

A nurses' guide to the critical reading of research

Note: This paper was first published in AJAN 2008 26(1):102-109 and has been updated to maintain currency.

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KEY WORDS

research critiquing, research methodology, evidence based practice (EBP).

ABSTRACT

Objective

A sound theoretical foundation to guide practice is enhanced by the ability of nurses to evaluate and implement research. This article provides a structured route to questioning the methodology of nursing research as well as aiding the construction of nursing research.

Primary Argument

It is common for students to wonder about the relevance of research (Wright-St Clair and et al 2014). Gaining a degree in the health sector requires the nurse to be familiar with research in a way that informs practice (Wright-St Clair et al 2014). Nurses may benefit from a structured approach that helps them understand the sequence of the text and the subsequent value of a research paper (Moxham 2012).

Conclusion

A framework is provided within this article to assist in the analysis of a research paper in a systematic, logical order. The questions presented in the framework may lead the nurse to conclusions about the strengths and weaknesses of research methods presented in a research article. The framework does not intend to separate quantitative or qualitative paradigms but to assist the nurse in making broad observations about the nature of the research.

INTRODUCTION

There is an increased emphasis on evidence-based practice (EBP) to substantiate clinical decision-making (Joanna Briggs Institute 2014). EBP is defined as the conscientious integration of best research evidence with clinical expertise, patient values and needs in the delivery of high-quality, cost effective health care (Wright-St Clair et al 2014; Burns and Grove 2009, p.17). This substantiation, or evidence, can arise from tradition, authority, experience, trial and error, logic or reason or importantly by nursing research (Urden et al 2014, p.3; Moxham 2012). A fundamental goal of nursing research is to improve nursing care and outcomes by basing care on sound scientific evidence (Elliott et al 2012, p.11). Knowledge gained from adverse events should be used to further improve patient outcomes (Australian Commission on Safety and Quality in Health Care 2014; The Cochrane Collaboration, 2014; Australian Nursing Federation 2009).

The Nursing and Midwifery Board of Australia (2012) requires a registered nurse or registered midwife to maintain their professional knowledge and competence by delivering care based on current evidence, best practice and, where applicable and available, validated research. Such an objective can be achieved if nurses and midwives understand the research process and demonstrate an ability to retrieve and critically evaluate research findings (Wright-St Clair et al 2014; Moxham 2012). This is strongly reinforced by the Nursing and Midwifery Board of Australia (2012) who state nurses have a responsibility to whom they provide care, society and each other to provide safe, quality and competent nursing care. The importance of understanding, critically evaluating and applying research becomes vital when so much rests on professional ability and accountability (Nursing and Midwifery Board of Australia, 2012). Evidence and research are threaded through practice, professional work and study in the health sciences (Bradshaw 2012, p.15; Burns and Grove 2009, p.17). This paper provides a simple structured process to assist the nurse in evaluating research papers.

CRITIQUING RESEARCH

Critiquing is defined as reading and examining the strengths and limitations of a published study (Jirojwong et al 2011, p.396). Similarly, critical appraisal is a term used to assess outcomes for evidence of a research study's effectiveness (Burns and Grove, 2011; Jirojwong et al 2011, p.396). Nurses need to look for the merits and demerits of the methods used as well as the applicability to the health care setting (Wright-St Clair et al 2014).

Research Methodology:

A research report should contain a carefully and concisely worded problem statement identifying key variables (Polit and Hungler 2013). Research is often categorised as qualitative or quantitative, the former concentrating on words expressed by people in order to determine the reality of practice, whereas the latter tends to emphasise the use of numbers. Quantitative approaches to data collection and analysis are precise and systematic (Burns and Grove 2009, p.45) whereas qualitative research means any kind of research that produces findings not arrived at by means of statistical procedures or other methods of quantification (Burns and Grove 2009). A quantitative approach may be chosen because the researcher wishes to collect information in a numerical form as the results will be based on rigour, objectivity and control (Polit and Hungler 2013; Burns and Grove 2011). Qualitative research allows the researcher to study things in their natural surroundings and attempt to interpret, or make sense of, phenomena (Burns and Grove 2009) which is subjective in nature (McNaughton 2014) and includes the analysis of themes (Jirojwong et al 2014).

Mixed method research is a combination of quantitative and qualitative approaches (Borbasi and Jackson 2012, p.148; Jirojwong et al 2011, p.166). Complex concepts of interest in nursing may require both approaches to sufficiently study the phenomena. Examples of different data collection methods might include

questionnaires, the use of physiological instruments to measure patient responses, as well as observation techniques to provide a more rounded picture of the concept under study (Burns and Grove 2009). The combined approaches are known as triangulation (Polit and Hungler, 2013; Burns and Grove 2009, p.30).

