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How to Conduct a Qualitative Systematic Review to Guide Evidence-Based Practice in Radiography

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Abstract

In recent years, there has been emphasis on evidence-based practice. Traditionally, systematic reviews of quantitative evidence on randomized clinical trials (RCTs) and the effectiveness of technology in radiography provided the evidence on which to base decisions for patients and policies. However, there has been a recognition that to have in-depth understanding into human behaviour, opinions and experiences also requires evidence-based literature from systematic reviews of qualitative evidence. Unfortunately, there is limited educational literature on how to conduct systematic reviews of qualitative evidence. Therefore, this article provides this information to radiographers, radiography students and other healthcare professionals. This information is applicable in both clinical and educational settings.

Keywords: Evidence-based Practice; Qualitative; Radiography; Systematic Review.

1. Introduction

A systematic review is a research method that identifies relevant primary research studies, appraises their quality and summarises their findings using a scientific methodology [1]. In other words, systematic reviews use existing primary research studies as a source of data. For this reason, it is called secondary research. A systematic review provides the highest quality and most reliable findings of evidence to guide practice because researchers bring together the findings of all relevant individual research studies [1-3]. Systematic reviews are at the top, primary studies in the middle and opinion papers at the bottom of the evidence-based framework [2].

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Since the 1990s, systematic reviews have been accepted as legitimate research [4]. Because systematic reviews use secondary data, researchers should understand how to conduct primary research studies before undertaking one. Radiography students should be taught how to conduct a systematic review. Radiographers undertaking postgraduate education and training in specialised fields of diagnostic imaging also should be taught and encouraged to conduct a systematic review as a dissertation. This also gives radiographers and radiography students literature searching and critical appraisal skills which are vital in evidence-based practice. Like primary research, systematic reviews can be conducted using three research designs: qualitative, quantitative and mixed methods [2]. Historically, quantitative systematic reviews have dominated in healthcare research and are most suitable to investigate phenomena that lend themselves to precise measurements and quantification [5]. However, exploring and understanding the meaning people have towards a phenomenon, such as the interactions of healthcare professionals with patients are most appropriate using qualitative research design approach [6]. It is well known that qualitative primary research study provides a deeper understanding of the phenomenon under investigation [2,5,6]. Thus, bringing together findings from multiple qualitative primary research studies provides a range and depth to the phenomenon under review [7]. This is the main reason for conducting a qualitative systematic review to guide evidence-based practice in radiography. The aim of this article is to educate and bring awareness to radiographers and radiography students on how to conduct a qualitative systematic review to guide evidence-based practice in radiography. The article also brings awareness to educators and policy makers that radiography students and postgraduate students should be taught and given the opportunity to choose either primary research or systematic review for their dissertations.

2. Ethical considerations

Systematic reviews do not require ethical approval from research ethics committee before commencing the study [4]. This is because each primary research study included in the review is subjected to an ethical review already. Furthermore, systematic reviews use publicly accessible data as evidence [2]. This means that primary research studies which have not described ethical considerations should be excluded during the selection process of articles to include in the review. For radiography students, it can sometimes be challenging to get permission from medical facilities to conduct a primary research study. It can also take a long time to get ethical approval which is a challenge to radiography students with limited study time. Therefore, conducting a systematic review (secondary research) which does not require ethical approval can provides a better alternative option.

3. Five stages associated with conducting a qualitative systematic review

The Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) guidelines is used by researchers to conduct and report the stages most associated with qualitative systematic review: formulation of a review question, comprehensive literature search, quality assessment, data extraction, and data synthesis and analysis (Figure 1) [7].

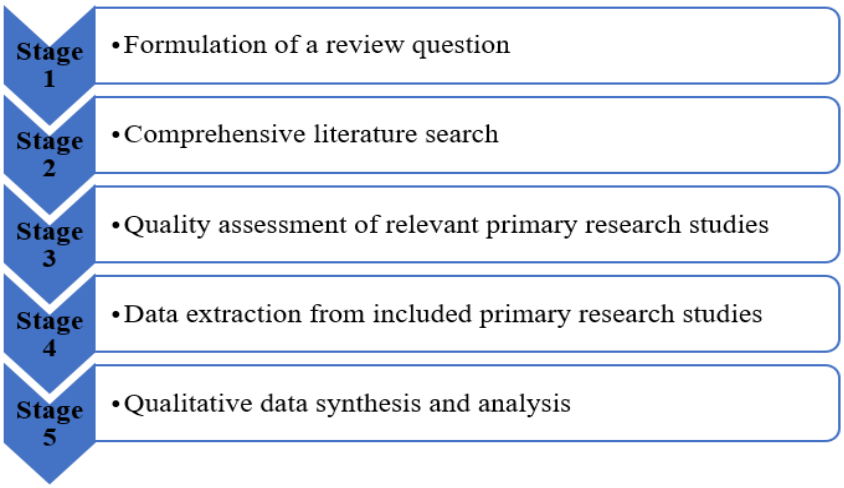

Figure1: Five stages associated with conducting a qualitative systematic review

These stages are discussed using an example of the experiences of patients with diagnostic imaging examinations.

