Joanna Briggs Institute
Comprehensive Systematic
Review - Training Programme

CSRTP **Study Guide**

Introduction to
Evidence-Based Healthcare

THE JOANNA BRIGGS INSTITUTE | THE UNIVERSITY of ADELAIDE

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Contents

Introduction

Welcome to the introductory module of the Joanna Briggs Institute Comprehensive Systematic Review Training Program. This Module overviews the Joanna Briggs Institute; the emergence of evidence based healthcare; developing a systematic review protocol; and the four initial steps involved in designing and conducting a systematic review - developing a question, identifying inclusion criteria, searching for the evidence and selecting papers for retrieval.

Aim and Objectives

The aim of this module is enable participants to develop a comprehensive understanding of the purposes and principles of evidence-based healthcare.

The objectives of this module are to prepare participants to:

- describe the origins and development of evidence-based healthcare,
- critique the role of evidence in contemporary healthcare practice,
- describe and discuss the systematic review process, and
- develop a systematic review protocol.

Content Outline

Session 1:	Introduction to the Joanna Briggs Institute
Session 2:	Introduction to Evidence-Based Health Care
Session 3:	Introduction to the Systematic Review of Evidence
Session 4:	Developing a review question and inclusion criteria
Session 5:	JBI Comprehensive review Management System (CReMS)
Session 6:	Developing a search strategy: A guide to evidence-based information retrieval
Session 7:	Searching for the evidence: A guide to the research resources
Session 8:	Selecting Studies
Session 9:	Protocol Development in CReMS

Recommended Textbooks:

Pearson A, Field J. and Jordan Z. (2007) 'Evidence-Based Clinical Practice in Nursing and Health Care.' Oxford, Blackwell Publishing.

Jordan Z, Donnelly P, Pittman E (2006) 'A short history of a BIG idea: The Joanna Briggs institute 1996-2006'. Ausmed Publications Pty Ltd. Melbourne.

Recommended Readings

Pearson A, Wiechula R, Court A and Lockwood C. (2005) The JBI model of evidence-based healthcare. Int J Evid Based Healthc 3:207-215.

Pearson A. (2004) Balancing the evidence: incorporating the synthesis of qualitative data into systematic reviews. JBI Reports 2:45-64.

Assessment

Multiple choice question assessment of 30 minutes.

Protocol developed in CReMS.

Power Point presentation of a draft, preliminary review protocol.

Program of Study

Time	Session	Group Work
09.00	Introductions and overview	
09.15	Session 1: Introduction to the Joanna Briggs Institute	
09.45	Session 2: Introduction to Evidence-Based Health Care	
10.15	Morning Tea	
10.45	Session 3: Introduction to the Systematic Review of Evidence	
11.15	Session 4: Developing a Review question and inclusion criteria	
12.00	Session 5: JBI Comprehensive Review Management System	Group Work 1: PICO question inclusion criteria development in CReMS: Reporting Back
12.20	Lunch	
13.20	Session 6: Developing a Search Strategy: A guide to evidence-based information retrieval	Group Work 2: Developing a concept map for your clinical question: Reporting Back
14.15	Session 7: Searching for the Evidence: A guide to the research resources	Group Work 3: Searching for the Evidence: Reporting Back
15.00	Session 8: Selecting studies	Group Work 4: Selecting Studies: Reporting Back
15.15	Afternoon Tea	
15.30	Session 9: Protocol Development in CReMS	Group Work 5: Protocol Development in CReMS: Reporting Back
16.30	Self Assessment and Summation	
17.00	Summation - End	

Session 1:
Introduction to the Joanna Briggs Institute

The Joanna Briggs Institute

The Joanna Briggs Institute (JBI) is a not-for-profit membership based organisation that develops and provides evidence-based information and expert systems to implement and evaluate these resources for health professionals and health services.

The Institute was established in 1996 as an initiative of the Royal Adelaide Hospital and the University of Adelaide to meet the need for a

> "well-developed, world-class research programs drawing on a clearly articulated position on the role and scope of nursing research and a diverse, creative, international community of nursing researchers…" (Jordan et al 2006:12)

The initial focus of the Institute was nursing and after 12 months of operation also included midwifery. The Institute had just 8 staff in Adelaide, 23 members and seven collaborating centres in Australia, New Zealand and Hong Kong (Jordan et al 2006:-17-19).

After some 15 years of operation the Institute now encompasses multidisciplinary health care and has some 25 staff, over 10,000 members around the world and collaborates with health scientists, professionals and researchers in over 60 Centres and groups. The number of Centres is continually expanding with collaborating entities currently located in Australia (13), Botswana, Brazil, Cameroon, Canada (2), England (2), Ethiopia, Ghana, Hong Kong, Kenya, Kingdom of Saudi Arabia, Korea, Malawi, Myanmar, New Zealand (2), Nigeria (2), People's Republic of China, Philippines, Romania, Rwanda, Scotland (2), Singapore (2), South Africa (2), Spain, Swaziland (2), Taiwan (2), Tanzania, Thailand (2), Uganda, USA (4), Wales and Zimbabwe.

The Institute now operates as a School within the Faculty of Health Sciences at the University of Adelaide.

The Institute visions *evidence-based practice as a central characteristic of all health services. Its mission is to be a leader in producing, disseminating and providing a framework for the use of the best available research evidence to inform clinical decision-making to improve health outcomes globally.*

This mission is operationalised by providing point-of-care access to:

- Develop methods to appraise and synthesise evidence, conducting systematic reviews and analyses of the research literature (evidence synthesis)
- Disseminate information globally in diverse formats to inform health systems, health professionals and consumers (evidence transfer)
- Facilitate the effective implementation of evidence and the evaluation of its impact on healthcare practice and health outcomes (evidence utilisation)

The Joanna Briggs Institute was named after Mrs Joanna Briggs, the first matron of Royal Adelaide Hospital. Joanna and her husband Henry Briggs emigrated from England to Australia 1836 with their children. Henry was appointed dispenser of the Adelaide Hospital in 1849 and Joanna worked alongside him as a nurse. Joanna was the first nurse at the Adelaide Hospital to be given the title 'Matron' in 1855.

The Institute is grounded in international collaboration and the forging of global partnerships. The Institute in Adelaide is also the home of:

- The Joanna Briggs Foundation Inc;
- The Cochrane Nursing Care Network;
- The National Evidence-Based Aged Care Unit (NEBACU) and
- The Wiley-Blackwell International Journal of Evidence-Based Healthcare

It also supports:

- The editorial office of the Wiley-Blackwell International Journal of Nursing Practice;
- The Co-Convener of the Cochrane Qualitative Research Methods Group;
- C.H.A.I.N (Contact, Help, Advice, Information Network) International;
- C.H.A.I.N. (Contact, Help, Advice, Information Network) Australia; and
- Guidelines International Network (G-I-N) as a founding member.

Members of the Institute have access to a variety of evidence-based information and resources to promote and support health care delivery based on the best available evidence.

Session 2:
Introduction to Evidence-Based Health Care (EBHC)

Evidence based health care "takes place when decisions that affect the care of patients are taken with due weight accorded to all valid, relevant information" (Hicks, 1997). Guyatt et al. (2008:783) define evidence as 'the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. Evidence-based clinical practice requires integration of individual clinical expertise and patient preferences with the best available external clinical evidence from systematic research and consideration of available resources'

Evidence-Based Practice (EBP)

Pearson et al (2005) state that evidence-based practice is clinical decision-making that considers the best available evidence; the context in which the care is delivered; client preference; and the professional judgment of the health professional (p 209) and Guyatt et al (2008) suggest that

> "EBP is clinical practice in which patient management decisions are consistent with the principles of evidence-based health care. This means that decisions will be, first of all, consistent with the best evidence about the benefits and downsides of the alternative management strategies. Second, decisions will be consistent with the values and preferences of the individual patient" (p783).

Evidence-Based Medicine (EBM)

Evidence based medicine is the extrapolation of EBP to medical practice and is described by Sackett et al (1996) as

> "…the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research. By individual clinical expertise we mean the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice."

Thus, Evidence-Based Medicine (EBM) can be considered as 'a subcategory of evidence-based health care, which also includes other branches of health care practice such as evidence-based nursing or evidence-based physiotherapy' (Guyatt et al., 2008:783).

Evidence-Based Policy Making

Policymaking is evidence based when practice policies (e.g. use of resources by clinicians), service policies (e.g. resource allocation, pattern of services), and governance policies (e.g. organisational and financial structures) are based on research evidence of benefit or cost-benefit (Guyatt et al., 2008:783).

The Nature of Evidence

The obvious source of evidence for health care is the results of well-designed research, but such results are by no means the only data used in everyday practice. Pearson et al (2007:33) suggest that

> "…the patient and her or his relevant others, the practitioner's own experiences, and the nature and norms of the setting and culture within which healthcare is being delivered are all rich sources of evidence upon which to draw in making clinical decisions."

Steps in EBM/EBP/EBHC

The essential steps in evidence-based medicine are described by Sackett & Haynes (1995) as:

- To convert information needs into answerable questions (to formulate the problem);
- To track down the best evidence with which to answer these questions;
- To appraise the evidence critically to assess its validity (closeness to the truth) and usefulness (clinical applicability);
- To implement the results in practice;
- To evaluate performance.

The JBI Model of Evidence-Based Healthcare

The JBI model (Figure 1) was developed by Pearson et al in 2005 to visually portray the methodological thinking and framework of activity that the Institute and its international collaboration had been within that had been emerging and developing over the previous nine years.

The model depicts the process that the Institute works through to provide the best available evidence and utilization resources to health professionals to improve global health.

Evidence-Based Practice

Central to the JBI understanding of Evidence Based Practice (depicted by the core of the model) is that health professionals will use research evidence together with their context, client preference and their own clinical judgment. Using all of this information health professionals are in a position to make evidence informed decisions.

Similarly, the 'pebble of knowledge' that appears on the back of every JBI Best Practice Information Sheet, underlies that the Institute provides evidence to inform practice, rather than a formula driven approach to practice.

Figure 1: Conceptual model of evidence-based healthcare

(Pearson et al 2005, p 209)

Global Health

The model demonstrates the belief of the Institute that global health issues are both the driver and reason for evidence-based practice. It is appropriate that research be conducted to address concerns identified by health carers and/or consumers and to generate evidence that will effectively and appropriately meet these identified needs (Pearson et al 2005:209).

Healthcare Evidence Generation

The Institute considers that evidence may be indicated by experience, expertise, inference, deduction or the results of rigorous inquiry. It does recognize that "the results of well-designed research studies grounded in any methodological position are seen to be more credible as evidence than anecdotes or personal opinion" (Pearson et al 2005:211). However, when no research evidence of this level exists other evidence may represent the 'best available evidence' for a specific question. This position is taken to provide the most meaningful and useful information to inform healthcare delivery.

The JBI model also recognizes that health professionals consider evidence broader than evidence of effectiveness to inform their everyday practice (Pearson 2004:46). The Institute recognize this information as evidence of feasibility, appropriateness, meaningfulness and/or effectiveness (FAME). These are defined below:

Evidence of feasibility – "the extent to which an activity is practical and practicable. Clinical feasibility is about whether or not an activity or intervention is physically, culturally or financially practical or possible within a given context".

Evidence of appropriateness – "the extent to which an intervention or activity fits with or is apt in a situation. Clinical appropriateness is about how an activity or intervention relates to the context in which care is given."

Evidence of meaningfulness – "the extent to which an intervention or activity is positively experienced by the patent. Meaningfulness relates to the personal experience, opinions, values, thoughts, beliefs and interpretations of patients or clients."

Evidence of effectiveness – "is the extent to which an intervention, when used appropriately, achieves the intended effect. Clinical effectiveness is about the relationship between an intervention and clinical or health outcomes." (Pearson et al 2005:210)

To date the generation of primary research has not been a major work program of the Institute.

Evidence Synthesis

The area of synthesis forms the major work program and activity of the Joanna Briggs Institute.

Evidence synthesis is the evaluation or analysis of research evidence and opinion on a specific topic to aid in decision-making in healthcare. There are three elements in the JBI model: theory, methodology and the systematic review of evidence.

