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Undertaking Systematic Reviews in Nursing

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ABSTRACT

Health care knowledge is rapidly evolving with inexorable volumes of research based information getting published every day. Systematic reviews provide comprehensive and unbiased summaries of a research on a single topic. Systematic reviews are considered as the gold standard for summarizing evidence found in research literature. The objective of this article is to sensitize nurses regarding systematic reviews by summarizing major steps and process involved in doing a systematic review. Doing a systematic review requires significant planning and execution. This article is an introductory description on how to undertake a systematic review. A thorough understanding of systematic review is necessary to make a quality review. Following the systematic rigorous methodology helps to reduce bias and improve the reliability and accuracy of conclusions.

Keywords: *Evidence based nursing, Nursing, Systematic review, Meta-analysis.*

INTRODUCTION

Health care knowledge is rapidly evolving with inexorable volumes of research based information getting published every day. It is not advisable to make clinical decisions based on results of an individual study. Systematic reviews provides a means of having comprehensive and unbiased summaries of research on a single topic. This helps nurses to rapidly keep abreast with the current knowledge required for safe practice. When nursing practice is evidence based, patients will receive nursing care that is safe and effective that promotes comfort and facilitates best outcome.[1]

Systematic reviews provide comprehensive and unbiased summaries of a research on a single topic. A high quality systematic review is considered as the most reliable source of evidence. Systematic reviews are considered as the gold standard for summarizing evidence found in research literature.[2] The objective of this article is to sensitize nurses regarding systematic reviews by summarizing major steps and process involved in doing a systematic review.

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TERMS ASSOCIATED WITH REVIEWS

Various terms are widely used in association with reviews and are often confusing to readers. The widely known reviews are narrative review, scoping review, systematic review and meta-analysis.

Narrative Review: Traditionally narrative reviews were used to guide clinical decision making. Narrative reviews are descriptive summaries of various literature concerning to one focused area, which do not involve a systematic search of literature.

Scoping review: A review that involves the synthesis and analysis of a wide range of research and non-research material in order to generate better conceptual clarity about a specific topic. This review aims to develop a schema for future research. Scoping review outlines what is already known about an area, and then focuses on the gaps, arguments, blank and blind spots in literature.[3]

Systematic Review: A systematic review

attempts to identify, appraise and synthesize all the empirical evidence that meets pre-specified eligibility criteria to answer a given research question. Researchers conducting systematic reviews use explicit methods aimed at minimizing bias, in order to produce more reliable findings that can be used to inform decision making. [4]

Meta-analysis: Meta-analysis is the statistical analysis of a large collection of analysis results from individual studies. Data from various studies are pooled to a single quantitative estimate, or the effect size. Four types of effect-size are usually computed from various input data, they are, the standardized mean difference, the correlation coefficient, the odds-ratio, and the risk-ratio.[5]

FEATURES OF A SYSTEMATIC REVIEW

In this era of evidence based practice, health professionals rely on systematic reviews for high quality evidence. Higgins (2011), outlined the features of a high quality systematic reviews as, [6]

- a clearly stated set of objectives with pre-defined eligibility criteria for studies
- an explicit, reproducible methodology
- a systematic search that attempts to identify all studies that would meet the eligibility criteria
- an assessment of the validity of the findings of the included studies
- a systematic presentation, and synthesis, of the characteristics and findings of the included studies

STEPS IN CONDUCTING A SYSTEMATIC REVIEW

The Review Team: Doing a systematic review is a team work. The team can include nurses, librarians, statisticians, physicians, and undergraduate & postgraduate students. The lead author must organize team meetings and must discuss regarding the progress of the review. Each member in the team must be assigned to a specific task with a timeframe. The team must meet regularly, discuss the work progress, clarify the doubts and work systematically as per the protocol developed by the team.[2]

Initial Search: An initial literature review can be done to determine if a systematic review is being conducted or published on the selected question.[2] The various sources for systematic reviews are Cochrane Database of Systematic Reviews (CDSR), Database of Abstracts of Reviews of Effects (DARE), ARIF Reviews database from the Aggressive Research Intelligence Facility (ARIF) at the University of Birmingham UK ,The Campbell Collaboration library of systematic reviews, The Joanna Briggs Institute and PubMed (MEDLINE) database.[2,7,8] This will help to avoid duplication of review. If a systematic review is already done on the same area, the researchers can revise and address any another aspect.

