databases cover much of the mainstream medical and health literature, but at the same time do not cover all of the journals in all disciplines.

## 5.3 Keywords

To increase the chances of retrieving relevant information from a search you need to create a description of the subject of interest. This takes the form of a set of words or

phrases, which are known as 'search terms' or 'keywords'. Each search term or keyword identifies a part of the subject and provides a focus for the search.

The process of creating keywords involves three stages:

1. Identify the key concepts in your research area
2. Analyse the concepts; extend their scope to find broader terms; define them with increasing precision to produce narrower terms; produce a list of synonyms; produce a list of related terms.
3. Map the list of key words or terms to the subject headings of each index to be used in the search.

## **5.4 Creating Key Terms: an example**

The area of interest is health visiting and the prevention of accidents to children in the home. The key concepts are health visitor, accident prevention, children, and home. To analyse the concepts it can help to create 'spider diagrams' as shown below (Figure 5.1).

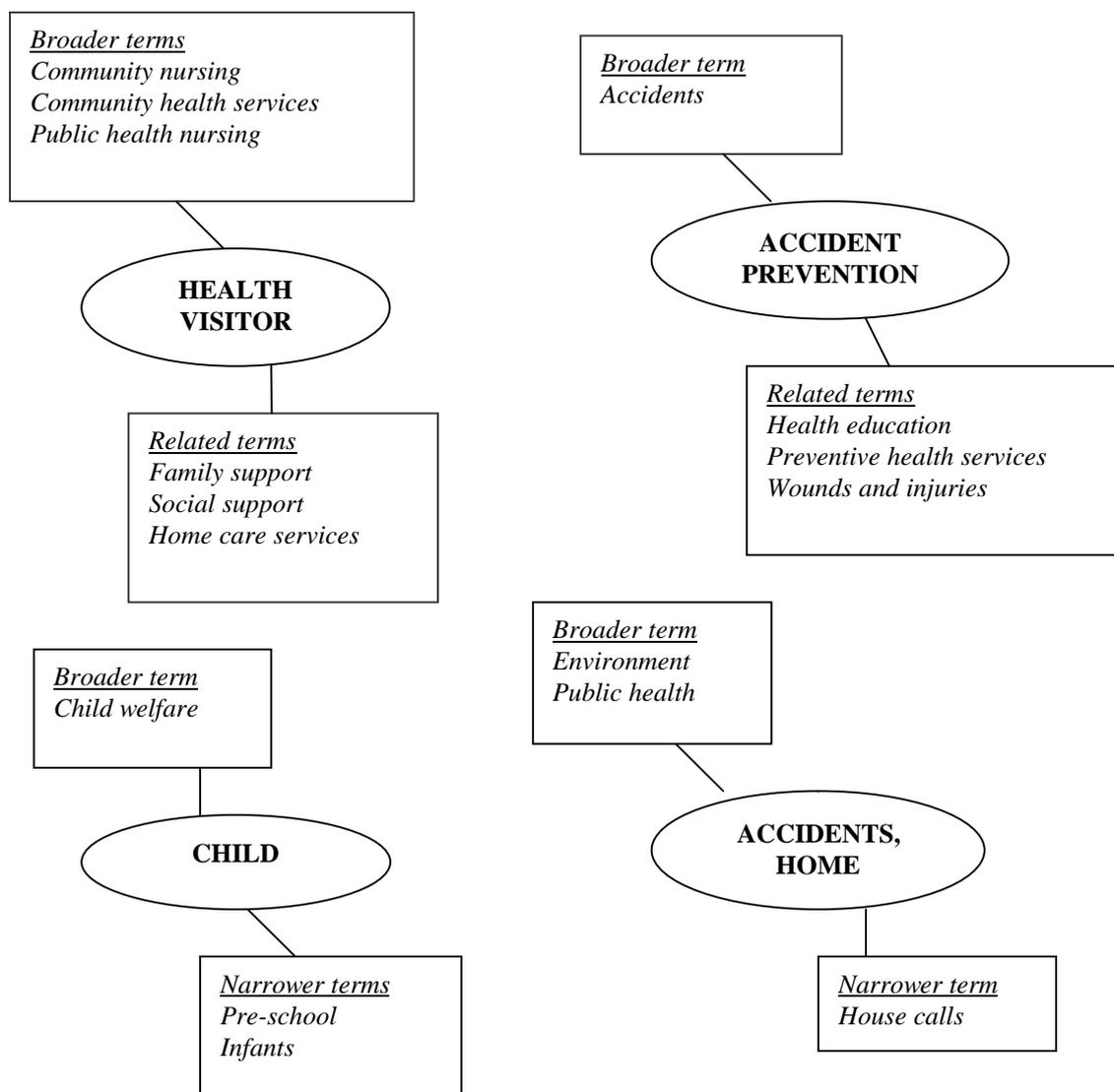


Figure 5.1. Key concepts and related terms

Start the diagram by writing down the key concepts on a blank piece of paper. Carry out a brainstorming activity and make a note of related, broader and narrower terms as well as synonyms for each one.