Theory – Although the science of evidence synthesis is most advanced in relation to the meta-analysis of numerical data, which is linked to theories of cause and effect, the further development of theoretical understandings of the role and nature of evidence as it impacts on healthcare delivery and ultimately improves global health continues to be explored and developed.

Methods - The theoretical work on methods of synthesizing evidence from diverse forms of evidence (FAME) is depicted as an element of evidence synthesis. The Institute continues to develop methods, particularly in the area of qualitative and textual data.

Systematic reviews – This third element of evidence synthesis is the operationalization of methods of synthesis through the systematic review process. This element in the model is grounded in the Institute's position that evidence of feasibility, appropriateness, meaningfulness, and effectiveness may be legitimately included in a systematic review. That evidence derived from experience, opinion, and research that involves numerical and/or textual data may be appraised, extracted and synthesized (Pearson 2005, p. 211).

The systematic review of the literature on a particular condition, intervention or issue is seen as core to defining reliable evidence for practice. A systematic review is essentially an analysis of all of the available literature (evidence) and a judgment of the effectiveness or otherwise of a practice, involving the following steps:

- The development of a rigorous proposal or protocol. The review protocol provides a predetermined plan to ensure rigor and minimize potential bias. It also allows for periodic updating of the review if necessary. All of the stages of the review (as listed below) are described fully in the protocol, and it is usually subjected to peer review before the review commences.
- Stating the questions or hypotheses that will be pursued in the review.
- Identifying the criteria that will be used to select the literature.
- Detailing a strategy that will be used to identify all relevant literature within an agreed time frame.
- Establishing how the quality of each study/paper will be assessed or critically appraised and any exclusion criteria based on quality considerations.
- Detailing how data will be extracted from the primary research or text.
- Setting out a plan of how the data extracted will be synthesized. (Pearson 2005: 211)

Traditionally the classical randomized controlled trial is seen as the highest form of evidence. The JBI model of evidence-based healthcare adopts a pluralistic approach to what constitutes evidence, where the

> "findings of qualitative research studies are regarded as rigorously generated evidence and other text derived from opinion, experience and expertise is acknowledged as forms of evidence" (Pearson 2005: 211)

where 'higher forms' of evidence are unavailable or the question of interest is not one simply of effectiveness.

Systematic reviews are considered hierarchically as the highest form of evidence as they systematically search, identify, and summarize the available evidence that answers a focused clinical question with particular attention to the methodological quality of studies (all papers are critically appraised) or the credibility of opinion and text.

The synthesis of the results of quantitative research

Statistical analysis (meta analysis) may or may not be used in synthesizing numerical data and this depends on the nature and quality of studies included in the review. Meta-analyses of numerical findings provide precise estimates of an association or a treatment effect in reviews of effectiveness through the statistical synthesis of multiple studies. Key outcomes of the meta-analysis are the measure of effect, the confidence interval and the degree of heterogeneity of the studies synthesized.

The synthesis of the results of qualitative research

The term "meta-synthesis" refers to a "higher form of synthesis". Meta synthesis is a process of combining the findings of individual qualitative studies (that is, cases) to create summary statements that authentically describe the meaning of these themes.

The synthesis of evidence arising out of expert opinion and text

Although the proponents of evidence-based healthcare would argue that the results of high quality research are the only source of evidence for practice this has drawn considerable criticism from clinicians. Clinicians argue that the nature of everyday practice demands an eclectic, pragmatic approach to conceptualizing evidence. The "consumers" of systematic reviews – those who practice within the health system - regard the opinion of experts and the views of experienced clinicians and their professional bodies as valid forms of evidence for practice, especially when some intervention or activity is required in practice, even if no evidence from research exists. The process seeks to locate the major conclusions in text that represent credible opinion.

The synthesis of evidence arising out of economic analyses

The synthesis of economic analyses or evaluations is a developing science. There is an obvious need for methods of synthesizing economic information, however there is currently a lack of standardization in the systematic review of this kind of data. There are few high quality studies and no established methods for meta-analysis of economic findings, however summaries of this information from high quality studies are useful to inform practice. Healthcare decision-makers are increasingly seeking economic information to inform their practice and researchers in the field of evidence-based practice are increasingly interested in extracting this data with recognition of the difficulties surrounding its synthesis.

Evidence Transfer

This component of the model relates to the act of transferring evidence (knowledge) to individual health professionals, health facilities and health systems globally by means of journals, other publications, electronic media, education and training and decision support systems. Evidence transfer is seen to involve more than disseminating or distributing information and to include careful development of strategies that identify target audiences – such as clinicians, managers, policymakers and consumers – and designing methods to package and transfer information that is understood and used in decision making. Fundamental to this process is:

- Developing understandable and actionable messages;
- Accommodating the context of a target audience's information needs; and
- Delivering messages in cost-effective ways (including information technology, print material, meetings, workshops and training programs)

Evidence transfer may relate to the format and delivery of information as well as issues surrounding acceptance of evidence to inform healthcare delivery.

The model therefore depicts three major elements of evidence/knowledge transfer – education and training, information delivery and the transfer of evidence though organizational and team systems. (Pearson et al 2005:213).

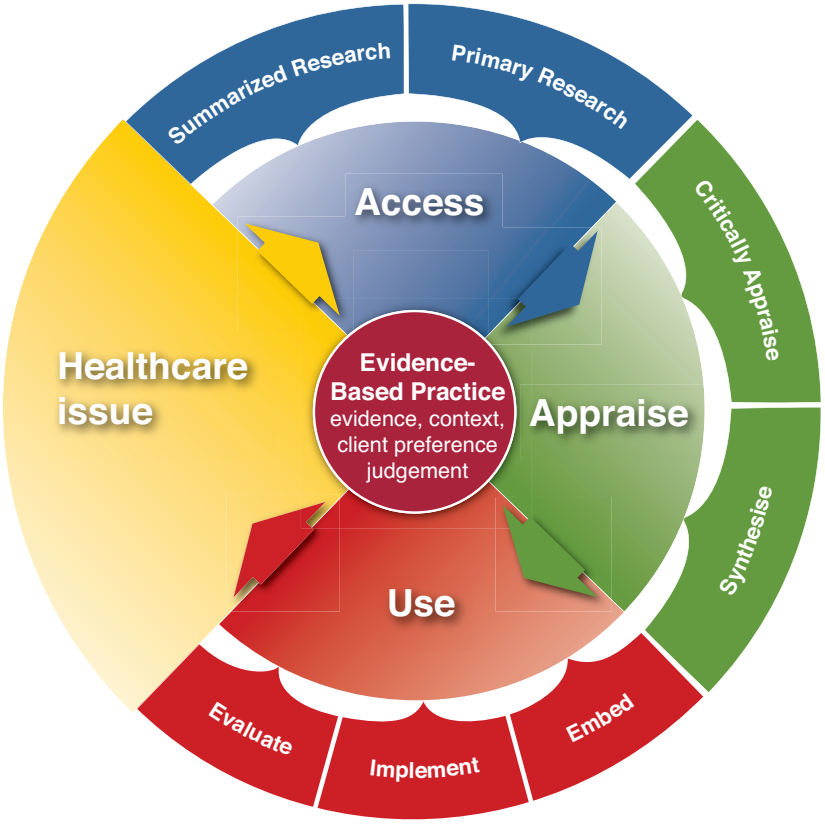
Evidence Utilization

This component of the model relates the implementation of evidence in practice, as is evidenced by practice and/or system change. It identifies three elements: evaluating the impact of the utilization of evidence on the health system/ the process of care and health outcomes; practice change and embedding evidence through system/organizational change. (Pearson et al 2005: 213)

It is now well recognized that multiple interventions may be more effective than single interventions in evidence utilization programs, and that implementation is complex (Grimshaw et al, 2001; NHS Centre for Reviews and Dissemination (CRD), 1999). CRD state that evidence indicates a need for the following steps to be pursued in programs designed to utilize evidence:

- "A 'diagnostic analysis' to identify factors likely to influence the proposed change. Choice of dissemination and implementation interventions should be guided by the 'diagnostic analysis" and informed by knowledge of relevant research".
- "Multi-faceted interventions targeting different barriers to change are more likely to be effective than single interventions".
- "Any systematic approach to changing professional practice should include plans to monitor and evaluate, and to maintain and reinforce any change". NHS CRD, 1999:1 and 7

Figure 2: Model of user engagement of evidence-based information to inform clinical decision making



The above model was developed by the Institute's communications team in 2008 in a communication strategy to demonstrate how users approach JBI COnNECT+ with a health care issues or clinical question.

The starting point is to **access** information – initially searching for summarized evidence.

JBI provides access to a comprehensive range of high quality evidence reviews and evidence based information (as detailed in the section *'JBI Tools and Resources for Evidence-Based Healthcare'* following).

If there is no summarized evidence available on the topic of interest, users then seek to search for primary research in the wide range of databases and journals accessible through JBI COnNECT+. Once primary papers are identified, considering research methodologies appropriate for the information sought, the recommendation is that this information be **appraised** prior to being relied upon as a source of evidence. JBI RAPid provides the user with a simple framework for critically appraising any paper that is found. If multiple papers are located and further synthesis is required – or the user is a researcher wishing to undertake a systematic review – the synthesis step arises at this point. This order of approaching JBI information is also appropriate for those conducting a systematic review, as prior to undertaking a review, the author will search for existing systematic reviews to ascertain the need for evidence synthesis in the chosen area.

In today's health service environment it is important to develop skills in assessing the quality of information used to inform decisions (includes SUMARI, RAPid, International Evidence Synthesis Network, International Evidence Appraisal Network).

Following the identification of the best available evidence the user then proceeds to use the information – to inform a single clinical decision, to embed the information within an existing system, to conduct a clinical audit, and/or to evaluate the impact on client outcomes by using the information.

The Institute provides resources and frameworks designed to enable health professionals to develop organizational policy and practice manuals based on the best available evidence and evaluate the effectiveness of those systems (includes clinical manual builder, consumer pamphlet builder, PACES, POOL/COOL) (JBI, 2008a).

JBI Tools and Resources for Evidence-Based Healthcare

The Joanna Briggs Institute have developed and created links to a large number of evidence-based information and resources. Some of these are free access on the Institute website (www.joannabriggs.org) and others are available only to members of the Institute.

Free access information including background information about the Institute, its methods and approaches are available on the www.joannabriggs.org site. Content available to subscribers only is available via the OvidSP platform exclusively.

Accessing Evidence

This provides access to summarized evidence - a comprehensive database of evidence reviews and best practice guidelines. Members and subscribers to JBI content via OvidSP have online access to a wide range of databases in one central location that may be searched for evidence to support healthcare practice. Summarized research may be accessed in a format that is easy to locate, understand and distribute to healthcare staff.

Health professionals will find Best Practice Information Sheets, Evidence Summaries and Recommended Practices a useful addition to their practice. They can be utilized in the practice setting (e.g. in treatment rooms in clinics, nurses' stations and doctors' offices in hospital wards, nurses' stations in residential care facilities or in the care of community/school health staff) as a quick reference guide to a wide range of interventions.

Search

JBI Database of Evidence Summaries

This database consists of evidence summaries (or literature reviews) that summarize existing international literature on common health care interventions and activities. Evidence summaries are available for a variety of professions and are based on a structured search of the literature and selected evidence-based health care databases.

JBI Evidence Summaries are available to subscribers only.

JBI Database of Evidence-based Recommended Practices

This database consists of procedures that describe and/or recommend practice on selected clinical topics. They are based on the best available evidence and each bundle consists of an equipment list, recommended practice, occupational health and safety provisions in the form of easily identified icons and an adjoining evidence summary.

JBI Recommended Practices are available to subscribers only.

Best Practice: evidence based information sheets for health professionals

This series of information sheets are produced specifically for practicing clinicians and are based on the best available research evidence as reported in systematic reviews. They are available both electronically via the JBI website and exclusively in a hard copy annual volume to members who receive hard copy. Dissemination of the series is also supported by a number of health publications throughout the world.

JBI Database of Consumer Information Summaries

This database consists of standardized summaries on a wide range of health care interventions and activities targeted at consumers of health care (i.e. resident/client, relatives and carers).