Developing A Protocol: Protocol is a brief outline of the project. It is the plan the researcher desires to follow to complete the systematic review. All systematic review must start with a peer reviewed protocol.[2] Developing protocol is a complex process and it includes several decisions about the process and resource needed. Once the review area is finalized the researcher can develop the protocol. A protocol must include objectives, methods of literature research, selection criteria, ways of data extraction, and analysis. Writing a protocol and sticking on to it will reduce a considerable amount of bias in the review. The protocol will help in further replication of methods.[2] Each protocol must consist of cover sheet (provide the title, citation details and contact addresses), Text of the protocol, (consists of a background, objectives, selection criteria, search methods, plan for data collection and data analysis,) acknowledgements, conflicts of interest, tables and figures and references.

Formulate The Problem: Formulating a problem is the first step in doing a systematic review. Objective is to develop clear, unambiguous structured question. Problem intended to study is written in form of a well-structured question. It is a very crucial step as the rest of the steps will depend on the primary question formulated. The 'PICOS' acronym is the commonly used structured approach to frame the research question. Each letter of the acronym represents components of a well formulated question. P stands for Population, I stands for Intervention / treatment, C represents comparator/comparison group/alternative intervention/control, O represents outcome / results

of the study and S stands for study design.[8]

- **Population:** Providing information about the population

- **The intervention/s** under consideration in the systematic review need to be clearly reported. Interventions include drugs, devices, education, training methods and health care practice. diagnostic test, therapeutic regimens, lifestyle changes, educational intervention, behavior modification, risk prevention etc.

- **Clearly reporting the comparator**: explain to what the intervention is being compared. Usually comparison is done with usual care, placebo or drug.

- **Outcomes:** Specify the outcomes of the intervention being assessed. Usually outcome assessed are mortality, morbidity, symptoms relief and improvement in quality of life.

- **Study design:** mention the type of study design(s) to be included in the review.

Another framework for developing a focused question is the SPICE framework.[2,8] SPICE framework stands for Setting (where), Perspective (whom), Intervention (what), comparison (compared with what) and Evaluation (what conclusions can be drawn)

Locate & Select Relevant Literature: Locating and selecting relevant literature is one of the critical step in a systematic review. Objective of this step is to identify potential studies. Multiple sources of literature are searched. Search must include data bases and print search. A clear inclusion & exclusion criteria must be mentioned prior to the review.

- **Developing A Search Strategy:** The objective of developing an optimal search strategy is to balance sensitivity with specificity. Here sensitivity refers to retrieving a high proportion of relevant research works and specificity refers to retrieving a low proportion of irrelevant works.

- **Sources of Literature Search:** Cochrane controlled trials register, Medline, PubMed, CINAHL, Journals, conference proceedings, unpublished thesis, ongoing researches etc.

- **Data Extraction:** A data extraction form can be used to retrieve and compile data from various articles. Components for a general data extraction forms include Reference, Objective, study design, population, intervention, Control, Outcome and comments. [9] Data extractions forms can be tailored to the requirements of the study. Final decisions regarding inclusion and exclusion can be made after data extraction. It is recommended to do the data extraction by two independent reviewers. Any differences in opinion can be resolved by an expert consultation or mutual agreement. It is advisable to make a note on why an article was accepted/rejected as this justification may be needed at a later stage.[9]