RESEARCH CRITIQUE FRAMEWORK

Title

The title should not be long and complicated and should reflect what the research is about. Quantitative titles are usually straightforward whereas qualitative research titles may be expressed in metaphor or be more artistic (Borbasi and Jackson 2012).

Author

The author's brief biographies may be important sources of information about academic degrees, certification, position and place of employment, from which clinical and research expertise can sometimes be discerned (Nieswiadomy, 2012).

Date

Research papers can be significantly delayed before publication. It is important to determine whether the paper has been developed from a recent piece of work in order to assess its relevance to inform current practice (Polit and Hungler 2013).

Journal

Members of the editorial panel or board may represent a combination of academic research and practice and may have either national or international representation. A peer-reviewed, or refereed, journal is one where manuscripts are evaluated by subject experts chosen by the journal's editorial staff (Nieswiadomy 2012).

Abstract/Summary

An abstract or summary should clearly outline the problem or purpose, the hypothesis or research question(s), aims and objectives of the study (Polit and Hungler 2013; Nieswiadomy 2012). It should also cite the methods, which may include either a qualitative or quantitative approach, or a combination of both, to collect the data, the results, conclusions and recommendations for practice (Nieswiadomy 2012). Abstract length is usually less than 200 words (Borbasi and Jackson 2012, p.178).

Identifying the problem

The problem should clearly describe what will be studied (Nieswiadomy 2012). In order to evaluate the value of the research it is important for the hypothesis, aims and/or objectives to be clearly and unambiguously stated. Ideally the topic is narrowed down to a specific one sentence statement of the problem (Nieswiadomy 2012). A useful strategy for formulating EBP question is the acronym PICO/s (patient, population or problem, intervention or interest, comparison, outcome and study design) (Hoffmann et al 2013, p.22; Burns and Grove 2009, p.474).

Literature Search

The literature review is generally in the introductory section (Polit and Hungler 2013). Reference to original sources is important as information can be taken out of context and used inappropriately therefore an abundance of secondary sources should be viewed with caution (Polit and Hungler 2013; Nieswiadomy 2012). The purpose of the literature review is to discuss what is known, identify gaps in knowledge, establish the significance of the study and situate the study within the current body of knowledge (Hoffmann et al 2013; Polit and Hungler 2013; Burns and Grove 2009).

The researcher should critically appraise and use the literature to inform their thinking and methodology (Polit and Hungler 2013). Journals often place strict limits on word length so check superficiality is not the result of editorial demand (Nieswiadomy 2012). The search should consider how the major variables were explored previously by critiquing the strengths and limitations of the methods used eg. design, sample and instrument (Burns and Grove 2009). Previous methods should be appraised to assess suitability or modification for the current research. In short articles it is unreasonable to expect an exhaustive list of references however they should be relevant and current (Polit and Hungler 2013). Alternately, there may be little literature available.

METHODOLOGY

Designs

There are numerous research designs. More common examples include: experimental (the investigator controls the independent variable and randomly assigns subjects to different conditions); quasi-experimental (the investigator manipulates an independent variable but subjects cannot be randomised); or descriptive (the main objective is to accurately portray characteristics of persons, situations, or groups and the frequency with which certain phenomena occur) (Polit and Hungler 2013). The choice of design should allow the variable to be measured or manipulated in the study (Burns and Grove 2009). Polit and Hungler (2013) state that before a study can progress, the researcher will usually clarify and define the variables under investigation and specify how the variable will be observed and measured in the actual research situation. This is known as an operational definition (Polit and Hungler 2013; Nieswiadomy 2012).

Hierarchies of evidence can tell you what type of study provides the most robust (that is, free of bias) evidence and what to look for – systematic reviews are at the top of the hierarchy, typically seen in Cochrane Collaboration (2014) reviews, as opposed to case studies at the bottom (Hoffmann et al 2013 p.27).

Instrument

It is important for the researcher to justify the use of selected instruments. The rationale may clearly state the advantages and disadvantages of using one tool rather than another and the literature search should also have commented on the use of particular instruments in previous studies (Polit and Hungler 2013). The reliability and validity needs to be considered. Reliability refers to the degree of consistency or accuracy with which an instrument measures the attribute it has been designed to measure (Polit and Hungler 2013). Data retrieved may look authoritative but it could be incomplete or inaccurate or may not be sufficiently reliable to be of value in generalising to the larger population. Concurrently, validity refers to the degree to which the instrument measures the phenomena in the first place or reflects the abstract construct being examined (Burns and Grove 2009, p.479). Use of validated research tools can reduce the overall cost of undertaking research.