Consumers of health care are often faced with making difficult decisions about their treatment. Consumer information developed by JBI ensures that consumers are provided with the same information as health professionals to assist in more informed, evidence-based decision-making. They also provide a useful addition to patient education strategies in the clinical setting.

The JBI consumer program is a developing resource and is freely available to all users of the Institute website. http://joannabriggs.edu.au/AccessEvidence/ConsumerInformation

JBI Library of Systematic Reviews

The JBI Library of Systematic Reviews contains reviews produced by the Joanna Briggs Institute and its Collaborating entities in the area of evidence-based practice. These are comprehensive reviews of the international research literature completed by trained JBI reviewers and are available to members only at: http://connect.jbiconnectplus.org/JBIReviewsLibrary.aspx

Education and training

The Joanna Briggs Institute offers two core programs for clinicians, managers, educators, academics and students from the fields of medicine, nursing, and allied health. Institute programs are practical and international in scope and reflect the expertise of a leading international research and development institute in the fields of evidence synthesis, transfer and utilization. JBI members are eligible for a 20% discount on all JBI training programs. Further information and a detailed annual prospectus may be found at: http://joannabriggs.edu.au/AccessEvidence/EducationandLearning

Programs include:

- Comprehensive Systematic Review Training Program
- Comprehensive Systematic Review 'Train the Trainer'
- Evidence Based Clinical Fellowship (culminating with an opportunity to join the JBI Fellowship Alumni)
- Evidence Based Clinical Fellowship 'Train the Trainer'

The Joanna Briggs Colloquium

The Joanna Briggs Institute has held a colloquium every second year since its establishment. Colloquia are organized jointly by Collaborating Centers and the Institute, and are conducted within the geographical area of the host Collaborating Centre. The Colloquium provides opportunities to share experiences and knowledge of evidence-based practice. JBI Colloquia have been hosted by JBI Centers in Australia, Spain, South Africa, New Zealand, America and Thailand.

The JBI International Convention

The JBI International Convention is a biennial event held in Adelaide, South Australia, on alternate years to the Colloquium. It is for health professionals, health service managers, policy makers, educators, researchers and consumers of health care to engage in debate and discussion on improving health care and health systems through the synthesis, transfer and utilization of evidence and has traditionally been a truly international event.

Appraising Evidence

Appraise

JBI has developed resources deigned specifically to help assess the quality of research evidence. It is important for all users of research evidence to be confident of the quality and reliability of the information they are viewing.

Appraise individual research papers

The JBI RAPid Assessment Protocol internet database (JBI RAPid) is an online training resource that provides a framework for critical appraisal of research using established data collection tools and offers the possibility of publishing this appraisal in the form of a refereed report in the RAP library. RAPid has been designed to assist individual practitioners or students to acquire the skills of posing relevant questions about the feasibility, appropriateness, meaningfulness and effectiveness of an intervention or professional activity and to pursue this question through applying a series of basic steps in the critical appraisal process.

Health professionals, education providers and students will find the skills and knowledge development achievable through the use of RAPid of particular relevance. RAPid facilitates centralized activity with a core focus on critical appraisal skills, which are now considered fundamental to professional practice in health care.

Health professionals interested in appraising a single research paper or multiple research papers on a similar topic will benefit from using these resources.

The JBI International Appraisal Network

The JBI initiated the Evidence Appraisal Network to compliment RAPid and bring together individuals who act as reviewers for the RAP library and evaluate and develop critical appraisal methods used by the Institute.

Those who complete the free, online RAPid Critical Appraiser Program (RAPcap) may become members of this network. This provides access to software to assist with critical appraisal processes and also a network of other like-minded individuals and groups.

Synthesise

A well conducted systematic review provides reliable, current information that health professionals and consumers can use to make decisions about care. Members and subscribers of JBI have access to resources and networks that support this process.

Conduct systematic reviews

Systematic reviews are an important part of the evidence-based process as they review all of the current literature on a specific topic in a comprehensive and methodical way. The JBI System for the Unified Management of the Assessment and Review of Information (JBI SUMARI) is a comprehensive software suite that has been developed by the Institute to assist individuals to develop, conduct and report systematic reviews of evidence.

The SUMARI suite will be of particular interest to those interested in conducting systematic reviews, particularly reviews that consider evidence other than effectiveness.

The JBI International Evidence Synthesis Network

Evidence synthesis is a challenging component of the evidence-based practice process. Traditionally it has been left to experienced centers, however, increasingly small groups are becoming interested in undertaking work of this nature that addresses their specific information requirements. The Evidence Synthesis Network was developed in an effort to enable small groups to contribute to the body of evidence-based knowledge. This unique opportunity provides groups (known as Evidence Synthesis Groups) to be officially and publicly recognized as a member of the JBI Evidence Synthesis Network; to have access to the Joanna Briggs Institute resources and education and training programs; and to have the opportunity to have their work formally reviewed and published.

Using Evidence

Most health professionals are familiar with the need to conduct regular audit, feedback and improvement cycles to improve the quality of care provided. Similarly, evaluating the effectiveness of any best practice program is an important part of continuous quality improvement. JBI recognizes the importance of creating systems that enable the development of organizational policy and practice manuals based on the best available evidence and programs to evaluate the effectiveness of those systems.

Members and subscribers of JBI may access a range of resources to assist with disseminating, embedding, using and evaluating evidence-based practice in the clinical setting.

Embed

Build an evidence-based manual

The JBI Evidence-based Manual Builder (previously the Clinical Information Service) is now available via OvidSP and incorporates the JBI Database of Evidence Summaries and the JBI Database of Recommended Practices. This facility provides the ability to download a standard JBI evidence-based manual (current manuals available for download include acute care, aged care, midwifery and rural). Alternatively a manual may be developed and tailored to meet the specific needs of a specific organization. Using the Manual Builder, information may be selected for inclusion with free text specific to a facility as well as an individual organizational logo.

Health professionals, particularly those involved in quality improvement, safety and quality and clinical practice improvement, are generally familiar with the need to base practice on the best available evidence and all organizations have strategies and processes that focus on implementing evidence-based practice.

The JBI Evidence Based Manual Builder and Consumer Pamphlet Builder are a great way to ensure that staff have access to information that is based on the best available evidence.

Evidence-based consumer pamphlets

The JBI Evidence-based Consumer Pamphlet Builder is available via OvidSP. This facility allows users to download a standard JBI Consumer Pamphlet or pamphlet tailored to meet the specific needs of an organization. Using the Pamphlet Builder, the layout of the pamphlet may be selected (A4, A5 or DL), a selection made from range of photos, free text specific to a facility incorporated and individual organizational logo included. The information contained in each pamphlet is based on the best available research evidence.

Utilise

Audit and change practice

The JBI Practical Application of Clinical Evidence System (JBI PACES) is designed to meet the needs of individual health services, health units/wards and health professionals. The system consists of an online database for the collection of data on clinical activities, based on the clinical audit process; an online generic work plan (the Getting Research Into Practice [GRIP] module) related to problem identification, action planning and action taking; an online facility to compare results with industry averages. There is also opportunity to join a clinical Evidence Utilization Group.

JBI PACES, JBI POOL and JBI COOL provide an opportunity to utilize a standardized system that will assist in measuring compliance of a specific clinical topic with what is considered ‘best practice’, to implement change where required and to re-assess compliance following that change.

Evaluate

Collect prevalence data

JBI Patient/Client Outcomes Online (JBI POOL/COOL) are online prevalence databases that can be used as stand-alone databases, or in conjunction with JBI PACES. These databases have been designed for clinicians and health/aged care organizations as an easy to use tool in the collection and storage of prevalence data. Data can be collected at a patient/client care level and can then be examined at higher levels for trends in specific outcomes via automatically generated graphs for specific areas, a whole of facility approach, or across multiple facilities.

JBI International Evidence Utilization Network

Evidence utilization is an identified need for most organizations and a process that is often deemed to be difficult. Strategies to promote evidence utilization and practice change pose significant challenges for health professionals in the practical setting. JBI invites those professionals utilizing evidence in their practice to form an Evidence Utilization Group (EUG) and become part of the JBI Evidence Utilization Network. The network has been developed to provide its members with an opportunity to undertake evidence utilization projects, following a comprehensive program of training, and to share their utilization triumphs and challenges in the form of a published report.

An application form is available at: http://joannabriggs.edu.au/About%20Us/Joanna%20Briggs%20Collaboration

JBI Membership

Membership of JBI provides is separate to content subscriptions via Ovid. Membership is free and entitles individuals and organizations to access a range of additional benefits, including JBI Endorsement, a membership newsletter, discounts on events and education and more!

Evidence-based Endorsed Organisation

The Joanna Briggs Institute also provides an endorsement program that promotes high standards of evidence-based practice and policy. JBI recognizes that the key to clinical practice improvement is the development of infrastructures and processes that promote, facilitate and measure engagement in an evidence-based approach to care and evaluate its impact on performance and patient/resident/client outcomes.

Organizations with JBI endorsement are able to demonstrate that their achievements in evidence-based health care have been recognized by a body independent of their accrediting body as well as clients, families and prospective employees.

More information about becoming a JBI Evidence-based Endorsed organization is available at: http://joannabriggs.edu.au/Access%20Evidence/Education%20and%20Learning/Endorsement

JBI COnNECT+

JBI COnNECT+ is a unique web based available exclusively via OvidSP facility that provides online resources and tools to assist patients, their families, health professionals, health care providers and others involved in care in clinical decision making processes. JBI COnNECT+ allows point-of-care access to evidence and tools to appraise evidence, implement evidence, and evaluate the impact of the evidence on patient outcomes. These capabilities are reflected in the five discrete and essential steps, which provide the foundation for the JBI COnNECT+ Model. These five steps are:

1. Searching for the Evidence,
2. Appraising the Evidence,
3. Embedding the Evidence in Practice and in Systems,
4. Utilising the Evidence, and
5. Evaluating the Impact of the Evidence.

JBI COnNECT+ provides access to the following JBI resources:

Search

- The JBI Database of Systematic Reviews
- The JBI Database of Evidence Summaries
- The JBI Database of Evidence-Based Recommended Practices
- The JBI Database of Best Practice Information Sheets
- The JBI Online Journal Collection

Appraise

- JBI Rapid Assessment Protocol internet database (RAPid)

Embed

- JBI Evidence-Based Manual Builder
- JBI Evidence-Based Consumer Pamphlet Builder

Utilise

- JBI Practical Application of Clinical Evidence System (PACES)

Evaluate

- JBI Patient Outcomes On Line (POOL)
- JBI Client Outcomes On Line (COOL)

The web-based facility consists of a range of specialist sections (called “nodes”) developed and maintained by the Joanna Briggs Institute. It provides online resources and tools to assist health professionals and others involved in health care to utilise evidence-based information in their daily practice.

Existing nodes in JBI COnNECT+ include:

- Aged Care
- Cancer Care
- Rehabilitation
- Midwifery Care
- Diagnostic Imaging
- Emergency and Trauma
- Health management and Assessment
- Infection Control
- Burns Care
- Mental Health
- Wound Healing and Management
- Surgical Services
- General Medicine

For more information, or to get COnNECTed, contact an Ovid sales team member.

Session 3:
Introduction to the Systematic Review of Evidence

Systematic reviews aim to provide comprehensive and unbiased summaries of the evidence on a single topic bringing together multiple individual studies in a single document. As part of the systematic review process, individual research studies are subjected to critical appraisal. Even when research evidence is limited or non-existent, systematic reviews summarize the best available evidence on a specific topic providing the best evidence for clinical decision-making as well as identifying future research needs. (JBI, 2001:1)

The risk of human error during the review process is minimized by having two or more people undertake critical appraisal and data extraction. However, as a result of these processes, systematic reviews are both time-consuming and expensive. (JBI, 2000:5)

The process of conducting a systematic review is a scientific exercise, and as the results will influence health care decisions, it is required to have the same rigor expected of all research. The quality of a review, and its recommendations, depends on the extent to which scientific review methods are followed to minimize the risk of error and bias. The explicit and rigorous methods of the process distinguish systematic reviews from traditional reviews of the literature. (JBI, 2001:1)

The systematic review process

The **key characteristics of a systematic review** are (Green et al., 2008:6):

- 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, for example through the assessment of risk of bias; and
- a systematic presentation, and synthesis, of the characteristics and findings of the included studies;

Steps in conducting a systematic review (Egger & Davey Smith, 2001:25; Glasziou et al., 2004:2):

- Formulate review question;
- Define inclusion and exclusion criteria;
- Locate studies;
- Select studies;
- Assess study quality;
- Extract data;
- Analyze/summary and synthesis of relevant studies;
- Present results;
- Interpret results/ determining the applicability of results.