3.1. Formulation of a review question

The problem to be addressed by the review should be specific in the form of a clear, unambiguous and structured question before beginning the research study [1]. Population, Exposure and Outcome (PEO) format is the most common format used in developing a qualitative review question [1,2]. Example: *"What are the experiences of patients with diagnostic imaging examinations"?* The following are the components of the review question:

- Population- patients
- Exposure- diagnostic imaging examinations
- Outcome or themes- experiences

After formulating the review question, it is important to conduct a quick scoping search to make sure there is no systematic review already conducted which has addressed the same review question [2]. The general rule is that the researcher cannot conduct a systematic review on a review question which has already been answered previously, unless a literature gap is identified which needs to be addressed. For example, systematic reviews have been conducted on the experiences of patients with diagnostic imaging examinations, but mostly from the literature of western countries and none from an African perspective. The experiences of patients in Africa can differ from those of the western world due to limited resources, a lack of modern equipment and a different culture. This is the gap for which another systematic review could be conducted based on literature from Africa.

3.2. Literature search

This stage involves stating the inclusion and exclusion criteria, determining the keywords (search terms),

searching, and selecting all relevant primary research studies to answer the review question.

Inclusion and exclusion criteria-This describe the criteria that the researcher uses to include any primary research study in the review. It should follow logically from the review question and be stated in the research protocol before starting to conduct a review to avoid selection bias [1,2]. In general, the parameters applicable to systematic reviews of qualitative evidence are population, phenomena, outcome (theme), publication date, language and study settings. These parameters can be presented in text or table formats in a report. To be transparent, the reasons for excluding some primary research studies should be stated in the review report.

Determining the keywords (search terms)- Identifying the appropriate keywords to guide the entire search is vital in searching and identifying all relevant literature [1,2]. The search terms should be listed in the protocol before the commencement of the review process. In our example, the key words can be "patients", "experience", "diagnostic imaging examinations", "X-ray examinations" and "radiological examinations". The researcher should consider using synonyms and common operators (AND/OR) to combine the search terms. Yannascoli and others [3] point out the importance of involving the expertise of a medical librarian when determining the keywords to minimise the prospect of bias caused by terms which are too restrictive.

Searching and selecting all relevant primary research studies- This process should be conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [8]. A comprehensive literature search involves searching in electronic databases and other sources of information, such as professional journals.

An electronic search should be conducted in accessible databases using keywords with the help of a medical librarian or expert in this area [3]. The three main databases for healthcare literature are PubMed/MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and ScienceDirect. PubMed comprises more than 30 million articles for biomedical literature, covering more than 4600 journals from 1950 to date [2]. PubMed is freely accessible through the internet. CINAHL database also provides more than 5,300 nursing and allied health journals [9]. ScienceDirect is another database which contains more than 3,500 academic journals [10]. Filters should be applied for each search based on the inclusion criteria. The number of initial records obtained in each database should be stated in the review report. Other sources of information include professional journals, grey literature, cited references and contacting experts [1,2]. Firstly, the researchers can visit the library and conduct a manual search of professional journals. This should be supplemented with electronic searches of tables of contents of radiography journals through the internet. Regarding our example, the radiography journals that can be searched include the Radiography Journal (UK), South African Radiographer, Nigeria Journal of Radiography and Radiation Sciences, and Journal of Medical Radiation Sciences. Secondly, the researchers should search for grey literature which is non-published primary research studies such as dissertations and theses [1]. It is the author's observation that most research projects conducted by radiographers and radiography students, both at undergraduate and postgraduate levels, are unpublished. Thirdly, further research studies should be searched through cited references of the main articles retrieved from the databases and journals. The searching of cited references is sometimes called snowballing or citation chaining [2,4]. Lastly, it is vital to contact experts in the field under investigation for any unpublished or

recently submitted journal articles relevant to the review question [11]. This comprehensive search ensures that all relevant literature is retrieved, which is an important characteristic of a systematic review. The above process should be reported using the PRIMA flow chart which contains four sections: identification, screening, eligibility and included (Figure 2) [8].