## 5.5 Recording the Results

The results of a search are references to articles. It is advisable to keep a copy of the articles it has retrieved. Computerised searches will generate reference lists that can be transferred electronically on to a computer and loaded into a database or word processor. Alternatively they can be printed out on to paper or e-mailed.

## 5.6 Satisfactory Searches

When conducting your search it is always a good idea to periodically examine the references and decide if the search is 'on target'. It is difficult, often impossible, to know how many references to expect on a particular subject. However, if you already know of some key references in the area and your search does not find these, you should suspect a problem.

There are a number of problems that can occur at each stage of search process. For example you may have:

1. defined your subject too narrowly and ended up with no references
2. defined your subject too broadly and ended up with thousands of references
3. used inappropriate keywords
4. chosen the wrong (or not the best) databases for you search.

Finding too little: be especially careful if you find nothing. Often this is not the case. Proving that there is nothing is not easy. You should try several different approaches before coming to this conclusion. It is easier to begin a search with a broad strategy and narrow appropriately than to construct a narrow search and try to broaden it if you find nothing.

Finding too much: this is a common problem particularly with computerised searching. Try limiting the search by selecting relevant sub-headings for the search terms you are using.

If you decide your search is unsatisfactory then you need to revisit keyword and index selection and iterate through the process again.

## 5.7 Summary

This section has provided an insight into conducting a literature search. To maximise the success of a search careful planning is required. Decisions need to be made for instance concerning the bibliographic databases to be used and the time period to search. One important step is the construction of keywords to be used in searching; care here may save you time looking through irrelevant material later. Finally, it is important to record the searches you perform and the results.

The output from this the literature search is a list of references to articles of the subject of your interest, you may have saved the full text of some articles offered on-line. The next section looks at how to analyse and review this literature.

## Exercise 2

### 1. Plan and conduct a literature search

- a) Decide on an area of interest for investigation. Try to think of a specific area/problem/feature/question of your work rather than a general area. For example, 'Are Practice Nurses effective in delivering health care?' is too general; whereas, 'Do Practice Nurses give effective quit-smoking advice?' is more specific and a more appropriate starting place.
- b) Collect together any articles you may already have on the area of interest. Use the articles and your clinical experience in the area to make a list of key terms/phrases/concepts.
- c) Use the list of key terms and generate broader, narrower, and related terms and synonyms (use spider diagrams as shown in Figure 5.1 if this helps).
- d) Conduct the search, be systematic and print out or save a copy of the results and search terms.

## 6. Examining the Results and Writing a Review

Examining the results of a literature search can be performed at different levels of complexity. This may range from a superficial scan of the references to decide on relevance, to a detailed analysis of the quality of each article. The aim of this section is to present an overview of these levels of analysis. A brief introduction on how to write up the findings of a literature review is also provided.

### 6.1 Relevance

The first level of analysis is to scan the list of references, remove duplicates and assess the relevance of the material your search produced. However, assessing relevance on the strength of an abstract is not always possible and in some instances the full paper will be required. In addition, the quality of the material can only be assessed by looking at the original work. Collecting copies of original articles is, therefore, the next task and a visit to the nearest medical library is one place where a search can begin.

Medical libraries will publish a list of journals they subscribe to and some of your references may be photocopied from stock. However, libraries have finite budgets and shelf space and will only hold a limited number of journals. It is not likely, therefore, that all of your references will be available from a single library. This problem is resolved by the Inter-library Loans (ILL) system whereby items from other libraries are lent or photocopied on request. Two important points must be made with regard to the ILL system. First, it takes time to process each request and provide the material; this delay can be as long as four weeks. Second, the ILL system is not free and a charge may be made for each item requested. Consult with your local library staff for details.

### 6.2 Quality

It is important to note that the contents of an article do not necessarily represent facts just because they are in print. An article may instead represent the views or opinions of an author that are not based on research evidence. Reading literature critically and assessing quality can be a complex and involved activity. It is a skill that needs to be learned, practised and developed. There are, however, a number of guidelines that can help you get started with this process.