There are **two major advantages of systematic reviews** (Glasziou et al., 2004:1):

- by combining data they improve the ability to study the consistency of results;
- similar effects across a wide variety of settings and designs provide evidence of robustness and transferability of the results.

Session 4:
Developing a Review Question

Once a topic has been identified, a specific, answerable question is developed. The level of detail in the question should be adequate to inform the development of review criteria that address the specific components of the review question. Additionally, the clearer and more specific a title is, the more readily users of electronic databases (for example MEDLINE, EMBASE, and CINAHL) will be able to make decisions about the review's applicability to their information needs. The question should receive a similar level of attention to that of primary research, and be focused on issues of relevance to clinical practice (Counsell, p 67 in Mulrow and Cook, 1998). Counsell goes on to suggest that failure to develop a robust question will increase the probability of a poor, unfocused review, and indicates that while many questions arise that deserve consideration, some attention needs to be given to how these are identified and prioritized.

When planning to conduct a review, consider issues associated with high cost, high frequency, poor outcomes, or whether there is widespread variation in practice that cannot be explained by current evidence. These can be unpacked further in terms of level of severity, socio-economic impact, acuity as measured by morbidity or mortality, time, or prevalence. Counsell advocates that considering the ability to change practice also be included in the decision making process for question development, although this is an applied construct rather than one related to rigor or validity of question design. It is the question design that has the most significant impact on the conduct of a systematic review as the subsequent inclusion criteria are drawn from the question and provide the operational framework for the review.

The core elements of a good question include:

Population or participants

Intervention, interest or exposure

Control or comparator

Outcomes to be measured

There is a range of mnemonics available to guide the structuring of review questions, the most common for quantitative reviews being PICO. The PICO mnemonic begins with identification of the Population, the Intervention being investigated and its Comparator and ends with a specific Outcome of interest to the review. Use of mnemonics can assist in clarifying the structure of review titles and questions. In JBI, and in Cochrane, there is a preference for the PICO mnemonic to be used to guide question development. It can also be used to guide concept mapping for the search strategy and tailored to the specify type of evidence being focused upon. In qualitative reviews the mnemonic PICo is used – for Population, Phenomena of Interest and the Context.

Depending on the type of question being asked, the level of detail on the nature or characteristics of the question may vary. As an example, in reviews of RCTs or quasi RCTs, the intent is to establish whether there is a statistically significant relationship between an intervention and an outcome, for a given population. However, equal weighting is not required for each aspect of the question – if the population is detailed, and the intervention less specific, this suggests defining the population to identify specific groups or sub groups is significant in terms of the scope of the review but the review will focus on groups of interventions rather than a single intervention. This shifting of balance between the PICO elements can lead to a more open review, or if the elements are tightly defined, a short, concise review that is easier to conduct, but may lack sufficient studies that are suitable for meta analysis due to highly prescriptive inclusion criteria.

Experimental questions

In a review investigating the effectiveness of a health care intervention, questions are stated broadly as review 'Objectives', and operationalized in detail through the inclusion criteria. A well-designed objective informs study identification, inclusion, data extraction and data synthesis. As well as focusing review conduct, the objective is used by readers in their initial assessments of whether the review is likely to be directly relevant to their information needs. Cochrane reviews of effects will preferably specify the intervention, the population and outcome of interest.

Give consideration to how broad the review will be in terms of the type/s of intervention, the characteristics of the population and the outcome/s of interest at the point of question development; then add this detail when completing the inclusion criteria.

> Active versus expectant management for women in the third stage of labour; Cecily M Begley, Declan Devane, Deirdre J Murphy, Gillian ML Gyte, Susan J McDonald, William McGuire; Year: 2008

In this example, the intervention is broadly described, the population is also generalized rather than specified and the timing of the intervention is the most specific element of the question. One could ask whether the woman being nuli- or multi- parous might be a significant factor in the outcome, or in potential meta analysis, or whether the review was only going to include expectant management in uncomplicated labour, or all types of labour. However these types of details could also be covered in the inclusion criteria.

> Addition of inhaled long-acting beta2-agonists to inhaled steroids as first line therapy for persistent asthma in steroid-naive adults; Muireann Ni Chroinin, Ilana IG Greenstone, Francine Ducharme; Year: 2004.

This example shows high description of the intervention, and the population, but not the outcome. The authors may have decided to include all outcomes, or further specified the outcome in the inclusion criteria. Both examples are good examples of a review objective, but the second example could be applied to a wider range of outcomes due to the openness of that criteria; while the first review objective could include a range of interventions and types of women during 3rd stage labour.

Non-experimental questions

Whilst the PICO framework has an obvious link to the structure of experimental studies, not all non-experimental designs are suited to description of intervention and comparator. The causal link between intervention and outcome is also less certain in non-experimental studies, however, the benefits of a clear structure are no less for both the reviewers, and readership. In JBI MAStARI, the question is described as an objective where the impact of an intervention on an outcome is stated as the primary objective.

One or more specific sub objectives expand upon the primary objective, and in JBI MAStARI, users are required to define the intervention, outcome and population of interest based on the focus defined during the setting of primary and secondary objectives. Although the framework for non-experimental studies does not require a comparator to be stated, it can be added to the question wizard built in to CReMS if of benefit to the particular topic being developed.

Keeping the PICO open by not specifying a control is likely to increase the number of papers available, this needs to be considered by the reviewers, as does the likelihood that papers that report data on single groups only can not be pooled or combined statistically. The question in non-experimental review may therefore either contain a comparator or not.

> The Impact of Hospital Visiting Hour Policies on Pediatric and Adult Patients and their Visitors. 2009, L Smith; J Medves; M.B. Harrison; J Tranmer; B Waytuck. JBI Library of Systematic Reviews, JBR000146. 7(2) 38-79.

As the above citation demonstrates, the PICO for non-experimental studies can be more open, and a comparator is not required. The protocol though must explain in detail how the PICO elements used will be actioned through the review.

Qualitative and textual objectives

The PICO framework is applied to question development in a slightly different way. The participants are still defined, there is though a phenomena of Interest rather than an intervention. The difference between an intervention and a phenomena of interest is in where the focus lies. Experimental and non-experimental reviews focus on an intervention, and seek to isolate that intervention from the activities and influence of study participants. With qualitative reviews, it is the engagement between the participant and the intervention that is of interest. While the intervention may be described, the full question will focus on the perspective, experience or sense of being the individual experiences as part of a phenomena.

> A systematic review of the experiences of caregivers in providing home-based care to persons with HIV/AIDS in Africa. 2009, P McInerney; P Brysiewicz. JBI Library of Systematic Reviews JBR000086, 7(4) 130-153.

As the above example illustrates, the focus is on the experience rather than the intervention. Thus the experience (in this case it is about experience) is the phenomena of interest. If the review is examining meaning, essence, being or lived experience this should be stated. A specific phenomenon of interest should also be included.

Including the context in the title assists readers to situate the review when searching for evidence related to their particular information needs. The PICo mnemonic can provide potential readers with a significant amount of information about the focus, scope and applicability of a review to their needs.

Economic questions

The Centre for Reviews and Dissemination at the University of York run the NHS Economic Evaluation Database, and have developed methods related to economic modeling and decision analysis that link economic data with clinical trial data. The CRD suggest that economic reviews may consider aspects of cost-effectiveness of different intervention, outcomes, populations and settings. They may also investigate factors such as economic impact of treatment adherence or other types of cost measurements applied to health services. The scope of questions on economics may be broader than those used for reviews of experimental studies in order to capture the range of costs and outcomes or consequences related to an intervention. The CRD also recommend the use of PICO to guide question development.

Not stating a comparator suggests the review will be more inclusive of a range of interventions as comparator or control, hence larger numbers of studies are likely to be available for consideration.

> Herman W H, Shahinfar S, Carides G W, Dasbach E J, Gerth W C, Alexander C M, Cook J R, Keane W F, Brenner B M. Losartan reduces the costs associated with diabetic end-stage renal disease: the RENAAL study economic evaluation. Diabetes Care 2003; 26(3): 683-687

An economic question using PICO can either express costs in a broad, exploratory sense, and include time as a specific measure as in this second example, or be broader and not specific detailed approaches to costing, or time as per the third example.

Relationship among the degree of control of arterial hypertension, co morbidity and costs in individuals over age 30 during 2006.

MR angiography versus intra-arterial digital subtraction angiography of the lower extremities: activity-based cost analysis.

These examples are not the only structure for reviews of economic evidence, but they usefully illustrate that variation in PICO detail can lead to more open or focused questions. Reviews of economic effectiveness may also incorporate a review of clinical effectiveness. Both elements can readily be incorporated in the title, for example: “A rapid and systematic review of the clinical effectiveness and cost effectiveness of debriding agents in treating surgical wounds healing by secondary intention”.

Session 5:
JBI Comprehensive Review Management System (CReMS)

CReMS is intuitively designed software to manage and write a systematic review project and incorporates the ability to import data from Endnote™; includes fields to enter full data extraction and full critical appraisal documentation; and the capacity to generate publishing house standard reports.

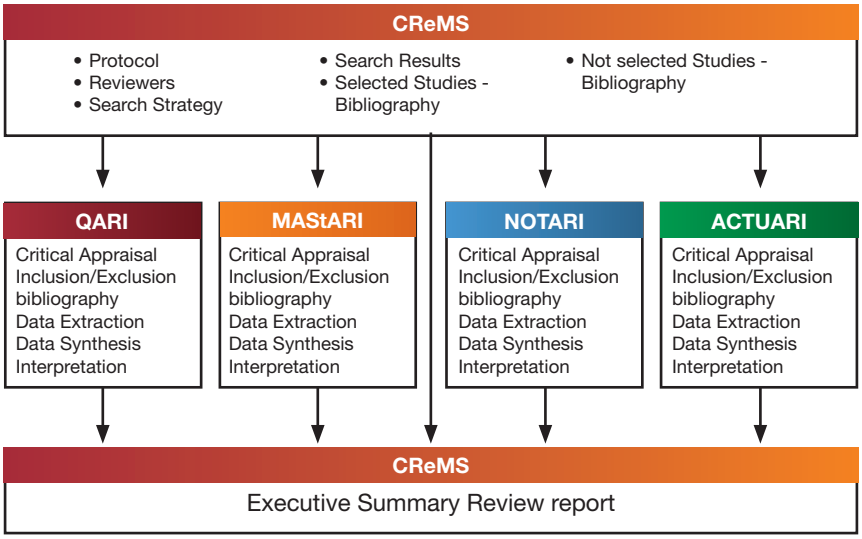
CReMS is web based and can be accessed on the web at no cost. It can be used as a stand-alone program or in conjunction with other SUMARI components.

Each of the other SUMARI analytical modules are also web-based and are designed to interface with CReMS and all other components. The analytical modules can also be used as stand-alone programs by reviewers or researchers who wish to utilise the functions of a specific component. The total package is designed so that each component interacts with the others and a reviewer can, at the point in the review when critical appraisal, data extraction and data synthesis/meta-analysis is reached, select a pathway to manage RCT data, non-RCT quantitative data, qualitative data, textual data from opinion papers or reports or economic data. In a single focus review (for example, a review of effectiveness) would follow the RCT data pathway only and extract and analyse only results from RCTs. A review with more than one foci can select any number of pathways (for example, a review of effectiveness and feasibility may enter data from action research and evaluative studies into the QARI pathway and data from reports of learned bodies into the NOTARI pathway, as well as RCT results.)