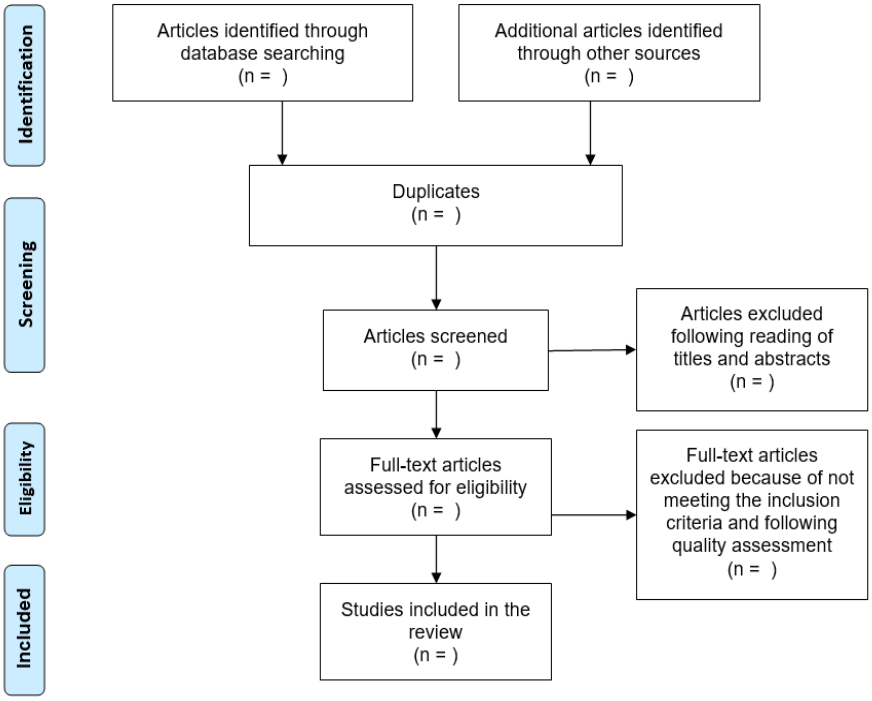

Figure 2: PRIMA flow chart for reporting the literature search of qualitative evidence

The identification section contains the number of articles retrieved from databases and other sources. Duplicates removed should be stated. Only articles to be subjected for screening then remain. The screening section reports the number of articles excluded following reading of titles and abstracts using the criteria stated in the research protocol to avoid bias which is crucial in systematic reviews. The eligibility section reports the articles remaining following the initial screening process. These are the articles retrieved and assessed for eligibility after having been read in full. The number of excluded articles should be stated and the reasons for their exclusion. In the case of a qualitative systematic review, this may include research studies conducted quantitatively. Other reasons include wrong population, reviews, opinion papers and poor methodology quality. The last section reports the final number of research studies included in the review. The purpose of reporting all these stages is to ensure reproducibility which is one of the characteristics of the systematic review [1,2].

3.3. Quality assessment of the included research studies

Quality of a research study is the degree to which a researcher employs measures to minimise bias and error in its design, conduct and analysis [1]. This means that the reviewers should understand how to conduct primary research studies before undertaking the process of quality assessment (critical appraisal). This process should be undertaken by more than two reviewers using a standardised critical appraisal checklist [3]. For radiography

students, the supervisor of the research project should countercheck the process and results of quality assessment. The commonly used checklist for qualitative evidence is the Critical Appraisal Skills Programme (CASP) for qualitative research studies (Table 1) [12].

Table 1: Critical appraisal skills programme (CASP) checklist for qualitative studies [12]

	Statement	Yes	No	Unclear
1	Was there a clear statement of the aims of the research?			
2	Is a qualitative methodology appropriate?			
3	Was the research design appropriate to address the aims of the research?			
4	Was the recruitment strategy appropriate to the aims of the research?			
5	Were the data collected in a way that addressed the research issue?			
6	Has the relationship between researcher and participants been adequately considered?			
7	Have ethical issues been taken into considerations?			
8	Was the data analysis sufficiently rigorous?			
9	Is there a clear statement of findings?			
10	How valuable is the research?			

The scoring of the checklist should be standardised, and any differences reconciled by mutual agreement or by involving a third reviewer [3]. Nelwatia and his colleagues [13] conducted a systematic review of qualitative studies exploring peer learning experiences of undergraduate nursing students. The CASP qualitative checklist [12] was used to assess the quality of included research studies and had 10 questions with three options, "Yes", "Unclear", and "No". The score of 1 was allocated to each question on the checklist if the answer was "Yes" and a score of 0 for "Unclear" and "No". A research study was rated high when it met at least a score of 6, medium with a score of 5-3 and low with a score of less than 3. It should be mentioned that low quality research studies should be excluded because the quality of evidence and conclusions generated by a systematic review depends entirely on the quality of the primary research studies that are included in the review [2].

