



Understanding Research

Understanding research: Systematic reviews for orthopaedic and trauma nursing



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Understanding research series

This 'Understanding Research' series aims to provide plain language explanations of the various types of research related to orthopaedic and trauma practice. Each article in the series will identify why research is important, who uses the knowledge from research, how it is used to shape or influence practice and its importance in the delivery of safe and effective care that is based on high quality research and evidence.

It is important that all health care professionals develop skills in understanding, reading, conducting and incorporating research into their practice. For some people, understanding research articles may be challenging, especially for those not experienced in reading, conducting or using research. The language used can seem complicated and make understanding, and therefore using, research difficult. This series will explore different approaches to research, explain why research is conducted in a certain way and consider the benefits of using different approaches whilst defining some of the terminology used.

There is much focus in nursing practice and, in the literature, on ensuring that practice is based on good quality evidence, but it is important to understand what evidence is, where it comes from and how to know if it is of a high enough quality to influence practice. Best practice recommendations are rarely based on a single piece of evidence. Policy and practice tend to change over time in response to new evidence identified through research. When thinking about changing practice, clinicians can become overwhelmed when there are large amounts of literature to consider on a given topic and it can be confusing if research appears contradictory, so identifying exactly what best practice is can be difficult. This is compounded by the fact that not all research is conducted or reported well. Evidence may also be specific to a setting or situation and may not always be relevant for another situation or setting. Systematic reviews are used by researchers or clinicians to synthesise the available evidence on particular subjects and present a summary of the research, its findings and its quality to practitioners.

What is a Systematic Review?

While systematic reviews may be referred to by various names such as meta-analysis, comprehensive reviews. Conceptually, the purpose of

a systematic review is that all the available, good quality evidence (existing research evidence) regarding a specific topic is sought, analysed and then synthesised to produce a summary of evidence that can be considered at a higher level because it combines the findings of existing good quality studies. Conducting a systematic review can accommodate variations in conclusions from different primary research studies, potentially producing a more reliable level of evidence and/or indicate areas where evidence is weak and further research is required. As an example, a single randomised control trial (RCT) may be well designed, conducted and reported, but if its results are able to be combined with other similar RCTs that consider the same research subject, then the findings of the systematic review may be able to provide stronger, more reliable evidence. The review may also identify contradictions across various RCTs that indicate the need for more research in that area.

Historically, systematic reviews were conducted using only quantitative studies. Over time, the use of systematic reviews across a wider range of methodologies has been gradually accepted. It was not until the 1970s that formal approaches to conducting systematic reviews were developed (EPPI-Centre). The concept and development of evidence-based healthcare is widely attributed to Archie Cochrane who described the systematic review process in 1972 and completed the first systematic reviews that considered the effectiveness of healthcare interventions (EPPI-Centre). Systematic reviews that considered other types of evidence (apart from quantitative data/evidence from RCTs etc) began to be conducted in the 1990s and have gradually grown in number, design and use across a wide range of disciplines over the past 20 years (EPPI-Centre). Throughout that process there were some that felt that reviews other than those that considered RCTs were not reliable but, over time, robust methodologies have been designed that are mostly well supported (Dixon-Woods et al., 2006). The Johann Briggs Institute (JBI) and the University of York are examples of centres that are world-renowned for their work in designing methodologies and conducting and publishing systematic reviews for a number of different types of study ('Joanna Briggs Institute: Database of Systemic Reviews'; 'The University of York: Centre for Reviews and Dissemination').

What is considered a systematic review can be explained relatively easily. How one is conducted and how various people believe they should be conducted is another matter. A systematic review has been

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described as:

‘... an appraisal and synthesis of primary research papers using a rigorous and clearly documented methodology in both the search strategy and the selection of studies.’

(QUT University: [SooHoo, Farnig, and Zingmond, 2010](#))

In other words, it is a rigorous review of all the accessible literature and research evidence, relating to a particular topic or phenomenon. The literature is sought, and then reviewed, to produce a higher level (ideally) of evidence or information regarding that topic. The purpose is to create that higher level of evidence by combining and synthesising the outcomes and conclusions from multiple primary research studies. The phrase ‘higher level of evidence’ refers to a traditional consideration that there is a hierarchy of evidence often starting with systematic reviews at the peak of the hierarchy, then RCTs followed by other types of research and inquiry ([Burns et al., 2011](#)). While consideration of levels of evidence is important, the quality of evidence or studies is also important. Just because a study is an RCT, does not necessarily mean that it has been conducted and reported properly ([McLiesh et al., 2018](#)).