Accessing SUMARI

SUMARI is accessible via OvidSP

CReMS is designed to manage a systematic review. The review protocol and details of the review and the reviewers are entered into CReMS, and the results of the search (i.e. the bibliographic information on all papers/ reports found in the search – including those selected for retrieval and those not selected for retrieval) are also documented in CReMS. The reviewers then appraise the selected papers and extract and synthesise the data from those papers that are included in the review. When this analysis is complete, a draft report is automatically generated through CReMS, as the flow chart below shows:



Developing a Review Protocol in CReMS

The first step in the systematic review process is the preparation of review protocol and subjecting this to international peer review.

A review protocol consists of:

- A synopsis of the review;
- A substantive background to the review, demonstrating that the literature has been explored and that international databases show that a need for the review is apparent;
- The objectives of the review;
- The inclusion criteria for the review;
- The search strategy; and
- The review methods for critical appraisal; data extraction; and data analysis.

Title

The title of the protocol should be as descriptive as is reasonable and reflect the systematic review type to be conducted. As an example, if the review is examining clinical effectiveness this should be stated in the title. Where possible the setting and target population should be stated.

Background

The background should be a concise overview of the main issues. The length will vary, however 1-2 pages is the norm. It should provide sufficient detail to justify the conduct of the review and the choice of various elements such as the interventions and outcomes.

The initial step is to undertake a quick, general evaluation of the literature to determine the scope and quantity of the primary research, to search for any existing reviews (e.g. within the Cochrane Library, Joana Briggs database and CINAHL database) and to identify issues of importance. If an existing review is found it is necessary to state how the selected review differs and why is worth continuing with the project.

Review Objectives/questions

As with any research, it is important to have a clear question. The protocol should state in detail the questions or hypotheses that will be pursued in the review. Questions should be specific regarding the participants, setting, interventions and outcomes to be investigated.

Inclusion Criteria

The protocol must describe the criteria that will be used to select the literature. The inclusion criteria should address the participants of the primary studies, the intervention (or phenomena of interest) and the outcomes.

In addition to this, for studies of effectiveness, it should also specify what research methodologies will be considered for inclusion in the review (e.g. randomised controlled trials, clinical trials, case studies etc).

Search Strategy

The protocol should provide a detailed strategy that will be used to identify all relevant literature within an agreed time frame. This should include databases and bibliographies that will be searched, and the search terms that will be used. However the detailed search strategy is not included in the protocol.

Critical Appraisal

It is important to assess the quality of the research to minimise the risk of an inconclusive review resulting from excessive variation in the quality of the studies. The protocol must therefore describe how the validity of primary studies will be assessed and any exclusion criteria based on quality considerations.

Data Extraction

It is necessary to extract data from the primary research regarding the participants, the intervention/phenomena of interest, the outcome measures and the results.

Data Synthesis

It is important to combine the literature in an appropriate manner when producing a report. Statistical analysis (meta analysis) or textual analysis (meta synthesis) may or may not be used and will depend on the nature and quality of studies included in the review. While it may not be possible to state exactly what analysis will be undertaken, the general approach should be included in the protocol.

The protocol should be entered into CReMS or RevMan. It is essential to plan the review carefully and to ensure that it focuses on a review question that is answerable. Asking answerable questions is not as easy as it sounds, but it is a skill that can be learned!

Group Work 1: Developing a review question

Using Worksheet 1 in your Workbook, and JBI CReMS, develop a review question. Reporting back.

Session 6:
Developing a Search Strategy: A guide to evidence based information retrieval

The aim of this part of the module is for you to be able to demonstrate the ability to retrieve, evaluate, manage, and utilise information for solving problems and making decisions that are relevant to the care of individuals and populations.

Plan

Plan your optimal search strategies… are there colloquial terms that could be used to describe what you are looking for? What about language differences e.g. American spelling color or the English spelling colour? Remember that many databases are based in America, so this can be a common problem when searching.

Type of Question for effects	Ideal Type of Study
Therapy	RCT
Prevention	RCT > Cohort Study > Case Control
Diagnosis	Prospective, blind controlled trial comparison to gold standard
Prognosis	Cohort Study > Case Control > Case Series/Case Report

PICO for the search example would be:

"Self monitoring of blood glucose in type 2 diabetes mellitus Systematic review of economic evidence".

Population = Type 2 Diabetes Sufferers

Intervention = Self monitoring

Comparison = Blood Glucose

Outcome = Economic Evidence

Study Design and the 'best' evidence.

Tip# When looking at the evidence in an article, make sure you check the 3 R's Reliability, Relevance and Readability.

Constructing your search

- Break up the search question
- Do not over complicate the search by including too many terms
- Do not search across major databases simultaneously (i.e. both CINAHL & EMBASE, as descriptors are not the same in all databases).
- Test search queries
- Are you getting the results you require? What is the specificity of your results? If you are not finding what you want – refine your searches.
- Allow for English and American spelling. Use a wildcard character, in most databases this is a '?' (i.e. Colo?r results = colour or color randomi?ed results = randomized or randomised)
- Other wildcards like '$' are unlimited for example: organi$ = organising or organizing or organised or organisation
- Variable number of characters: You are able to limit the truncation dog$2 will find dogma (i.e. two letters after dog).
- Boolean searches AND/OR/NOT can lead to either too many results with little relevancy or not enough results as the correct keywords have been missed
- Often drop down boxes or the ability to assign limits will give you date ranges or types of studies

Use keywords, also referred to as textwords or free-text searching to find more colloquial terms for your clinical search. Consider alternatives such as the word Chemist used to describe Pharmacy in an Australian database. Think laterally and consider the search and all its parameters before embarking on definitive search strategies.

Study design

The Institute consider a range of study designs to identify the best available evidence to appropriately answer the identified clinical question.

Systematic Reviews
RCTs
Quasi-experimental studies
Cohort Studies
Case Control Studies
Cross-sectional studies
Case series
Case report
Expert opinion

JBI Levels of Evidence

Levels of evidence are assigned according to the research design being included. The JBI levels of evidence[1] addressing evidence relating to studies of FAME (Feasibility, Appropriateness, Meaningfulness and Effectiveness) are outlined below.

Levels of Evidence	Feasibility F (1-4)	Appropriateness A (1-4)	Meaningfulness M (1-4)	Effectiveness E (1-4)	Economic Evidence
1	Metasynthesis of research with unequivocal synthesised findings	Metasynthesis of research with unequivocal synthesised findings	Metasynthesis of research with unequivocal synthesised findings	Meta-analysis(with homogeneity) of experimental studies (e.g. RCT with concealed randomisation) OR One or more large experimental studies with narrow confidence intervals	Metasynthesis (with homogeneity) of evaluations of important alternative interventions comparing all clinically relevant outcomes against appropriate cost measurement, and including a clinically sensible sensitivity analysis
2	Metasynthesis of research with credible synthesised findings	Metasynthesis of research with credible synthesised findings	Metasynthesis of research with credible synthesised findings	One or more smaller RCTs with wider confidence intervals OR Quasi-experimental studies(without randomisation)	Evaluations of important alternative interventions comparing all clinically relevant outcomes against appropriate cost measurement, and including a clinically sensible sensitivity analysis
3	a. Metasynthesis of text/opinion with credible synthesised findings b. One or more single research studies of high quality	a. Metasynthesis of text/opinion with credible synthesised findings b. One or more single research studies of high quality	a. Metasynthesis of text/opinion with credible synthesised findings b. One or more single research studies of high quality	a. Cohort studies (with control group) b. Case-controlled c. Observational studies(without control group)	Evaluations of important alternative interventions comparing a limited number of appropriate cost measurement, without a clinically sensible sensitivity analysis
4	Expert opinion	Expert opinion	Expert opinion	Expert opinion, or physiology bench research, or consensus	Expert opinion, or based on economic theory

1 http://joannabriggs.edu.au/About%20Us/JBI%20Approach/Levels%20of%20Evidence%20%20FAME

Building the search strategy

Constructing MeSH/EMTREE/keyword lists

- Conduct basic search to ascertain what you are looking for i.e. Terminology.
- Construct MeSH/EMTREE/Subject headings, keywords or text words for your search.

Why do databases index?

Indexing or subject listing of information is very important. It is a way to control data, to give it commonality, consistency and decrease the instances of spelling and cultural differences. It insures that you are able to retrieve all of the information on a given topic. Other disciplines use similar methods, for example pharmaceutical or chemistry names will vary from product name country to country, company to company or compound name. MEDLINE and EMBASE and several other databases have standardized subject terms as a controlled vocabulary or thesaurus. This is to minimise missing information because different words have been used to describe the same concept. However, it is worth noting that an indexer still uses his or her discretion and either extensive or limited knowledge about a subject to assign a heading to a concept.

MEDLINE and EMBASE have different approaches to indexing and it can be said that EMBASE is more technical particularly when referring to the pharmacological or pharmaceutical areas. The search fields are also different in each database. It is not always advisable to use the 'explode' subject terms initially, so as to include more specific terms automatically in the search. However, be aware that this can skew your search away from the specific search that you are looking for. Other indexing terms include Chemical Abstracts Service use Registry numbers to index their compounds or drug names.

For example:

To look for Atacand you could use all of the following terms, candesartan cilexetil, Kenzen, Antihypertensive Agents,1-(cyclohexylocarbonyloxy)ethyl-2-ethoxy-1-(2'-(1H-tetrazol-5-yl)biphenyl-4-yl)-1H-benzimidazole-7-carboxylate or the better way would be to look for the indexing term, the CAS Registry number 145040-37-5

MeSH terms display hierarchically by category, with more specific terms arranged beneath broader terms.

Many databases have shortcuts or abbreviations to help you efficiently search. For example abbreviated subject headings:

- cystic fibrosis/th (for therapy)
- asthma/dt,pc (for drug therapy or prevention and control)
- carcinoma/et (etiology)

When gathering your initial information to help you structure your search strategy and find all the terms to be used in the search it is often useful to draw out a form of concept map. Sometimes it is easier to see a diagram of what you are looking for to help you visually group words in and map your PICO with your MeSH and keywords. Another great thing is to remind yourself of spelling differences and any other clues that you have found to be of use.

An example of a search strategy in OVID Medline, broken down into sections with each section searched separately and the combined at the end. This search strategy was used for a systematic review commissioned by the NHMRC and undertaken at JBI.

Setting

1. hospital.mp. or exp Hospitals/
2. sub acute care.mp. or exp Sub acute Care/
3. residential facility.mp. or exp Residential Facilities/
4. intensive care unit.mp. or exp Intensive Care Units/
5. intensive care neonatal.mp. or exp Intensive Care, Neonatal/
6. intensive care units pediatric.mp. or exp Intensive Care Units, Pediatric/
7. exp Burn Units/ or burns unit.mp.
8. residential facilities.mp. or exp Residential Facilities/
9. exp Community Health Centers/ or exp Family Practice/ or community health centres.mp. or exp Primary Health Care/ or exp Rural Health Services/
10. exp Dental Care/
11. exp Long-Term Care/ or long.mp.
12. homes for the aged.mp. or exp Homes for the Aged/
13. nursing homes.mp. or exp Nursing Homes/
14. health services for the aged.mp. or exp Health Services for the Aged/
15. community health nursing.mp. or exp Community Health Nursing/
16. 6 or 11 or 3 or 7 or 9 or 12 or 2 or 15 or 14 or 8 or 1 or 4 or 13 or 10 or 5

Bacteria

17. staphylococcus aureus.mp. or exp Staphylococcus aureus/
18. staphylococcal infections.mp. or exp Staphylococcal Infections/
19. (staphylococc* and Infectio*).mp. [mp=title, original title, abstract, name of substance word, subject heading word]
20. (staphylococc* and (bacteremia or bacteraemia)).mp. [mp=title, original title, abstract, name of substance word, subject heading word]
21. 17 or 18 or 20 or 19

Drug Resistance

22. methicillin resistance.mp. or exp Methicillin Resistance/
23. (methicillin* and resistan*).mp. [mp=title, original title, abstract, name of substance word, subject heading word]
24. multi drug resistan*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]
25. antibiotic resistan*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]
26. mrsa.mp. [mp=title, original title, abstract, name of substance word, subject heading word]
27. (meticillin or metacillin) and resistan*).mp. [mp=title, original title, abstract, name of substance word, subject heading word]
28. 22 or 23 or 24 or 25 or 26 or 27

Personal Protective Equipment

29. protective clothing.mp. or Protective Clothing/
30. glove*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]
31. exp Gloves, Protective/
32. exp Gloves, Surgical/ or gloves.mp.
33. gown*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]
34. apron*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

35. Masks/ or masks.mp.

36. mask*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

37. barrier.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

38. contact precaution*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

39. universal precaution*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

40. droplet precaution*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

41. airborne precaution*.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

42. 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41

Study Design

43. clinical trial.mp. or exp Clinical Trial/

44. randomised.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

45. placebo.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

46. randomized.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

47. 44 or 46

48. randomly.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

49. trial.mp. [mp=title, original title, abstract, name of substance word, subject heading word]

50. 46 or 45 or 42 or 40 or 44

51. Humans/

52. 48 and 47

Combining

53. 21 AND 28 (Bug AND Resistance)

54. 16 AND 53 AND 42 AND 52

(Setting AND (Bug AND Resistance) AND Personal Protective Equipment AND Study Design)

Group Work 2: Developing a Concept Map

Using Worksheet 2 in your Workbook, develop a concept map for your Clinical Question.