#### *Peer review*

The first section described the steps involved in the publication process. One important stage in the process is peer-review where each article is critically reviewed prior to publication. This acts as a filtering stage with the idea that only works of sufficient quality are published.

To some extent, therefore, you can judge an article by the journal in which it appears. Journals that use peer review will have an editorial committee and/or an editorial advisory board. They will outline their arrangements for peer-review in each issue of the journal. This can usually be found on the inside front or back cover of the journal.

### *Reading articles*

Before you consider a detailed analysis of each article it is worth previewing each one by scanning the abstract, the introduction, headings and subheadings, tables and figures, discussion and conclusions, and the reference list. This will provide you with an initial impression of the article; whether there are any obvious omissions, lack of detail, errors in presentation of figures. A reference list, for example, that includes articles from a range of journals and years, with books and other formats included, will indicate that a proper search of the literature has been made.

## **6.3 Critical Evaluation**

Critical evaluation (also known as critical appraisal) of research articles involves asking the question 'Am I persuaded by this study's results?' Answering this question involves asking a series of other questions:

- Is the purpose of the study clear and well defined?
- How was the study done? Are the methods clearly described and appropriate?
- Are the results presented in a clear and understandable format?
- Does the interpretation of the results seem consistent with the results presented?
- Are there other explanations that could account for the results?

In essence the method of evaluation requires consideration of the individual sections of the research article and this in turn enables an overall impression of the quality of the research as presented. Below the reader is shown how to critically read all components of a research report. Typical questions that the reader should ask when reading a research article will be discussed.

## **6.4 Introduction**

Every article starts with some form of introduction although it may not be explicitly identified as an introduction. The purpose of the introduction is to quickly inform the reader what the research is about and why it is important. The introduction may be very short or it can be of considerable length. In the latter case this is usually because it contains the literature review.

## **6.5 The Research Problem**

At an early stage, usually in the introduction, the article should clearly indicate the purpose of the research. The research problem can be stated as an aim, a question or as a hypothesis. The research study may have several aims, questions or hypotheses. It is not the case that one type of research statement is better than another but that some types of research are better described by using one rather than another. Quantitative research designs such as experimental designs are concerned with testing out an idea so a hypothesis is frequently used. Qualitative studies are often exploratory in their nature so it may be appropriate to use an aim and/or questions to identify the purpose of the study.

The important thing common to any research problem is that it should be researchable. For example, the question "how much illness is there?" is not answerable because different people and different groups define illness differently and it would be impossible to measure. It's rather like the old question "how long is a piece of string?" Answer: it depends on the piece of string. However, if the study sets out to investigate "how many working days are lost each year due to reported sickness?" this is researchable because we know exactly what we want to measure. The following rules should be observed in stating the research problem.

- An aim must be achievable.
- A question must be answerable.
- A hypothesis must be testable.

### Exercise 3

#### Research Problems:

Look at the research problems listed below. Identify whether each one is an aim, a question or a hypothesis and consider their researchability.

- The purpose of this study is to identify the main reasons for GP referral of patients.
- The number of staff employed by a primary care trust affects the number and type of patients treated each year.
- What is a good nurse?

The second thing we need to know about a research problem is the researcher's definition of the key concepts or key variables. For example, if the study is about "stress" how has the researcher defined stress? To some people, stress is a feeling or response to unpleasant events while others think of stress in terms of the actual events. A third group might take a broad definition of stress and describe stress as both a cause and effect.

District nursing is another example. Some people might define "a district nurse" as any nurse who works in the community, possibly including nursing assistants. Other people restrict the definition to nurses employed at a certain grade or in possession of a specialist qualification. Try out the example in Exercise 6.2 to see how people's definitions can vary.

### Exercise 4

#### Key concepts in a research problem:

If you were to read an article about "elderly people" what age group would you expect the article to be about? You can either do the exercise alone by listing the different

ways you would define elderly or you could ask a group of friends to define the word "elderly".

You may be surprised at the wide range of responses.

## 6.6 The Literature Review

The literature review should put the present research problem into context. It should contain a summary of the current state of knowledge about the topic and identify gaps in the literature thereby making a case for carrying out research in this field. If the topic has been extensively researched previously the proposed research may not be necessary so it is up to the researcher to make the case. For example, the problem may not have been investigated in relation to the proposed patient or population group. Or previous research findings may provide conflicting results and this warrants further study.