There are many different systematic review methodologies that address different types and levels of existing evidence. Systematic Reviews are sometimes referred to as ‘secondary research’ as they aim to take the results from primary research projects and combine/synthesise the results to identify the outcome from a particular practice, intervention or phenomenon over a broader range of settings or people ([Campbell ‘The Campbell Collaboration’](#)).

Systematic reviews can be conducted that focus on different types of research methods, information or data. These include:

- Quantitative evidence which is generated by traditional scientific methods that generate numerical data
- Qualitative evidence has its origins in research methods from the humanities and social sciences and seeks to analyse the complexity of human phenomena (aim to understand the complex nature of certain situations). It includes various research methodologies including ethnography, phenomenology, action research and grounded theory
- Economic data
- Text and opinion
- Scoping reviews
- Reviews of aetiology and risk
- Reviews of prevalence and incidence
- Umbrella reviews
- Diagnostic test accuracy reviews.

(Adapted from the Joanna Briggs Institute Reviewer's Manual, [Aromataris and Munn, 2017](#))

Sometimes primary research, such as RCTs, are conducted in one setting with a small sample size (number study participants or units of data) so by combining results from other RCTs conducted elsewhere (as long as the research considers the same interventions and outcomes measures), the statistical results can be combined to create evidence with greater breadth. When conducting a systematic review of RCTs, providing they have been designed the same way, a statistical method (often referred to as ‘meta-analysis’) can be employed to increase the sample size, thereby potentially improving the strength of the results. The results may then show that, statistically, the evidence is stronger one way or the other, or that there is no clear evidence either way regarding the effectiveness of an intervention ([Halcomb and Fernandez, 2015](#)). This allows the author/s of the systematic review to judge how likely (or not) the intervention/s might work in that situation based on statistical analysis.

The terms systematic review, or meta-analysis are used differently throughout the world and, while some authors may claim to conduct a

Table 1

Links to further information about systematic reviews and review methods

Organisation	Link
Joanna Briggs Institute Reviewer's Manual	https://reviewersmanual.joannabriggs.org/
University of York: Centre for Reviews and Dissemination	https://www.york.ac.uk/crd/
Cochrane Library	https://www.cochranelibrary.com/
EPPI- Centre	https://eppi.ioe.ac.uk/cms/

systematic review or a comprehensive review of the literature, identifying what has actually been done, and how can be challenging. There are several other types of literature reviews that are genuine, and which may be of high quality, but a systematic review is considered to have some core principles that separate it from other types of literature reviews. The lesson is to not always accept the claim of the author regarding the type of review, but instead look for the evidence or description of how the review was conducted and reported. This information can usually be found in the article's/report's description of the process in the methods section. This can then be compared and to the steps listed below to identify if it fits the criteria for a systematic review.

Systematic reviews differ from other forms of literature reviews in a few ways:

- They are usually conducted by more than one person, often a group and
- Focussed on a single question or phenomena
- The search is often much more rigorous and exact
- The search is clearly described and should be reproducible
- The search should aim to find every piece of available literature on that topic
- The protocol and final review are peer reviewed
- The papers (studies or research) that may potentially be included in the systematic review are put through a process of critical appraisal to ensure high quality evidence is used
- Data is extracted in a specific manner.

(Adapted from the QUT University website, Systematic Reviews)

While the method of conducting a review may vary, the following are steps that are essential in conducting a high-quality review. When assessing the quality of a published systematic review you can use the information below to assist in making that judgement (based on the Joanna Briggs Institute Reviewer's Manual):

Formulating a review question

This should be a planned and deliberate process that should not be rushed. A well-defined question provides an overall direction for the review and will ensure a better quality outcome.

Defining inclusion and exclusion criteria

This is essential as it focusses the review on the area of interest. A broad review is difficult to conduct, and a lack of appropriate criteria will make choosing articles for inclusion in the review very difficult.

Locating studies through searching

A suitably rigorous search is essential to the conduct of a systematic review. It must be well planned, based on the question and criteria and aim to identify all published evidence on that topic (it may also consider unpublished material). It should also be clearly described so that other could repeat (replicate) the review).

Box 1

Examples of systematic reviews relevant to orthopaedic nursing:

Compton, M. Mortenson, B. Sale, J. Crossman, A. Ashe, M. (2019) Men's perceptions of living with osteoporosis: A systematic review of qualitative studies. *International Journal of Orthopaedic and Trauma Nursing*, <https://doi.org/10.1016/j.ijotn.2018.11.007>.