Assess the quality of researches

This step involves quality assessment of all included researches. Assessing the quality of studies must be based on standard quality scales and checklists. Two independent reviewers can assess the quality of studies. Differences in opinion can be reconciled by mutual agreement or by a third reviewer.[9] Quality assessment can even be done by blinding informations like journal name, authors and affiliation. This method of blinding may be cumbersome and time consuming. 'Risk of bias tool' is used to assess the risk of bias in in randomized trials. Quality Assessment Tool for Quantitative Studies, developed by the Effective Public Health Practice Project, Canada is widely used to assess the quality of studies. [6]

Analyze & summarize the results

After the quality assessment of studies, the data analysis can be done. Involves summarization of study characteristics and results. Each study characteristics can be explained with simple description. A tabular format is usually adopted for this kind of description. Meta-analysis is done if appropriate. If an overall meta-analysis can't be done, a sub group meta-analysis can be undertaken. Due to clinical heterogeneity of studies, it may not be appropriate to do a meta-analysis, many times.

Interpret the Findings

Findings section involves interpretation of clinical relevance of each article. If a meta-analysis is done conclusion regarding the effectiveness of

an intervention can me made explicitly. If a meta-analysis is not done, the researcher can summarize the findings based on relative strength of studies.[9] Generation of inferences and recommendations can be made based on the findings of individual studies. Risk of bias need to be explained.

REPORTING GUIDELINES

Explicit and exhaustive reporting of the methods used in synthesis is also a hallmark of any well conducted systematic review.[10] Two commonly used guidelines for Cochrane reviews are the PRISMA and MOOSE guidelines

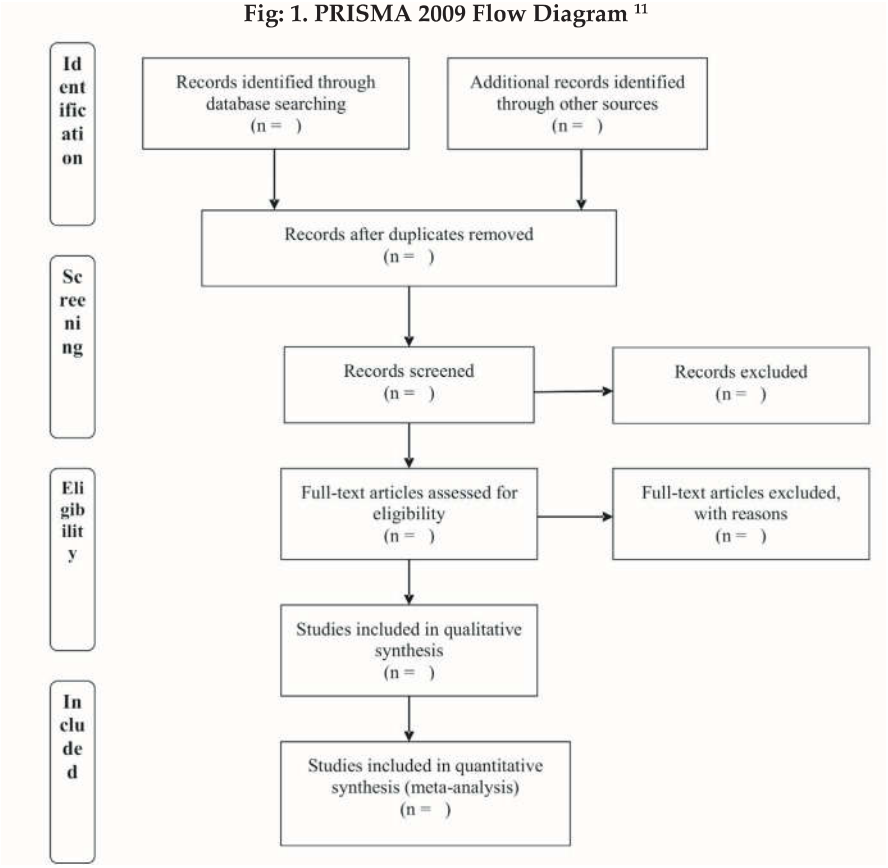
- PRISMA: PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses. It provides specifications for reporting in systematic reviews and meta-analyses. The PRISMA statement consists of a PRISMA checklist and a PRISMA flow diagram. PRISMA checklist is a 27 item check list scale which pertains to the contents of systematic review and meta-analysis. The PRISMA flow diagram is a four phased diagram that depicts the flow of information through the various stages of a systematic review. PRISMA is mainly used for randomized trials but can be used in other types of research which focuses on evaluation of various interventions. [11,12]