Reporting back.

Session 7:
Searching for the Evidence

The Search Process

Searching for the evidence is a three-step process:

1. Exploratory searching
2. Implementing a standardised tested search strategy within each selected database
3. Reviewing the reference list of retrieved studies

Prior to commencing a systematic review it is important to search existing systematic review libraries to ensure that the review you are planning has not already been conducted or currently being updated. (e.g. The Cochrane Library, JBI Library of Systematic Reviews and EPPI Centre.)

Types of Databases

There is value in a search being replicable, with the ability to demonstrate the logic of a conducted search and the ability to save and export the search strategy to be included in the systematic review report. The following databases provide these kind of facilities.

It is important to acknowledge the bias toward western dominated English language literature. The following databases are recommended, however are by no means exhaustive. Locally specific databases may be appropriate for identified review questions.

Computer Bibliographic Databases

(OVID, DIALOG and similar portals are platforms, providers and not databases in themselves. Other providers include LexisNexis, and STN.)

When searching in databases - know the language of the Database.

- Know how is it indexed
- Consider need to use .ae or /ae for adverse events
- Use Limits, if these are to be assigned before or after the search i.e. EBSCO.

MEDLINE

MEDLINE (Medical Literature Analysis and Retrieval System Online) is the U.S. National Library of Medicine's (NLM) premier bibliographic database that contains over 16 million references to journal articles in life sciences with a concentration on biomedicine. MEDLINE records are indexed with NLM's hierarchical Medical Subject Headings (MeSH) and date back to 1949. MEDLINE includes information on biomedicine and health, broadly defined to encompass those areas of the life sciences, behavioural sciences, chemical sciences, and bioengineering.

Differences between MEDLINE and PubMed are predominantly three-fold.

- PubMed publishes those articles beyond the scope of MEDLINE i.e. chemistry
- PubMed contains in process information
- Some life-sciences journals full text not yet recommended for publishing in MEDLINE.

CINAHL

CINAHL is a specialist nursing and allied health database from the National League for Nursing and the American Nurses' Association. It provides indexing for approximately 3000 journals and includes full text for more than 550 titles, from 1982 onwards and is updated weekly. CINAHL covers nursing, biomedicine, health sciences librarianship, alternative/complementary medicine, consumer health and 17 allied health disciplines. It is a useful database for primary literature relevant to qualitative reviews. In addition, this database offers access to health care books, nursing dissertations, selected conference proceedings, standards of practice, educational software, audiovisuals and book chapters. It has an internal subject thesaurus with over 7,000 terms 2,000 unique to CINAHL. Although a bibliographic database, the CINAHL database continues to include selected original and full-text material.

EMBASE

EMBASE (Excerpta Medica database, produced by Elsevier Science), is a predominantly European biomedical and pharmaceutical database containing over 19 million indexed records from more than 7000 peer reviewed journals starting from 1974 to date. It adds more than 600,000 items annually with an overlap of titles with MEDLINE of around 60%. It uses its own life science thesaurus called EMTREE. This is a primary source for reliable information from journal articles, reports, conference papers, proceedings, letters, and reviews. Records are scheduled to be online within 10 days of receipt and the database is considered to be a balance to MEDLINE giving more non-USA, particularly European sources. It also contains CAS Registry numbers for chemicals and drugs.

Dissertation Abstracts

Dissertation Abstracts Online is a definitive subject, title, and author guide to virtually every American dissertation accepted at an accredited institution since 1861. Selected Masters theses have been included since 1962. In addition, since 1988, the database includes citations for dissertations from 50 British universities. More recently citations and abstracts from Worldwide Dissertations (formerly European Dissertations) have also been included.

Current Contents

Current Contents is a current awareness database that provides easy access to complete tables of contents, bibliographic information, and abstracts from the most recently published issues of leading scholarly journals. Cover-to-cover, expert indexing provides accurate access to all the information available in journals, not just articles.

Other Specialist databases

PsycINFO

PsycINFO is an abstract database that provides systematic coverage of the psychological literature from the 1800s to the present. (The database also includes records from the 1600s and 1700s.) PsycINFO contains bibliographic citations, abstracts, cited references, and descriptive information to help locate a wide variety of scholarly publications in the behavioral and social sciences.

Research & Trials Registers

The following databases are more specialized and may contain some duplication of information contained within larger databases, e.g. MEDLINE and CINAHL. This must be taken into consideration when searching.

Cochrane Central Register of Controlled Trails (CENTRAL)

CENTRAL is a bibliography of controlled trials identified by contributors to the Cochrane Collaboration and others, as part of an international effort to hand search the world's journals and create an unbiased source of data for systematic reviews. CENTRAL includes reports published in conference proceedings and in many other sources not currently listed in MEDLINE or other bibliographic databases.

PEDro

An initiative of the Centre for Evidence-Based Physiotherapy (CEBP). PEDro is the Physiotherapy Evidence Database. It has been developed to give physiotherapists and others rapid access to bibliographic details and abstracts of randomised controlled trials in physiotherapy. Most trials on the database have been rated for quality to help you quickly discriminate between trials that are likely to be valid and interpretable and those that are not.

Current Controlled Trials

This is a part of the Science Navigation Group of biomedical publishing companies. In response to the growing body of opinion in favour of prospective registration of controlled trials, Current Controlled Trials Ltd launched the Current Controlled Trials website in late 1998, aiming to increase the availability, and promote the exchange, of information about ongoing randomised controlled trials worldwide. The company has the benefit of guidance from an international Advisory Group.

OTseeker

This database contains abstracts of systematic reviews and randomised controlled trials relevant to occupational therapy. Trials have been critically appraised and rated to assist you to evaluate their validity and interpretability. These ratings will help you to judge the quality and usefulness of trials for informing clinical interventions. OTseeker provides fast and easy access to trials from a wide range of sources. OTseeker was only launched in 2003 and therefore the number of trials and systematic reviews which it is able to display the abstracts will increase over time as agreements are established with more journals and publishers.

Grey Literature

What is it?

Grey or Gray Literature is information or documentation that is usually not peer reviewed, can be biased because it is sponsored by a pharmaceutical company or is allied with government or company policy. It can originate from academic institutions, corporations or government sources and be in the form of reports, newsletters, blogs, conference proceedings, census reports, non-independent research or work that has not yet been through peer review process and thus is a way of obtaining information before it is published. It is also material that has not been indexed by a web crawler or robot

Why use it?

Grey literature may reveal research that has not been included within main databases or that has not been through a peer review process. This literature may provide value in some cases, however, it should be used with caution for these very reasons.

Bias

Grey literature can be seen as biased because it is often not subject to rigorous review and editing processes. The person either writing or publishing the work may have an undisclosed vested interest in the information. However, in the preparation of a systematic review searching the grey literature is a key means of avoiding publication bias. Publication bias refers to the tendency of journal editors to publish studies finding a positive effect rather than research that found no effect. By not searching the grey literature, reviews may be open to missing studies that did not find an effect, and hence, bias the findings of the review.

Not Peer Reviewed

For expediency, publications may appear on Grey Literature sites before they have been reviewed. This along with the fact that it is possible to find rare information found no-where else in electronic form, can make mining Grey Literature sites a valuable exercise. However, a major limitation of Grey Literature in the context of evidence-based practice is the lack of reliable authenticity, accuracy and validity of information. As the data has not been peer reviewed and the journals referred to are not ISI listed, some clinicians do not advocate allowing the use of information from these sites.

Mednar

One of the new databases established in November 2008 and is a one-stop federated search engine therefore non-indexing, designed for professional medical researchers to quickly access information from a multitude of credible sources. Mednar has many tools to narrow searches, drill down into topics, de-duplicate, rank and cluster results as well as allowing the discovery of new information sources. It comprehensively searches multiple databases in real time, instead of crawling and indexing static content like Google or many metasearch engines, Mednar queries select, high quality databases to search simultaneously. It utilises the native search tools available at each of the 47 related sites/databases.

EAGLE

EAGLE (the European Association for Grey Literature Exploitation), has closed the SIGLE (System for Information on Grey Literature) database, which was one of the most widely used databases of grey literature. INIST in France (Institute for Scientific and Technical Information) has launched OpenSIGLE, which provides access to all the former SIGLE records, new data added by EAGLE members and information from Greynet.

Web Gateways and search engines

Searches using these tools may yield information relating to the topic of interest, however it must be noted that searches conducted through these search engines cannot be validated or verified, information is not archived and contents change over time and therefore this mode of searching is unreliable. Examples include:

- World-Wide Websites e.g. omnimedicalsearch.com, Google Scholar
- Government websites
- World specialist libraries and their websites

There are many specialist libraries around the world that can provide you with alternative resources to information. Some of these assist by finding difficult articles or books, checking references, or looking at non-English language.

The Healthcare Management Information Consortium (HMIC) database contains records from the Library & Information Services department of the Department of Health (DH) in England and the King's Fund Information & Library Service. It includes all DH publications including circulars and press releases.

New York Academy of Medicine is another excellent resource for general medical information and links to other sources.

World Cat is a great global resource for books and other media, citations, authoritative research materials in a variety of languages using the worldwide network of libraries. http://www.worldcat.org/advancedsearch

Group Work 3: Searching for Evidence

Using Worksheet 3 in your Workbook, carry out a search related to your PICO/ PICo question.

Session 8:
Selecting Studies

After the searching phase of the review is complete and the results of the search, that is the citations of relevant material and their abstracts, have been exported to bibliographic software such as Endnote it is time to begin selecting studies for retrieval! It is important to bear in mind that this study selection is an initial assessment that occurs following the review search addressing the simple question: “should the paper be retrieved?” Studies in your review will also undergo another ‘round’ of selection in the next systematic step in the review process. This second round of assessment asks a different question: “should the study be included in the review?” - this is critical appraisal and will be the starting point of the remaining Modules of the Comprehensive Systematic Review Training Program.

Study selection is performed with the aim to select only those studies that address the review question and that match the inclusion criteria documented in the protocol of your review. Two assessors, to limit the risk of error and minimise potential bias, should perform the process. Both assessors will scan the lists of titles, and if necessary abstracts, to determine if the full text of the reference should be retrieved. Sometimes it will be difficult or impossible to determine if the reference matches the inclusion criteria of your review on the basis of the title or abstract alone, in this case the full text should be retrieved for further clarification. Err on the side of caution in this process! It is better to spend a bit more time here, in careful consideration, rather than risk missing important and relevant evidence related to your review question. The entire process must be transparent and clear so that if an independent person were to apply your inclusion criteria to the same list of citations, they would arrive at the same result of included studies.

Group Work 4: Selecting studies for retrieval

Using Worksheet 4 in your Workbook, select the appropriate studies for retrieval.

Reporting Bac

Session 9:
Protocol Development in CReMS

In a polemic on the rationale for systematic reviews, Mulrow (2004) highlighted key needs that they need to fulfill. These include: the reduction of large volumes of literature , improved access to evidence by specialists and clinicians, the inherent efficiency of the technique (bringing studies together rather than duplicating them), the generalisability of findings arising from systematic review, the ability to assess quality and consistency across published evidence, exploration of inconsistencies in data across studies, increased power to detect a true effect, increased precision in estimating an effect size, and, finally, the accuracy of reporting is higher in systematic reviews than in traditional literature reviews (Mulrow, 2004).