Edwards, D; Carrier, J; Hopkinson, J (2016) Mealtime assistance for older adults in hospital settings and rehabilitation units from the perspective of patients, families and healthcare professionals: a mixed methods systematic review. *JBISRIR* 2016-003100. *Implementation Reports: 14(9) 261–357* <https://doi.org/10.11124/JBISRIR-2016-003100>.

McInnes, E. Jammali-Blasi, A. Bell-Syer, S. Dumville, J. Middleton, V. Cullum, N. (2015) Support surfaces for pressure ulcer prevention. *Cochrane Database of Systematic Reviews 9* John Wiley & Sons, Ltd <https://doi.org/10.1002/14651858.CD001735.pub5>.

McLiesh, P & Wiechula, R (2012) Identifying and reducing the incidence of post discharge Venous ThromboEmbolic (VTE) in orthopaedic patients: a systematic review, 10 (41), *JBISRIR* Library of Systematic Reviews, pp. 2658-2710.

Tune, B. (2012) Femoral and sciatic nerve blocks for total knee arthroplasty postoperative analgesia. A systematic review of current evidence. *International Journal of Orthopaedic and Trauma Nursing*, 16(2) 76–87 <https://doi.org/10.1016/j.ijotn.2011.11.003>.

Selecting studies for inclusion

Once the literature search is completed the resulting papers are considered for inclusion in the review. At this point, this is based solely on whether the papers match the inclusion criteria. This process must be clearly described.

Assessing the quality of studies

This is a core component of a systematic review and what often distinguishes it from other types of literature reviews. It ensures that only high-quality evidence or research is included in the findings of the review, although this may vary depending on what evidence exists on the topic of interest. If no high level evidence exists, then lower levels of evidence may be considered although these studies would still be subject to critical appraisal to assess their conduct and presentation. A newer review methodology can be used known as a 'scoping review' which does not conduct critical appraisal of the evidence. The purpose of a scoping review varies to a traditional review as the purpose is to examine the extent, range, and nature of research activity in a topic area to determine the value and potential scope and cost of undertaking a full systematic review, so assessment of quality is not required.

Extracting data

Data extraction is conducted by the reviewers and seeks to identify data (any type, qualitative, quantitative for example) identified by each primary research paper. The reviewer does not seek to make any judgements about the data at this stage and the conclusions of the primary research authors are not considered here yet.

Analysing and synthesising the relevant studies

This is the main body of the review. Once there is high quality evidence and data, the reviewer can then synthesise that data (there are specific methods for how this is managed for each type of data, such as economic, qualitative and quantitative).

Presenting and interpreting the results

The results should be interpreted and presented using a process to establish the credibility and certainty of the body of evidence through systems such as GRADE ('The JBI Approach: Grades of Recommendations'). There are comprehensive guidelines and requirements relating to this process. The analysis and synthesis of results are conducted in particular ways and often assigned levels of certainty based on the results of the review. This part of the process is essential in summarising the overall findings of the review and providing them to other researchers and readers to digest and use.

An essential step in the early development of a systematic review is

the development of a review protocol. A protocol pre-defines the objectives and methods of the systematic review which allows transparency of the process and, in turn, allows the reader to see how the findings and recommendations were arrived at. It must be completed prior to conducting the systematic review as well as be peer reviewed as it is important in restricting the presence of reporting bias (Aromataris and Munn, 2017).

The process for conducting a review varies depending on each institution but is well described by Halcomb and Fernandez (2015). If you are interested in the process, for more information use that paper or view any of the organisation websites in Table 1 below.

The organisations identified in Table 1 provide comprehensive detail about how to conduct and analyse a systematic review, especially regarding varying types of evidence. These organisations often produce evidence and practice summaries that allow clinicians to read a summary of a systematic review regarding a specific topic or area of practice which may be quicker and less complex than reading and understanding an entire systematic review.

Some examples of systematic reviews relevant to orthopaedic and trauma are listed in box 1.

Conclusion

Understanding the purpose of and the way a systemic review is conducted is essential if you are to identify high quality evidence that can be used to inform and direct practice. In essence, understanding the methodology of a systematic review requires an understanding of rigorous research practice in primary research. You can use the previous articles from this publication series to assist you in better understanding these various research methodologies.

Evidence from well-conducted and presented systematic reviews are valuable in guiding practice and policy and you are encouraged to access this level of evidence when considering your own practice.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://doi.org/10.1016/j.ijotn.2019.04.004>.

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