3.4. Data extraction from included research studies

The data extraction process involves going back to the included research studies and highlighting the relevant data that will help answer the review question [2]. There are two types of data that researchers are interested in during data extraction process: descriptive and analytical data [14]. In a qualitative systematic review, descriptive data describes study characteristics, such as author (s), date of publication, study setting, number of participants, sampling approach and data collection method (s). This information should be reported and presented in a table format. On the other hand, analytical data describes the outcomes or themes from each included research study, including participants' quotes. This data is extracted from the result section and sometimes from the discussion section of each research study [4]. To standardise the data extraction process and improve the validity of the results, a data extraction form should be used [2]. A completed data extraction form is like an interview transcript used in primary qualitative research studies. Researchers can use an already validated data extraction form available in the textbooks and online or design a new one to suit the review. The

process of data extraction should be performed by two reviewers and any differences need to be reconciled by mutual agreement or involvement of the third reviewer [3]. In the case of radiography students, the research supervisor should countercheck the exercise. It is the author's opinion and experience that the reviewers involved in data extraction should also analyse the data since they will be familiar with the data.

3.5. Analysis and synthesis of qualitative data

The purpose of the synthesis is to bring together the principal findings of the systematic review in a narrative (i.e. text) form [15]. This process should be conducted by more than one researcher to enhance the analysis and synthesis of data [2]. The methods used to analyse and synthesise qualitative evidence have been adopted from primary research methods and depends on the purpose of the review [15]. The common methods used are thematic synthesis, framework synthesis, meta-ethnography, and grounded theory (Table 2) [15].

Table 2: Common methods of analysing and synthesising qualitative evidence [15]

	Method	Description
1	**Thematic synthesis**	Codes are identified inductively, and constantly compared and regrouped into themes.
2	**Framework synthesis**	The analysis begins with a priori framework of themes against which data are extracted and synthesised. In the example on the experiences of patients with diagnostic imaging examinations, the themes are already known and can be grouped into three: experiences before, during and after the examination. The subthemes and codes could then be grouped under each theme.
3	**Meta-ethnography**	Participant findings and author interpretation from primary ethnography research studies are combined to produce new meaning or theoretical understanding.
4	**Grounded theory**	Theory is inductively derived through concurrent collection and analysis of data.

4. Writing up a systematic review report as a dissertation or journal article

The format for writing up a systematic review report is the same for a primary research study, except that a literature review chapter or section is not required. The format includes title, introduction, methodology, findings or results, discussion, and conclusion and recommendations.

4.1. Title

This should include the words "systematic review" to alert the reader that it is a secondary research study. In the context of this article, the title should also include the word "qualitative" to differentiate it from the dominated

quantitative systematic reviews.

4.2. Introduction

This should contain background information, the aim of the review and objectives, and the review question. The identified literature gap should also be stated. In our example on experiences of patients with diagnostic imaging examinations, the literature gap can be stated like "To the best knowledge of researchers, this is the first systematic review to be conducted on the experiences of patients with diagnostic imaging examinations based on the literature from Africa".

4.3. Methodology

This should describe the research design adopted and the stages followed in conducting a systematic review using ENTREQ guidelines [7] or any other suitable guidelines. The PRISMA guidelines [8] also should be used to report the searching and selecting of all relevant primary research studies for the review.

4.4. Findings/results

This should report on the results of the literature search, quality assessment, data extraction, and analysis and synthesis of data. To ensure confirmability, direct quotes from participants should be included in the report [5].

4.5. Discussion

The discussion should contain a discussion of the literature search, quality assessment and data extraction processes [1,2]. The findings of the review should be compared with the related literature and clinical practice.

4.6. Conclusion and recommendations

The conclusion should state a summary of the whole review, restate the main findings, and state the limitations of the review [1,2]. The main limitation applicable to all systematic reviews is that the findings provided in the review are only as reliable as the findings reported in each of the primary research studies [2]. This means that the review cannot overcome the challenges that were inherent in the design and conduct of each research study included in the systematic review. This section should end with recommendations based on the review findings.

5. Conclusion

In conclusion, modern practice in radiography demands the need to base decisions for patients and policies on the best available research evidence [16]. The best way to obtain this information is by conducting a systematic review which is at the top of the hierarchy of research evidence with primary research studies in the middle and expert opinion articles at the bottom [2]. Therefore, it is highly recommended that radiography students and radiographers be knowledgeable in conducting systematic reviews. Systematic reviews of quantitative evidence have dominated this area, leaving those with qualitative designs with little educational literature [15]. This article has provided information on how to conduct a systematic review of qualitative evidence to guide

practice. There is a saying that "practice makes perfect". This means that the best way to understand how to conduct a systematic review is putting theory into practice by undertaking one as a dissertation or journal article.

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