The Joanna Briggs Institute, Cochrane Collaboration and other review-based organisations require the development of a protocol before a review can be commenced. The issues highlighted by Mulrow (2004) can be summarised as benefits related to the validity and merit of a research process that reduces risk of bias, promotes a systematic rather than ad hoc approach to the review process, facilitates communication with others and promotes consistency between review team members. These features further support the reliability and usefulness of reviews to health professionals.

A review protocol provides the specific direction the review will follow. It explicitly describes the inclusion criteria, methods of appraisal, extraction and synthesis. The background section describes the topic, why it is important and explores key elements of the inclusion criteria. Protocols across all review methods (experimental, non-experimental, qualitative & textual and economic) contain a series of standardised headings that are consistent with the scientific principals of a priori documentation.

Title

The title of the protocol should be as descriptive as is reasonable and reflect the systematic review type to be conducted.If the review is examining clinical effectiveness this should be stated in the title, similarly if the review is a review of the qualitative evidence then this should be stated in the title.

Background

The purpose and structure of the background does not vary between experimental and qualitative, economic or textual reviews, although the content will obviously be quite different.

The background describes the issue under review. Without making statements of fact about findings that the review intends to establish, the background can usefully highlight the significance of the issue, what current uncertainties are associated with it, as well as explain the specific focus of the review in terms of the characteristics of the population, intervention or phenomena of interest and the range of outcomes that are documented in the literature.

The Joanna Briggs Institute places emphasis on a comprehensive, clear and meaningful background section to every systematic review. The background should avoid making statements about findings (for example: “Use of acupuncture is effective in increasing smoking cessation rates in hospitalised patients”). This is what the review will determine. If this type of statement is made it should be clear that it is not the reviewer’s conclusion but that of a third party, (phrased such as “Smith indicates that acupuncture is effective in increasing smoking cessation rates in hospitalised patients”).

Inclusion and Exclusion Criteria

The methods section of a systematic review consists of the inclusion criteria for the population of interest, interventions/phenomena of interest, comparators, outcomes and types of studies to be included. Each of these sections may also state specific, clinically relevant exclusions. The methods are a detailed extension of the primary objective, and are described below for experimental studies, non-experimental studies, qualitative studies as well as text and economic studies.

Reviews of experimental studies

A Cochrane review would typically seek all rigorous studies (e.g. randomised trials) of a particular comparison of interventions in participants randomised to two or more groups. Hence the protocol should commence with a statement that randomised controlled trials will be sought. However, a protocol for a review of experimental studies may reasonably state that in the absence of RCTs, other experimental study designs will be included as the need for data from the best available evidence may require reviewers adapt to lower levels of evidence.

Population

Specific reference to population characteristics, either for inclusion or exclusion should be based on a clear, scientific justification rather than based on unsubstantiated clinical, theoretical or personal reasoning. For reviews of RCTs and quasi RCTs, give consideration to which characteristics that describe the population of interest are most important: are there relevant demographic factors, is the setting important, is the population definable by socioeconomics? Further to this, give consideration to whether within this population of interest there might be sub groups, or whether some characteristics should be excluded on the basis of having an alternate impact on the outcome of interest. The more tightly the criteria are defined, the less studies will be included. It is important to give consideration to the impact of specific characteristics such as age, gender or setting as some studies will have participants that cross these boundaries.

Intervention

Where possible, the intervention should be described in detail, particularly if it is multifaceted. Consideration should also be given to whether there is risk of exposure to the intervention in comparator groups in the included primary studies. When developing the intervention, it's also useful to think about what degree of variability in the intervention is acceptable, and what the comparator will be. The Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green 2008) suggests reviewers note the experimental and control interventions of interest, then identify variations that are likely to arise, and make a decision regarding their inclusion based on clinical appropriateness, plan for how trials that partially match the criteria will be managed and what will be done with studies that report co-interventions. Mapping these decisions in a table can assist to develop clear audit trails of decision making, promoting clearer communication between reviewers.

Comparison

Stating a particular comparator limits the scope of a review, assisting with ensuring a clear focus for determining inclusion and exclusion once searching and appraisal is complete. However, when a broader question is being considered, particularly one where multiple interventions exist, limiting the types of comparators may not be appropriate or desirable. Within reviews of effects, the comparator is the one element of the PICO mnemonic that can be either left out of the question/s, or posited as a generalised statement. Placebo, no treatment or alternate treatment can be described as comparators or open statements so that varied types of placebo, or alternate treatments can be included in the review. The comparisons can be used as a guide for the order in which the results are presented.

Outcome

There should be a list of all the outcome measures being considered. Note that outcome measures might be primary or secondary. The background should provide enough information to justify the outcomes included and potentially those that are not included. The outcomes need to be measurable and appropriate to the review objective. It is useful to list outcomes and identify them as primary or secondary, short-term or absolute. A balance of outcomes is desirable so note that if a review examines only positive outcomes, then the likely finding will be favorable.

When considering outcomes, using a framework may assist in systematic identification, i.e. mortality or survival, clinical effects, patient reported outcomes, adverse events, burden of illness, economics, and in more recent years, Cochrane reviews of effects have started to recognise the inclusion of qualitative outcomes. From this extensive list, make particular note of those that are relevant clinically or to decision makers. Cochrane recommend giving consideration as to:

- How the outcome is going to be measured
- When the outcome should be measured (single or multiple time points)
- Which are the most important outcomes, and
- Adverse as well as positive outcomes.

Where an outcome is listed, but does not appear in the included studies, this suggests a gap in the research base and is a finding worth discussing in your review report. As well as types of outcomes, give consideration to how they will be measured – types of scales and timing of measurement are important study elements when planning for meta analysis. Time can be complex, with studies using multiple time points that do not align when comparing one study to another; where this effect is likely, it is useful to group similar time points into general categories such as "short term", "medium term", and "long term". Cochrane advise this approach in their handbook to systematic reviews.

Given systematic reviews are developed in order to inform clinicians or decision makers, it is important to ensure the stated outcomes are relevant. A review of pharmacotherapy for minimisation of fall related injury should not include bone mineral density as an outcome. In this example, fractures would be a relevant clinical outcome, and bone mineral density a surrogate outcome.

Arguments in favour of surrogate outcomes include time and costs associated with attempting to reach a clinically relevant end point. As an example, trials of anti hypertensives can show a reduction in blood pressure, and this data may be used to approve a medication. Surrogate outcomes however may lack evidence related to whether survival is improved. Given the range of anti hypertensive medications on the market, D'Agostino (2000) suggests better outcome data in this example would inform clinicians of clinically relevant end points such as survival, rates of adverse events and provide comparative data against other anti hypertensive medication.

D'Agostino RB. 2000, Debate: The slippery slope of surrogate outcomes, Current Controlled Trials Cardiovascular Medicine, doi:10.1186/cvm-1-2-076.

The alternate argument suggests surrogate outcomes provide a useful and informative marker. Taking cholesterol as an example, reductions in cholesterol are associated with reduced mortality; demonstrating this in an RCT would require years of follow up, whereas serum cholesterol can be more readily measured, and the outcome extrapolated. There is no clearly defined position in relation to this issue, therefore, it's more reasonable to suggest that surrogate outcomes should be used with caution, and where clinical prediction is both appropriate and well established.

Types of Studies

In reviews of effects, it is common to begin with a statement that randomised controlled trials will be sought. Randomisation is the only technique known to prevent systematic differences between the baseline characteristics of the participants in trial arms. Randomisation accounts for both known and unknown confounders that may exist in samples of a given population. For example, randomisation should account for baseline differences in HbA1c among participants in RCTs investigating the effect of tight glycaemic control on people with poorly controlled insulin dependent diabetes.

Reviews of Non-experimental studies

These vary in design, the Cochrane EPOC group prefer Controlled Before and After designs, then Interrupted Time Series designs. However, non-experimental designs may also be uncontrolled, are not always well described, or consistently reported. This makes it difficult to establish the type of study design that was used if the study authors description of their methods does not appear to match the design they specified (this is also a problem for qualitative research). There is no clear agreement on which non experimental designs are appropriate for inclusion in reviews, with EPOC specifying a limited scope for inclusion, while Cochrane takes the view that while less biased designs are better, the reader must be made aware of the limitations associated with non experimental designs.

In the Joanna Briggs Institute, the best available evidence for the particular question is considered the guiding principal. This means non-experimental studies may be the optimal design (i.e. where ethics would prevent random allocation– e.g. studies where risk of harm is an outcome; or where the practice or delivery of health care was being investigated and randomisation was not used).

In accounting for reviews where the topic of interest does not suit the RCT design, however, there is an implicit understanding that the risk of bias is greater. The assessment of this risk though can be based on the same methodological considerations that relate to internal validity. Cochrane suggest studies be carefully examined for differences between study samples (selection bias) and studies that did not report the use of a research protocol. The critical appraisal criteria applied in JBI reviews is based on the assessment of internal validity, and enables reviewers to make a decision regarding individual papers.

Where a review includes both RCT and non-randomised designs, Cochrane strongly advocate that these not be combined in meta analysis. The likelihood of heterogeneity is also increased, and this complicates both the conduct and interpretation of meta analysis.

Population

Unlike experimental studies, non-experimental studies lack randomisation. This means there is a greater likelihood that the baseline characteristics of study groups will have significant differences that may influence the results. This is the main issue in non-experimental studies where there is a comparator group.

Intervention

The selection of non-experimental study designs has no impact on the issues or considerations related to choice of, description and selection of interventions.

Comparator

Some non-experimental studies will have comparator groups, those that do should be reported separately to those that do not. The protocol will have to describe what types of comparators will be included, and how the reviewers will resolve decision making about inclusion of study designs with or without comparator groups. If no comparator is listed in the protocol, how such studies will be dealt with in the review process needs to be documented.

Outcome

There are no substantive differences in how the outcomes are considered when compared with the experimental studies model. However, there may be a difference in how they can be analysed, as meta analysis in particular is more problematic given the increased risk of bias. This should be considered at the outcome identification stage, although the primary goal is still to identify and prioritise all clinically relevant outcomes.

Types of studies

These vary from controlled before and after right down to individual case studies, or descriptive studies. Reviewers familiar with hierarchies of evidence will still be faced with the issue of deciding what (if any) cut off point to use. As a guide to these considerations, JBI takes a "best available evidence" approach where lower levels of evidence are considered in the absence of higher levels of evidence. How this is operationalised is up to the individual reviewers.

Reviews of Qualitative studies

Participants

Specific reference to participant characteristics, either for inclusion or exclusion should be based on a clear, scientific justification rather than based on unsubstantiated clinical, theoretical or personal reasoning. Given the focus in qualitative reviews is on a phenomenon of interest i.e. the interaction between the individual and the intervention, the description of the inclusion criteria will vary from quantitative and economic reviews, although the framework remains the same.

Phenomena of Interest

The level of detail ascribed to the phenomena at this point in protocol development may vary with the nature or complexity of the topic, or the purpose in conducting the review. The more tightly defined the phenomena is, the less studies will be included, and the more specific the analysis will be. Reviewers should decide whether more tightly defined criteria will better answer their question, and also consider the additional time and resource requirements should an open, exploratory approach taken.

Context not Comparator

There is no comparator in qualitative reviews, instead the context within which the phenomena is experienced is defined. The JBI Reviewers manual (2008b) indicates that in a qualitative review, context should be defined depending on the objective of the review and the specific questions constructed to meet the objective.

Context may include but is not limited to consideration of cultural factors such as geographic location, specific racial or gender based interests, detail about the setting such as acute care, primary health care, or the community as they relate to the experiences or meanings individuals or groups reported in studies.

Outcome

The JBI Reviewers manual (2008b) states that no specific requirement for an outcome statement exists in qualitative reviews. An outcome of interest may be stated (this may relate to, or describe the phenomena of interest), or this section may reasonably be left out of the protocol.