Sample

It would be ideal to include every relevant subject but this is usually impossible (Polit and Hungler 2013). The total membership of a defined set of subjects from which the study subjects are selected is termed the ‘target population’. From this group the final population entered in the study is determined (Polit and Hungler 2013). Investigators must ensure their subjects have attributes that make it possible to accomplish the purpose of the research. This includes “Inclusion” and “Exclusion” criteria which are both ethically and statistically important to increasing the likelihood of producing reliable and reproducible results (Yale University 2014). Inclusion criteria are characteristics the prospective subjects must have if they are to be included whereas exclusion criteria are those characteristics that disqualify prospective subjects (Yale University 2014).

The paper should reveal the mechanism for arriving at the sample eg. random, stratified random, cluster. From a sampling point of view, each individual in the population should have an equal opportunity to be selected

to prevent sampling bias (Hoffmann et al 2013, p.31). The method which achieves this is random sampling (Burns and Grove 2009). Stratified random sampling allows the random selection of subjects from two or more strata of the population independently (Burns and Grove 2009). Cluster sampling involves the selection of a large group or groups (eg. a nursing school with sub-sampling on a smaller scale eg. nursing students) (Polit and Hungler 2013). Smaller samples of subjects are likely to appear in qualitative research where interview approaches, observational methods, or case studies aim to gain a depth of enquiry. The sample should possess characteristics compatible with that of the target population in order to be representative. Generalisations can be more readily made when the results of the research can be applied to the larger group (Hoffmann et al 2013, p.237; Polit and Hungler 2013).

Ethics

The researcher is obliged to consider the implications of the proposed research for the participating subjects, their families and society (Burns and Grove 2009). Most nursing research usually requires the permission of an appropriate ethics committee (Elliott et al 2012, p.93; Jirojwong et al 2011, pp.63-66). Ethical guidelines outline a set of standards for conducting research. Within their practice nurses have a moral and legal obligation to protect the privacy of an individual (Nursing and Midwifery Board of Australia 2012, Conduct Statement 5) and this holds true within nursing research. Equally important is the premise to protect individuals from the risk of significant harm (Nursing and Midwifery Board of Australia 2012, Conduct Statement 8).

The National Statement on Ethical Conduct in Research Involving Humans is intended for use by any researcher conducting research with human participants, any member of an ethical review body reviewing that research, those involved in clinical governance and potential research participants (NHMRC 2014; Jirojwong et al 2011).

Pilot Study

A pilot study is a trial run of the research (Nieswiadomy 2012). The function of a pilot study is to obtain information for improving the project or assessing its feasibility. Costly mistakes can be avoided by a pilot study (Polit and Hungler 2013). Reliability and validity of the instrument(s) is usually determined in the pilot study (Polit and Hungler 2013).

Main Study

The collection of data is typically time consuming. The paper should explain why the researcher has chosen a particular method of data collection. Questionnaires tend to be less costly require less time and energy to administer, offer complete anonymity and avoid bias. The strength of interviews is the response rate will probably be high with a face-to-face format. Members of society who cannot complete questionnaires (eg. people who are blind or elderly) can be included, the interviewer or respondent can clarify questions and additional information can be gathered through observation (Polit and Hungler 2013).

Nursing studies most frequently involve the use of interviews or questionnaires, socio-psychological scales, direct observation or a biophysical measures which lend themselves to studying nursing phenomena (Polit and Hungler 2013). Another method may include a focus group where the group discusses a given topic. Group interaction can clarify or quantify ideas, however, the group interaction of the focus group can be affected by both the personal characteristics of the participants and interviewer such as class, gender and race (Nieswiadomy 2012).

Results

Numerical data tends to be presented in two forms, firstly as raw figures and percentages and secondly, more visually, as line graphs, tables or histograms (Burns and Grove 2009). Although quantitative analysis can only be carried out with numbers, the numbers themselves have no intrinsic worth so they need to be given meaning by those who are using them.

Measures of central tendency, also known as the average, identify how near the usual response a particular variable lies (Burns and Grove 2009). These averages are expressed as mean, median and mode (Burns and Grove 2009). The mean is the average, that is all scores are added up and divided by the number of subjects. The median represents the exact middle score or value in a distribution of scores. The mode is the value that occurs most frequently in a distribution of scores (Polit and Hungler 2013; Burns and Grove 2009). Figures may be expressed as $p>0.05$ or $p<0.05$ which gives a level of significance known as probability (Burns and Grove 2009, p.37). This means that techniques were used to ensure that each subject in the population had an equal chance of being selected. If a probability result is statistically significant ($p=<0.05$) the result had a less than 5% possibility of being caused by chance and therefore becomes significant and important (Polit and Hungler 2013). Qualitative data may be reported in a more discursive way, featuring actual quotes from interviews and discussions (Burns and Grove 2009).