- MOOSE: MOOSE stands for Meta-analysis of Observational Studies in Epidemiology. MOOSE checklist contains specifications for reporting of meta-analyses of observational studies in epidemiology.[13] The major areas under MOOSE are background search strategy, methods, results discussion and conclusion.

SOFTWARE USED FOR CONDUCTING SYSTEMATIC REVIEWS

Review Manager (RevMan) is the software used for preparing and maintaining Cochrane Reviews. It is a mandatory authoring tool for Cochrane Reviews and is endorsed by the Cochrane collaboration and is free to use for authors preparing a Cochrane Review or for purely academic use. RevMan is used to prepare Cochrane Reviews of interventions, methodology, diagnostic test accuracy, and overviews of reviews. The latest major version, RevMan 5.3, was released on 13 June 2014.[14,15]

Fig: 1. PRISMA 2009 Flow Diagram [11]



GRAPHICAL REPRESENTATION OF DATA IN SYSTEMATIC REVIEW

The two plots which is commonly used to represent of data in systematic reviews are funnel plot and forest plot.

- **Funnel Plot:** Light and Pillemer in 1984 introduced the concept of funnel plot. Publication bias in systematic reviews and meta-analysis can be checked with the help of a funnel plot. In the absence of publication bias the plot takes a rough funnel shaped symmetrical distribution. Deviation form funnel shape indicates publication bias. [16]

- **Forest Plot:** Graphical representation of meta-analysis are usually done in form of a forest plot. A forest plot or blobbogram illustrates the relative strength of treatment effects in multiple quantitative scientific studies addressing the same question. Forest plot demonstrates the difference between studies and provide an estimate of overall effect.[17,18]

TIME LINE

Timelines are roadmaps for successful completion of the project. Be generous in allocating time to each step. After the formulation of time frame, an expert consultation can be taken and necessary amendments can be made. The average systematic review requires at least 12 months of work. The sample time frame as per Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 (Higgins JPT & Green S, 2011) is given below.[3]

Table 1: Sample time frame for systematic review

Months	Activity
1 - 2	Preparation of protocol
3 - 8	Searches for published and unpublished studies
2 - 3	Pilot test of eligibility criteria
3 - 8	Inclusion assessments
3	Pilot test of 'Risk of bias' assessment
3 - 10	Validity assessments
3	Pilot test of data collection
3 - 10	Data collection
3 - 10	Data entry
5 - 11	Follow up of missing information
8 - 10	Analysis
1 - 11	Preparation of review report
12 -	Keeping the review up-to-date

ADVANTAGES OF SYSTEMATIC REVIEWS [19]

On comparison with narrative reviews systematic reviews

- Reduce bias
- Replicability
- Resolve controversy between conflicting studies
- Identify gaps in current research
- Provide reliable basis for decision making

LIMITATIONS OF SYSTEMATIC REVIEWS [19]

- Results may still be inconclusive
- There may be no trials/evidence
- The trials may be of poor quality

CONCLUSION

This article is an introductory description on how to design a systematic review. Doing systematic reviews is an exhaustive task and it requires a good amount of proficiency in subject matter and review methodology. In the upcoming days nursing care must be evidence based, systematic review is the key to evidence based nursing practice. Following the systematic rigorous methodology helps to reduce bias and improve the reliability and accuracy of conclusions.[20]