Types of studies

A protocol for an interpretive or critical or inclusive qualitative systematic review depends on the nature of the question being addressed. Interpretive reviews might be conducted to aggregate evidence related to social interactions that occur within health care, or seek to establish insights in to social, emotional or experiential phenomena and generate new theories. Critical reviews might be conducted to explore and theorise about issues of power in relationships while a critical and interpretive review might be conducted to bring both elements together.

There is no hierarchy of evidence for qualitative studies, nor is the issue of bias associated with quantitative designs relevant. Current methodological opinion related to aggregative reviews does not require any distinction between critical or interpretive studies, therefore choices regarding types of studies is the decision of the reviewers. The units of analysis in qualitative papers are the findings, presented as themes, metaphors or concepts as identified and described by the researchers. The traditions of the methodology associated with a particular paper are considered to be embedded within the findings, rather than distinct to the findings. Therefore, including studies from across paradigms or methodologies does not ignore the philosophic traditions of the approach, but rather integrates them with the findings, bringing the theory with the paper, rather than filtering out the theory. This line of argument is supported by the richness of the qualitative traditions, particularly the ability to develop thick or rich descriptions. Given the purposes of a systematic review are to bring together a body of literature in to a more concise, accessible volume, a qualitative synthesis that only drew on findings from one perspective (i.e. ethnography) would be lacking in depth and perspective, whilst a review that included a range of qualitative designs would be more likely to capture the whole of a phenomenon of interest. For these reasons, authors should discuss the types of studies they will include, and seek to fully explore a phenomena of interest, rather than a one dimensional perspective of it.

Reviews of Textual papers

Participants

Describe the participants, including specific characteristics of interest, such as age, gender, level of education or professional qualification, which are important to the question. Specific reference to participant characteristics, either for inclusion or exclusion should be based on a clear justification rather than personal reasoning. The term participant is used but not to imply that aspects of participant pertinent to reviews of RCTs such as sampling methods, sample sizes or homogeneity are either significant or appropriate in a textual review.

Intervention/phenomena of interest

As with other types of reviews, interventions may be broad areas of practice management, or specific, singular interventions. However, reviews of text or opinion may also reflect an interest in opinions around power, politics or other aspects of health care other than direct interventions, in which case, these should be described in detail.

Comparator/context

The use of a comparator is not required for a review of text and opinion based literature. There is no additional benefit conferred to the quality or conduct of a text-based review by seeking to consider one. The issue of context is more appropriate, and the considerations raised in the qualitative section on context applies here also

Outcome

As with the comparator, a specific outcome statement is not required. In circumstances where it is considered appropriate, as with the intervention, its nature and characteristics should be described.

Types of papers

Any non-research paper can be considered for inclusion. These include editorials, letters, policy statements, consensus based guidelines and statements by expert individuals or professional or peak bodies or organisations.

Reviews of Economic Studies

Reviews of economic studies tend to embed economic data within clinical trials or other effectiveness data. While the aim is to review the economic data, that evidence exists within specific clinical contexts, and these are important to the development of the inclusion criteria. The more detailed the inclusion criteria are, the clearer the reviewers will be regarding the PICO characteristics, and types of studies to include.

Participants

When expanding the title and objectives through the criteria for inclusion, reviewers will need to consider whether the participants will be limited to specific subsets, as may be the case when reviewing evidence on a certain type of cancer, if specific groups of participants have an important outcome or effect that is measurably different to the wider population. Specific reference to participant characteristics, either for inclusion or exclusion should be based on a clear, scientific justification rather than based on unsubstantiated clinical, theoretical or personal reasoning.

Intervention

Where possible, the intervention should be described in detail, particularly if it is multifaceted. Give thought to whether the intervention can be broken in to components, i.e. steps and equipment that might be needed. If it can, be aware that dollar figures of cost outcomes may vary if elements of the intervention can be skipped, added to, or if equipment has been substituted in some studies.

Comparison

Stating a particular comparator limits the scope of a review, assisting with ensuring a clear focus for determining inclusion and exclusion once searching and appraisal is complete. When a broader question is being considered, particularly one where multiple interventions exist (e.g. moist wound healing products for wound care, or types of solutions for chemical debridement), limiting the types of comparators may not be appropriate or desirable.

Where an intervention has not been subject to previous economic evaluation, the comparator can reasonably be identified based on either a known ‘gold’ standard, or an approach that is considered to be “current practice”.

Outcome

It is useful to list outcomes and identify them as either primary or secondary, short-term or absolute and discuss which ones will be included at a review panel meeting. In terms of costing data, the outcome may be described in relation to the type of review. Therefore the outcome may be described in relation to cost minimisation, cost effectiveness, cost benefit or cost utility.

Types of studies

This section should flow naturally from the criteria that have been established to this point, and particularly from the objective and questions the review seeks to address. Many JBI reviews will have a hierarchy of studies that will be considered. There should be a statement about the primary study type and the range of studies that will be used if the primary study type is not found.

In reviews of economic effects, it is common to begin with establishing clinical effectiveness, hence a statement that randomised controlled trials will be sought. However, protocols for economic reviews may reasonably state that in the absence of RCTs, other experimental study designs will be included as the need for economic data from the best available evidence may require reviewers adapt to lower levels of evidence.

For reviews of economic effectiveness, there are specific study designs of interest to specific economic questions. These include:

- Cost minimisation designs: intended to identify the least costly intervention where multiple interventions have demonstrated similar benefit.
- Cost effectiveness designs: where interventions achieve similar outcomes but have unknown or potentially different resource implications.
- Cost utility designs: seek to establish benefit as measured by quantity and quality of life (QALYs).
- Cost benefit designs: these seek to identify a specific monetary ratio (gain/loss or cost/benefit) for an intervention.

Assessment criteria

There are a variety of checklists and tools available to assess the validity of studies. The choice of appraisal instruments can be confusing given the huge number available. Furthermore, there are concerns and debates around the characteristics that define quality in different paradigms, questions regarding construct validity of specific types of scales, issues of rater reliability and practicalities of how assessment of quality should be performed.

Although there is a wide variety of appraisal instruments available, they tend to contain similar items (particularly in the quantitative paradigm), as there is general acceptance that appraisal seeks to establish some degree of internal validity. Appraisal remains hotly debated, particularly within the interpretive paradigm as to if and how appraisal should be applied, and what should be done with the results assuming some papers score high quality, and others lower, with some review methods indicating poor quality studies should be discarded, while other methods insist they should be included.

JBI advocates the use of standardised critical appraisal instruments. This enables reviewers to gain knowledge and expertise in the interpretation and application of criteria. Although many appraisal instruments are designed to look like a check list, with simple yes, no or not applicable options, reviewers need to meet and determine which instruments will be needed for their review, and how the items in each scale will be defined, and applied.

Each instrument should be read through by both reviewers and each item on the scales discussed in the context of the review. Without discussion, reviewers are likely to take a slightly different interpretation of the questions, creating more work later on in the review. Having gained clarity on how the items on each scale will be applied, reviewers also need to discuss whether a cut off point will be established, and if so, whether it will be based on either key items in the appraisal scale, or a tally of responses. Applying a cut off point based on weighting or cut off scores is a decision that needs to be justified in the protocol, and should be based on clinically sound reasoning. Applying a cut off point based on number of items in the appraisal checklist that were answered Yes compared with No does not guarantee that those papers with the maximal internal validity will be included, and review authors should consider carefully before taking this approach.

It is JBI policy that all study types (and non research texts) must be critically appraised using the standard critical appraisal instruments for specific study designs, built into the analytical modules of the JBI SUMARI software. The protocol must therefore describe how the validity of primary studies will be assessed; any exclusion criteria based on quality considerations; and include the appropriate JBI critical appraisal instruments in appendices to the protocol. This section will be covered in more detail in the study days for each specific module.

Data extraction

Data extraction refers to the process of sourcing and recording relevant results from the original (or primary) research studies that will be included in the systematic review. The protocol should describe the types of data that will be extracted, the process by which it will be extracted, and cite instruments that will be used. It is important that a standard extraction tool be used by both reviewers, that both reviewers have practiced using the extraction tool and can apply the tool consistently, facilitating accurate and reliable data collection. Data is more than numbers or words that describe the findings (or results) of interest to the review, data also includes the methods of the included studies, detailed characteristics of the study participants, intervention or phenomena of interest citation details, and, for experimental studies, may include unpublished data (where authors are contacted for further information).

It is necessary to extract data from the primary research regarding the participants, the intervention, the outcome measures and the results. It is an agreed JBI policy that data extraction for all study types must be carried out using the standard data extraction instruments for specific study designs, built into the analytical modules of the JBI SUMARI software. The protocol must therefore describe how data will be extracted and include the appropriate JBI data extraction instruments in appendices to the protocol.

Difficulties in synthesis will occur where data extraction does not accurately identify issues including:

- Differences in participant characteristics
- different outcome measures
- different scales or units of time for outcome measurement
- interventions administered differently
- reliability of data extraction (i.e. between reviewers).

Strategies to minimise the risk of error when extracting data from studies include:

- utilise a standardised data extraction form
- pilot test extraction form prior to commencement of review
- train and assess data extractors
- have two people extract data from each study
- blind extraction before conferring.

Data extraction can assist reviewers to gain a comprehensive knowledge of each included paper, and notations recorded should include details of the citation, information about the study method, setting and population characteristics. Population characteristics such as past medical history, complications or potential confounders and whether or not the groups were homogenous should be extracted and recorded.

Data extraction using the standardised JBI tools then progress to a focus on the specific detail of the sample sizes per group, and the intervention or exposure per group, including key definitions (e.g. number of colony forming units considered indicative of colonisation or infection). Data specific to the outcomes stated in the protocol is then extracted. Many studies report on multiple outcomes but only data pertinent to the specified outcomes should be extracted.

In some cases it may not be possible to extract all of the raw data required for a systematic review from a publication's results section. Sometimes only aggregated data are reported, or journal word limits have prevented more detailed reporting (more common in qualitative than quantitative studies). In these circumstances, the standard approach for experimental studies is to make contact with the authors of the publication and seek their assistance in providing the raw data.

With quantitative and economic reviews, there is a strong consensus in the literature, and in guidance from key organisations such as Cochrane (accessed online 22/5/09 http://www.mrc-bsu.cam.ac.uk/cochrane/handbook/chapter_7/7_6_2_who_should_extract_data.htm) and the NHS Centre for Reviews and Dissemination (accessed online 22/5/09 http://www.york.ac.uk/inst/crd/SysRev/!SSL!/WebHelp/SysRev3.htm) that data extraction be undertaken independently by two persons. One extraction is complete, reviewers should meet, compare and discuss results. Where necessary, the views of a third reviewer should be sought.

Qualitative evidence is of a different nature, and therefore data extraction is not characterised by the same process. The Cochrane Handbook and Centre for Review and Dissemination make no specific comments or recommendations related to the number of reviewers involved in data extraction. The general consensus in the practical conduct of qualitative reviews is that one reviewer may extract the data, but that it is useful then for the second reviewer to read and discuss the extraction. This relates not to risk of error in extraction in the same way that extraction of quantitative data seeks to minimise risk of introducing error. The interpretive nature of textual extraction is not validated by the second reviewer, but the shared understandings generated though the discussion facilitate effective progression throughout synthesis and write up of the review report. This section will be covered in more detail in the study days for each specific module.

Data synthesis

It is important to combine the studies in an appropriate manner using methods appropriate to the specific type and nature of data that has been extracted. In the protocol, the methods by which studies will be combined should be described in as much detail as is reasonably possible. This is a somewhat anticipatory process, as the studies that are identified may not be suitable for the primary method of synthesis described.

The methods of synthesis should be congruent with the description of the type of data for extraction. Therefore data synthesis should describe the specific types of data and effect measures that will be used. Consideration must also be given to the impact of timing for measurement on quantitative and economic outcomes, while in qualitative reviews, the method of synthesis should explicitly describe the process for analysis. This section will be covered in more detail in the study days for each specific module.

Group Work 5: Developing a review protocol in CReMS

Using Worksheet 5 in your Workbook and JBI CReMS, develop a draft protocol.

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Assessment

Multiple-choice assessment of 30 minutes.