You should consider the following questions when evaluating the literature review:

- Is the literature review up to date?
- Is the literature review sufficiently comprehensive? Has the researcher provided you with enough information to convince you that the research needs to be done?
- Are there any key pieces of literature that have been overlooked? Answering this would depend on the reader's knowledge of the field.
- Is there a balanced review of differing viewpoints or findings? Or is the literature review one sided ignoring alternative evidence?
- Is the cited literature appraised or is the author trying to impress you with a list of references and no information about their contents?
- Are the contents relevant to the proposed research or have irrelevant references been included?
- Does the writer present a logical coherent case for pursuing the study?

## 6.7 Methodology

When the researcher describes the methodology there are two conditions that should ideally be met. Firstly the researcher should provide sufficient information that the reader could repeat the study if desired. Secondly the chosen methodology should be justified. More specifically, the reader should consider the following points.

### *The type of information*

Is qualitative or quantitative information required to deal with the research problem and is the chosen methodology appropriate? This depends on the nature of the research problem. If objective and measurable information is required then a quantitative approach is appropriate but if the research sets out to explore a phenomenon in detail a qualitative approach is necessary.

### *The research design*

The design should be outlined and reasons given for using this approach. Lesser-

known designs would be enhanced by a brief definition: not everyone is familiar with ethnographic studies or the Delphi technique!

### *The method of data collection*

This should be appropriate for the type of information required. It would be time wasting to use unstructured interviews for essentially quantitative studies where information could be more efficiently collected through structured interviews or questionnaires. Conversely, self completed questionnaires are unsuited to qualitative research: even when there is space for comments or for respondents to express ideas the space is limited and requires respondents to have skills in articulation and literacy.

### *The data collection tool*

This should be described so that the reader knows what questions or observations were included. Ideally, a copy of the interview schedule, questionnaire or observation framework will be included but this is not always possible due to constraints of space and journal style. The reader should at least have an idea of how many items were included in the schedule, the topics covered and whether respondents replies were recorded verbatim or whether their answers were fitted into a set of pre existing codes as is the case with yes/no, fixed choice or multiple choice questions.

A second point to note regarding the data collection tool is whether the researcher has developed an original tool or used an existing tool. It is acceptable to use data collection tools that have been developed by previous researchers. It may even be preferable since the tool is more likely to have been subjected to tests for reliability and validity.

You should consider the following questions when evaluating the methodology

- Are all aspects of the methodology appropriate?
- Is the choice of method justified?
- What information are you given about the research design and the data collection tool?
- What does the researcher say about the reliability and validity of the methodology?
- Could the study be replicated on the basis of available information?

### *The sample*

Three factors should be considered: the criteria for selection, the method of sampling and the size of the sample. The population under investigation should be defined and the criteria used for selection clearly stated. For example, if the study is about "school age children" what is the age range and does it include any or a specific type of school. The method of selecting the sample should also be described so that the potential for bias can be assessed. The representativeness of the sample is a factor in considering whether the results of the study could be generalisable. The size of the sample is the third factor for consideration. In qualitative studies it is usual to collect information from a small sample because the methods of data collection and analysis are so time consuming. It is not unusual to find qualitative studies using samples of less than twenty

subjects. Quantitative studies use much larger samples, which should have been calculated as capable of providing statistically significant results.

You should consider the following questions when evaluating the sample:

- How was the sample selected?
- Is the sample representative of the population?
- Is the sample large enough for the findings to be significant?

### Exercise 5

#### Methodology:

Look at the extract below. It is taken from a research study that investigated nurses' beliefs about smoking.

A questionnaire was sent to 20 nurses working in one hospital trust. The nurses were asked to answer 20 questions about smoking.

- A. From this extract, what do you know about the methodology?
- B. What don't you know about the methodology?
- C. On the basis of the information you have, what would you say critically about the methodology?

### Exercise 6

#### Sampling:

The following extract is taken from a study exploring the impact of introducing a Saturday morning Family Planning Clinic in one health centre. A survey was undertaken using self-completed questionnaires as the method of data collection.

A sample of 50 women were invited to participate in the study. The sample consisted of patients who visited the health centre for an appointment with their GP. The 50 women were recruited during morning surgeries over a one-week period.

Using the information you have on sampling, comment on the sample. Include the following:

- The size of the sample.
- What kind of sampling technique was used?
- Potential problems with the sample.