Discussion/Recommendations

The discussion of findings allows the researcher to make interpretations (Nieswiadomy 2012). Recommendations could be implemented in practice readily or cautiously taken up and piloted over a period of time. Alternatively the results may not be considered unless modifications are made. An important point to remember is the research does not necessarily prove a point and may only suggest a relationship or highlight an issue needing further investigation. As Nieswiadomy (2012) states, the research study may raise more questions than it answers!

Conclusions

All major findings related to the original aims of the study are discussed in relation to whether the data supports or negates the hypothesis or research question(s) (Nieswiadomy 2012). In the discussion the reader should be able to evaluate the research design and the overall merit of the study. Competent researchers will highlight these concerns within a section on limitations of the study.

Reference List

Research papers conclude with a list including books, reports and other journal articles used to support the concepts outlined. For those interested in pursuing additional reading on the topic, the reference list provides an excellent starting place (Polit and Hungler 2013).

CONCLUSION

The methodological approach used in this paper provides a framework to analyse research papers logically and systematically. Whilst this paper is deliberately simplified it still allows for the major components of the research process to be identified and considered.

THE FRAMEWORK

The framework is a visual tool to stimulate questions to assist in the assessment of the value of a research paper. The framework is intended to allow the reader to question each section of any paper, allowing better interpretation of the contents.

The framework provides trigger questions; the reader should explore them within the paper and provide a rationale for the researcher's inclusions or omissions.

Questions to consider	Yes	No
1. Title Is the title clear and accurate ie. does it describe the research?		

2. Author

What are the author's qualifications and current position?

3. Date

When was the research undertaken? When was it published? Is it a recent piece of work? Is it relevant to present practice? NB. This is not always easy to establish with online articles.

4. Journal

Does the journal deal in nursing research? Are the members of the editorial board from a wide range of academia and practice? Who is the target audience?

5. Abstract/Summary

Does the abstract clearly outline the problem, the hypothesis/research question, aims and objectives, methodology, results, conclusions and recommendations? Are you clear about what is being investigated?

6. Identifying the problem

Is the problem and/or purpose clearly identified? Is there a rationale for the study?

7. Formulation of research questions

Are the aims and objectives clearly stated? How many research questions (qualitative)/hypotheses (quantitative)? Is too much being attempted? Does the hypothesis follow logically from the original problem? Do the aims and/or question/s follow logically from the original problem?

8. Literature search

Is there an unbiased discussion of related research? Does the researcher demonstrate insight into the subject under study? Is there an appropriate timescale for the literature cited? Does the search identify whether a theoretical framework has been used? Is the search a collection of quotes or does it critically appraise previous studies?

9. Methodology**9a.Design**

Is the study described adequately? Can you identify what type of study is used, eg descriptive, experimental, quasi-experimental?

9b.Tools

Are the reasons for the choice of instrument given eg questionnaire, observation, interview, patient records, diaries? Is the advantage/limitation of the tool used discussed?

9c.Sample

Is the sample representative of the population under study? Have the characteristics of the sample been considered eg size, culture, gender? How appropriate is the method of sample selection?

9d.Ethics

Has informed consent been given? Is confidentiality and anonymity assured? Was the right not to participate explained? Was dignity upheld? Were the subjects free from harm? Was ethics committee approval sought?

9e. Reliability and validity

Has the study considered the issue of reliability and validity? Is the research methodology biased?

10. Pilot study

Has a pilot study been completed? What modifications were made and why?

11. Main study**11a.Results**

Are the raw figures and percentages or dialogue provided in the text? Are they visually presented eg. graphs, bar charts, scatter-grams, extracts of dialogue? Is the rationale provided for the inclusion or omission of statistical testing? Is the probability of the result by chance included?

11b.Discussion/Recommendations

Is the discussion of the results understandable? Are the recommendations self-evident after reading the rest of the paper? Are the recommendations able to be implemented? Has the researcher acknowledged their limitations? Are their suggestions for further research?

11c.Conclusion/s

Do the conclusions relate logically to the results? Are there any distortions attempted to 'fit' preconceived ideas? Are the aims, questions or hypothesis posed earlier addressed? What omissions have been made and has the researcher referred to these?

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