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REFERENCES

1. Teing S L, Systematic Review Made Simple for Nurses, SGH proceedings. Vol 16(2), 2007.

2. Riesenberg LA, Justice EM. Conducting a successful systematic review of the literature, part 2. Nursing. 2014;44(6):23-6.
3. Thomson P, & Rarr; V. Not all literature 'reviews' are the same [Internet]. Patter. 2013 [18 July 2014]. Available from: http: //patthomson.wordpress.com/2013/05/23/not-all-literature-reviews-are-the-same/
4. Thecochranelibrary.com, (2014). About Cochrane Systematic Reviews and Protocols - The Cochrane Library. [online] Available at: http://www.thecochranelibrary.com/view/0/AboutCochraneSystematicReviews.html [Accessed 26 Jun. 2014].
5. Berman N, Parker R. BMC Medical Research Methodology [Internet]. 2002 [cited 8 October 2014];2(1):10. Available from: http://dx.doi.org/10.1186/1471-2288-2-10
6. Higgins JPT, Green S, eds. Cochrane Handbook for Systematic Reviews of Interventions: Version 5.1.0. The Cochrane Collaboration, 2011. http://www.cochrane-handbook.org
7. D'Souza P, George A, Nair S, Noronha J, Renjith V, Unnikrishnan B et al. Resources For Evidence-Based Health Care: Accessibility And Availability. Journal of Education and Practice 2014:5(7):65-72.
8. Riesenberg LA, Justice EM. Conducting a successful systematic review of the literature, part 2. Nursing. 2014;44(6):23-6.
9. Wright RW, Brand RA, Dunn W, Spindler KP. How to Write a Systematic Review. Clinical Orthopaedics and Related Research. 2007;455: 23-9 10.1097/BLO.0b013e31802c9098
10. Aromataris E, Pearson A. The Systematic Review: An Overview. AJN The American Journal of Nursing. 2014;114(3):53-8 10.1097/01.NAJ.0000444496.24228.2c.
11. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med. 2009 Jul 21;6(7):e1000097. Epub 2009 Jul 21. PubMed PMID: 19621072.
12. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, et al. (2009) The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration. PLoS Med 6(7): e1000100. doi: 10.1371/journal.pmed.1000100
13. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D, Moher D, Becker BJ, Sipe TA, Thacker SB. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. JAMA. 2000 Apr 19;283(15): 2008-12. PubMed PMID: 10789670
14. Tech.cochrane.org, (2014). RevMan | Informatics & Knowledge Management Department. [online] Available at: http: //tech.cochrane.org/Revman [Accessed 26 Jun. 2014]
15. Cochrane.org, (2014). Review Manager (RevMan) | The Cochrane Collaboration. [online] Available at: http://www.cochrane.org/editorial-and-publishing-policy-resource/review-manager-revman [Accessed 26 Jun. 2014].
16. R. J. Light, D. B. Pillemer (1984). Summing up: The Science of Reviewing Research. Cambridge, Massachusetts.: Harvard University Press
17. Lalkhen A G , McCluskey A, Introduction to clinical trials and systematic reviews Continuing Education in Anaesthesia, Critical Care & Pain j Volume 8 Number 4 2008 145 Downloaded from http://ceaccp.oxfordjournals.org/
18. Egger M ,Smith GD ,Schneider M ,Minder C. Bias in meta-analysis detected by a simple, graphical test. BMJ 1997;315:629
19. Background to Systematic Reviews. (2014).Retrieved from http://ph.cochrane.org/sites/ph.cochrane.org/files/uploads/Unit_One.pdf
20. Esteban walker, Adrian v. hernandez, Michael w. kattan, Meta-analysis: Its strengths and limitations Cleveland Clinic Journal of Medicine 2008; 75(6):431-439;doi:10.3949/ccjm.75.6.431