## 6.8 Ethical Considerations

The researcher should identify any ethical issues. If none are identified the reader should not automatically assume that there were none. You should consider the

following ethical issues:

- Would permission be required to undertake the study and, if so, did the researcher seek permission?
- Is it likely that the researcher would have needed to seek approval from an ethics committee and, if so, did he?
- What information was given to potential participants to enable them to decide whether or not to participate and was sufficient information given?
- Were there any potential risks to participants and did the researcher take sufficient steps to minimise the risks?

## 6.9 Data Collection

The methodology section should already have described the data collection tool. The report should also identify any factors that could affect the outcome of data collection. For example, if several people were involved in collecting the data this can affect the reliability and validity. If several interviewers use a loosely structured interview schedule, each interviewer is likely to use the schedule in a different way affecting consistency. In a highly structured interview this would be less of a problem. Secondly, when the researcher conducts the data collection personally, respondents are sometimes reluctant to say exactly what they think. The phenomenon of the interviewer affecting the outcome of an interview is known as *interviewer bias*.

The time of day, day of the week, time of the year or total period of time taken for data collection can affect the outcomes. For example, asking people about their intended actions may not be accurate if they are asked to forecast too far in advance. Conversely, recall about past events can be poor if the event was too far in the past. Asking people about their behaviour at a certain time of the year may be affected by seasonal changes. You should consider the following questions when evaluating the data collection:

- Who collected the data?
- When was data collected?
- Is there anything about the time scale that could potentially influence the results?

## 6.10 Results

The first result that should be included in the report is the response rate: the percentage of the subjects who were invited to take part in the study who actually participated. Low response rates should be viewed with some suspicion, as this can be indicative of some fault in the research design. It can suggest that subjects were inappropriately selected or that the method of data collection discouraged some potential respondents from participating: perhaps the data collection tool was long-winded, difficult to complete or caused offence.

The second set of results to look for are the characteristics of the sample. This provides

further information about some of the key characteristics of those taking part in the study. It can include age, gender, grade of staff, number of years qualified, proportion of staff who are qualified versus those who are unqualified, clinical classification of patients, and so on. If the reader is considering implementing the research findings in practice it is important to know how the research sample compares with the population with which the reader is concerned.

The main results come next. In a journal article the word limit for papers may prevent the researcher from presenting all the findings but it is his responsibility to point out that only selected results will be presented and why. If the results are otherwise incomplete this can lead the reader to suspect that the researcher is hiding something even if this is not the case. For example, if a questionnaire contains ten items and only eight are reported then the reader should wonder why this is so.

Results should be presented in a way that makes them easy to understand. If the results are difficult to follow the potential value of the research may be lost. Tables and figures can be helpful in presenting results but they should be clearly labelled so that they are easy to follow. The results should be accurate and the text should match information contained in tables and figures. Check the totals. It is not unusual to find mistakes in the adding up so that the total number of respondents presented in a result is greater or less than the sample group!

Results can be presented using words, numbers or percentages. It is misleading when researchers cite percentages when dealing with small samples. For example, 10% of a population of 10,000 is 1,000 people but 10% of a sample of ten accounts for only one person. Beware of phrases like "the majority of the sample (60%) agreed with the statement while only 40% disagreed". In a sample of ten this means that 6 people agreed and only two fewer disagreed. While this is technically a majority it is only a majority of two and a larger sample may have produced completely different results.

In summary, when reading the results ask the following:

- What are you told about the respondents?
- Are the results complete?
- Are the results accurate?
- Do the contents of figures and tables match the main text?
- Have percentages been used properly in a way that does not mislead?
- Are claims made about the results when these are inappropriate due to sample size or narrow majorities?

## **6.11 Discussion**

Most research articles contain a discussion of the results before finalising the paper with conclusions. The researcher highlights the most interesting or important findings and discusses any notable features. For example, if the sample was divided into sub groups any differences or similarities between them would be pointed out. Conflicting responses would be highlighted such as respondents claiming they have knowledge or experience of something but then contradicting this later.

The results should also be discussed in the context of previous research. The researcher should explain how the findings add to previous knowledge pointing out whether the findings of this study concur or dispute earlier evidence.

## 6.12 Conclusions

Towards the end of the article, the researcher summarises the research by identifying the main conclusions that can be drawn from the findings. The researcher should return to the original research problem and state whether the purpose of the research was met through the study. As a consequence of the conclusions, the researcher should make recommendations. These may be recommendations for practice that can be made as a result of the research. Or, there may be recommendations for further research if the researcher believes this to be necessary. Further research is usually recommended because the original research study is flawed in some way or limited due to resources. A good researcher will identify the limitations of the study for you. If not, it is part of critical evaluation to identify the limitations. The limitations of a study are a major factor in determining whether or not to implement the findings.

You should consider the following questions when evaluating the discussion and conclusions:

- Was the aim of the research achieved, the question answered or the hypothesis accepted or rejected?
- Are the results discussed in the light of previous research i.e. is the “new” knowledge put into context?
- Can the main conclusions be traced back to the results?
- Are the recommendations for practice realistic in view of the results?
- Are the recommendations for research specific? Would the recommended research really add further to the knowledge base?
- Are the limitations to the study fully acknowledged?
- At the end of it all, was the research worthwhile?

### Exercise 7

A lecturer leading a health care research course for health care professionals decided to investigate whether the teaching methods she used were the methods most preferred by students. By asking them to complete a questionnaire, she discovered that the teaching methods used most often with students were also the ones they a) found most helpful and b) found most enjoyable. She concluded that the teaching was achieving a quality standard by giving the students what they wanted and that the range of teaching methods she employed would be suitable for teaching the same topic in other colleges.

- Could any other conclusions be drawn from these results?
- What are the main limitations of this study?
- What do you think of her recommendations for practice?

## 6.13 Using checklists

There are a number of checklists that can be used to aid critical evaluation of research articles. They have been specifically developed to critically assess different types of research designs and articles e.g. randomised controlled trials, qualitative studies, economic evaluations (for instance see Crombie 1996; Greenhalgh, 1997). Also visit the Centre for Reviews and Dissemination (CRD) website to download checklists for various types of study: [http://www.phru.nhs.uk/casp/critical\\_appraisal\\_tools.htm](http://www.phru.nhs.uk/casp/critical_appraisal_tools.htm)

## 6.14 Writing a review

The structure of a review generally follows that of an original research article. It will have sections for methods, results, discussion and conclusions as well as an introduction.

The introduction should state the purpose of the review and give brief background information on the subject of the review. The methods section should describe in detail the methods used to compile the review. This will include details of which databases were used, the period covered by the search and keywords used in searching. Details of articles found in the search but excluded later should be given. This may include reasons associated with irrelevance of work to the subject of the review or low quality.

The results section summarises the main findings reported in the articles reviewed. One useful way of presenting results from many studies is in table form, for example:

Table 6.1. Compliance of insulin use by diabetics (fictitious reports and data)

<b>Article</b>	<b>No. of patients</b>	<b>Age range of patients (mean)</b>	<b>Method of measuring compliance</b>	<b>No. (%) of patients compliant</b>
Smith (2006)	50	50-65 (55)	Self report	42 (84)
Jones (2004)	56	55-75 (62)	Self report	48 (86)
Brown (2005)	55	57-70 (62)	Blood-sugar level	28 (51)

The table should be accompanied by text highlighting key points you wish to make about the data. This may include areas of agreement or disagreement between studies, and comments on any of the methods used by the researchers in obtaining their results.

The review ends with a discussion of your findings and any conclusions you wish to make. This may highlight important gaps in the field or how research in the area could be taken forward, including implications for health care practice.

## 6.15 Summary

Compiling a literature review is a crucial part of the research process. The first task is to search the literature for articles on your particular subject of interest. This is aided by the use of a range of bibliographic databases. The collection of articles must then be assessed for relevance and quality. Finally, the whole process should be documented in the form of a structured report. The whole endeavour requires certain skills, planning, time and access to good library facilities. However, a good review will provide an overview of the research already conducted, identify gaps or limitations in the research and act as a sounding board for future research ideas.

### Exercise 8

#### Summarising your results:

- Scan the list of references from exercise 5.1. Use title or abstract information to assess the relevance of each one. Make a note of relevant articles.
- Collect together copies of the relevant articles from your library.
- Extract key information from each relevant article and enter in a table (see Table 6.1 for an example).

## 7. Answers to Exercises

### Exercise 1

This exercise is based on self-selected examples and hence it is not feasible to provide a specific answer. You should, however, draw on the guidelines provided in the text when approaching it.

### Exercise 2

This exercise is based on self-selected examples and hence it is not feasible to provide a specific answer. You should, however, draw on the guidelines provided in the text when approaching it.

### Exercise 3

Research Problems:

- The purpose of this study is to identify the main reasons for GP referral of patients.

This is an aim. In its present form it seems that the study is concerned with identifying reasons for all types of GP referrals. This is possible but it is more likely that researchers would be more interested in focusing on particular types of referral e.g. orthopaedic, gynaecology etc.

- The number of staff employed by a primary care trust affects the number and type of patients treated each year.

This is a hypothesis as it predicts a relationship between the number of staff employed by a NHS Trust and the number and type of patients treated. It seems a strange study as one would assume that the more staff employed, the more patients would be treated. Similarly, the larger the trust the greater scope for developing specialised services so it would also be expected that there would be a greater range of patients treated.

- What is a good nurse?

This is a research question. But it is not possible to answer because there is no one definition of a good nurse. Although there may be some commonly held beliefs of what makes a good nurse, the detail may vary according to who is asked. It would be better to focus on the perceptions of a particular group e.g. what do children perceive as being “a good nurse”?

## Exercise 4

Key concepts in a research problem:

"Elderly people" may be variously defined as those belonging to a particular age group (for example, over 60 years of age, over 75, over 80) or because they share a characteristic (pensioners). I have also known individuals to answer this question by identifying health characteristics.

## Exercise 5

Methodology:

- The research design appears to be a survey, the method of data collection is a postal questionnaire and we know the sample is 20 nurses.
- We don't know whether the data being collected is qualitative or quantitative in nature. Nor do we know the definition of a nurse - is it any nurse working in a hospital or is it restricted to nurses working within a particular specialty like respiratory medicine?
- It is a small scale localised study, probably a convenience sample. This will affect the generalisability of the results. Insufficient information is provided about the questionnaire and there is no mention of reliability or validity. It would not be possible to replicate the study on the basis of the information provided.

## Exercise 6

Sampling:

The sample is small. Even in a single-handed practice it would represent a small proportion of the female population although not all women in the practice would have need of a family planning clinic due to their age. It is likely that this would apply to at least some of the 50 women selected so the results would actually be based on the views of less than 50 women. The sample is a convenience sample as only those who attended the health centre could be selected. We do not know when the sampling took place and there could be something about the time of year that affects the sample. For example, if the research took place during the school holidays, many women of childbearing age might be on holiday or if the survey took place during the flu vaccination period many of the women attending might be older women who do not need a family planning clinic.

## Exercise 7

### Drawing conclusions

- It is possible that the students identified these teaching methods as their preferred methods because they are the only methods with which they are familiar: they did not identify other methods because the methods were never used and were not understood by the students! It is also possible that the students were biased for some reason and gave positive answers to the lecturer, perhaps because they liked her or they may have been worried about her response if she had received more negative feedback.
- The main limitation of this study is that the sample came from one college and the situation is not necessarily representative of the situation in other colleges. Furthermore she only sampled her students, not all students in the college.
- Following on from A and B, her recommendations are inappropriate.

## Exercise 8

This exercise is based on self-selected examples and hence it is not feasible to provide a specific answer. You should, however, draw on the guidelines provided in the text when approaching it.

## 8. References

Centre for Reviews and Dissemination, critical appraisal checklists:  
[http://www.phru.nhs.uk/casp/critical\\_appraisal\\_tools.htm](http://www.phru.nhs.uk/casp/critical_appraisal_tools.htm) (Accessed 15 February 2007)

Chalmers, J. and Pearson, A. (2005) Oral hygiene care for residents with dementia: a literature review. *Journal of Advanced Nursing*, 52 (4):410-419.

Crombie, I.K. (1996). *The Pocket Guide to Critical Appraisal*. BMJ Publishing Group, London.

Greenhalgh, T. (1997). How to read a paper : getting your bearings (deciding what the paper is about). *British Medical Journal*, 315:243-246.

Lui, M., Ross, F. and Thompson, D. R. (2005). Supporting Family Caregivers in Stroke Care: A Review of the Evidence for Problem Solving. *Stroke*. 36 (11):2514-2522.

Richardson, G., Eick, S. and Jones, R. (2005). How is the indoor environment related to asthma?: literature review. *Journal of Advanced Nursing*. 52 (3):328-339.

## 9. Further Reading and Resources

Hart, C. (2001). *Doing a Literature Search: A Comprehensive Guide for the Social Sciences*. Sage Publications Ltd, London.

TRIAGE – The NIHR RDS EM / YH Research Information Access Gateway at  
<http://www.trentrdsu.org.uk/resources.html> (accessed 15 February 2007)

## 10. Glossary

<b>Abstract</b>	a very concise overview of an article.
<b>Action research</b>	small-scale interventions in real life situations involving practitioners. E.g. introducing a specialist practitioner role in the practice setting.
<b>Article</b>	a self-contained report on a particular subject.
<b>Case studies</b>	an in depth study of a single or small number of units. The unit may be individual people, patients, groups or organisations. e.g. evaluating a new service.
<b>Cluster sampling</b>	used when the population is diversely spread over a geographical area and for various reasons it is preferable to have groups of subjects from several sites rather than randomly selecting the whole sample from the whole population. e.g. to investigate the grades of community nurses employed nationally the sample could select a sample of community nurses in one NHS Trust in each of the health regions.
<b>Convenience</b>	also called incidental sampling. Utilises readily available subjects and sampling and is often used in small-scale localised research projects. The sample may not be representative of the population as a whole and the results may not be generalisable. e.g. patients selected from one geographical area such as an electoral ward may have particularly high or low levels of deprivation.
<b>Ethnography</b>	qualitative investigation of cultures and population subgroups that seeks to explore, describe and explain cultural behaviour. E.g. understanding of mental illness within a particular Asian sub group.
<b>Experimental</b>	controlled investigations, which try to establish to establish cause and designs effect between two or more variables with the purpose of predicting outcomes. E.g. whether one type of medication is more effective than another in treating a particular illness.
<b>Grounded theory</b>	research that involves the formulation, testing and development of new theories. E.g. identification of the grief process following bereavement.
<b>Hypothesis</b>	a testable idea that is written as a statement describing the research problem.
<b>Incidental sampling</b>	see convenience sampling

<b>Interview schedule</b>	a list of questions used in an interview.
<b>Journals</b>	magazine-sized publications containing articles.
<b>Literature</b>	all published written work.
<b>Literature review</b>	a concise summary of published work on a specified subject.
<b>On-line</b>	connection via a computer network to a large remote computer that holds references to the literature.
<b>Phenomenology</b>	descriptions of individuals' lived experience of events. E.g. the experience of caring for someone with Pre senile dementia.
<b>Population</b>	a collective name for the group of people that the researcher is interested in studying.
<b>Purposive sampling</b>	also called quota sampling. Subjects are selected because they have special knowledge of the topic under investigation. e.g. key stakeholders in an organisation.
<b>Quota sampling</b>	see purposive sampling
<b>Random sampling</b>	a method that gives every member of the population an equal chance of being selected. Frequently described as the method of sampling least likely to produce a bias but sampling errors can occur which can unintentionally produce bias.
<b>Reliability</b>	a term that refers to the ability of the data collection tool to give consistent results. E.g. a 12" ruler would consistently measure an item as being the same length irrespective of how many times it was used or who used it.
<b>Respondent</b>	the people who agree to take part in a research project and from whom data is collected.
<b>Sampling</b>	the selection of subjects from the population under study.
<b>Sequential sampling</b>	the size of the sample is not pre-set. The researcher collects data from each subject in turn until he is satisfied that there is no new information for collection - the topic is saturated. Used mostly in qualitative research e.g. In setting up a new service potential users of the service are asked what they would want until no new ideas emerge.

<b>Stratified sampling</b>	used when the population contains sub groups and it is necessary to ensure that representatives of all groups are included e.g. patients in different age bands, nurses employed on different professional grades, health care staff from a range of professions. Randomisation within each sub group can be applied.
<b>Surveys</b>	investigations into the beliefs, attitudes or behaviours of a section of the population which share certain characteristics e.g. patients' expectations of their health centre.
<b>Systematic review</b>	an unbiased and scientifically rigorous approach to reviewing the literature.
<b>Systematic sampling</b>	involves taking the nth name on a list such as every third person or every tenth. Sometimes used by researchers who claim to have used random sampling but factually this approach automatically eliminates certain members of the population who may have a perspective which is useful to the study but goes unnoticed. e.g. taking the first named member of the household from an electoral poll will almost certainly eliminate the younger members of the population.
<b>Validity</b>	a term that refers to the accuracy with which a data collection tool collects the information it intends to collect.
<b>Variables</b>	the features of particular interest in a research study. They include characteristics of the subjects in the sample group, any interventions, and outcomes.

If you have difficulty in understanding any of the definitions you may prefer to consult other sources. Introductory books on research often contain a glossary. Specialist dictionaries will also be helpful. If you would like more information on any of the terms, ideas or processes you could look at the appropriate The NIHR RDS EM / YH resource packs. There are a number of titles in the series and each pack concentrates on a particular aspect of research.