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Evidence-based medicine and systematic review services at Becker Medical Library

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The concept of evidence-based medicine has its roots in a group of epidemiologists at McMaster University which, led by David Sackett, wrote a series of articles about how and why clinical evidence needs to be assessed in a critical fashion.[1] The term evidence-based medicine (EBM) was coined by Gordon Guyatt in 1990 in an information document for McMaster residents. It stated that for "evidence-based medicine…the goal is to be aware of the evidence on which one's practice is based, the soundness of the evidence, and the strength of inference the evidence permits."[2] With the passage and implementation of the Patient Protection and Affordable Care Act there has been a greater emphasis on providing patient care that is efficient, cost-effective, and evidence-based.[3] EBM is becoming codified in healthcare legislation and is required to provide the best level of care to patients. Keeping up with recent evidence to answer a clinical question is a key element to practicing evidence-based medicine, however the amount of information published in medical journals, clinical trials, and elsewhere online can make it arduous to find good evidence. It can be difficult for physicians to find the time to search for the best evidence, critically appraise it, and apply it to patient care. Fortunately, resources like systematic reviews and practice guidelines facilitate the acquisition of information and support the practice of evidence based medicine.

Systematic reviews are designed to synthesize information from multiple studies and provide conclusions about the effectiveness, efficacy, or validity of an intervention or treatment and can help medical professionals apply current research to patient care. Medical professionals find them especially appealing because "the recommendations of systematic reviews, instead of reflecting personal views of experts, are based on balanced inferences generated from collated evidence."[4] A quality systematic review includes all appropriate research evidence relevant to the topic. Meta-analysis, within the scope

of systematic reviews, is when the data from separate studies have been pooled together using statistical methods. While systematic reviews and meta-analyses synthesize data, critical appraisal is still necessary to determine the strength and clinical applicability of a review. At least one study has shown that there is "an association between training in critical appraisal skills, and the application of evidence-based medicine to patients."[5] Critical appraisal involves carefully reviewing the study results, research methods utilized, and the strength of statistical analysis. Understanding how a systematic review should be conducted can provide a mechanism for practitioners to critically appraise them. There are now guidelines for reporting systematic reviews that can be used as critical appraisal tools. They include PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)[6], MECIR (Methodological Expectations of Cochrane Intervention Reviews)[7], and MOOSE (Meta-Analysis of Observational Studies in Epidemiology)[8]. There are several rubrics and analysis tools that can make critical appraisal of articles easier to complete, including collections of worksheets from Duke University and the Centre for Evidence Based Medicine. Additional recommended critical appraisal and systematic review resources can be found in Table 1.

Systematic Review Guidelines	Critical Appraisal	Reporting Guidelines
Cochrane Handbook for Systematic Reviews of Interventions: http://handbook.cochrane.org	**Duke University Worksheets: http://bit.ly/1hFjm8L**	**PRISMA: http://www.prisma-statement.org**
Centre for Reviews and Dissemination: Guidance for Undertaking Reviews in Health Care: http://bit.ly/1b4Maj3	**Centre for Evidence Based Medicine Worksheets: http://bit.ly/1b0TVJW**	**MECIR (Methodological expectations of Cochrane Intervention Reviews): http://bit.ly/1b4KW7w**
***Systematic Reviews in Health Care: A Practical Guide*: http://bit.ly/1nmXApA**	***BMJ*'s: How to Read a Paper series: http://bit.ly/1akanon**	**MOOSE (Meta-Analysis of Observational Studies in Epidemiology: http://bit.ly/Q7pBX7**
***Introduction to Meta-Analysis*: http://bit.ly/1hC4XsT**	**Secrets to Healthy Skepticism: http://bit.ly/1gmXFtY**	

Table 1

The evidence used in systematic reviews is derived from systematic searches of the literature. Without a sound, methodologically rigorous search strategy, the results or findings of the systematic review or meta-analyses should be suspect. Search strategies for a systematic review are carefully documented and should be reproducible.[9] Medical librarians ensure that researchers have the best evidence by creating thorough search strategies and searching multiple databases and grey literature resources. The task of locating all the evidence requires complex search strategies and a thorough knowledge of the literature, indexes and databases. A "high level of expertise is required to understand the technical aspects of data structure and databases" and "it is advisable to have a professional medical librarian or information specialist set up…and conduct the search."[10] Researchers benefit by knowing that their literature searches are methodologically rigorous and created by trained information professionals.

As noted, authors of systematic reviews are encouraged to use the PRISMA guidelines when preparing their findings for publication. This ensures a thorough reporting of each element of a systematic review or meta-analysis.[11] Journals like *BMJ*, *The Lancet*, and *Chest* endorse the use of PRISMA guidelines for publishing systematic reviews and meta-analyses.[12] There are twenty-seven elements that comprise the PRISMA check list, and two call on the particular skills of librarians. Step seven, "information sources," requires the author to "describe all information sources…in the search and date last searched;" and step eight, "Search," asks the authors to "present full electronic search strategy for at least one database, including any limits used, such that it could be repeated."[13] These two steps help inform the methodology section of a complete systematic review. Medical librarians can contribute to this part of the systematic review by writing a statement about the construction and implementation of the search strategy, resources searched, limits used, and the number of results found in the literature search. Librarians can also provide entire search strategies for one or more databases,

which are often listed in an appendix. In these ways medical librarians can help researchers fulfill PRISMA guidelines and ensure that their manuscript is complete prior to submission for publication.

Becker Medical Library recognizes the importance of systematic reviews in medical research and clinical care. To help meet the growing demand for systematic review literature searches, the library has developed a comprehensive systematic review service including a standard protocol that articulates what is required from researchers, and what will be provided by the medical librarians.[14] Librarians work with researchers from the conception of their research question, through the literature search process. Currently four librarians at Becker Medical Library provide systematic review literature searches. As a first step researchers are asked to provide their research question in the PICO (Problem, Intervention, Comparison, Outcome) format, and include a few articles that fit their research and inclusion and exclusion criteria. Next, a medical librarian creates a preliminary search strategy (usually in Medline or Embase) for the researcher to approve. Once the preliminary search strategy is agreed on, it is translated to meet the requirements for searching additional databases and other appropriate resources. Typical systematic reviews will include searches in Medline, Embase, Scopus, and CINAHL. Grey literature resources, like the Cochrane Library and ClinicalTrials.gov, are also reviewed for relevant citations. All of the citations found in the systematic search are exported to a bibliographic management software program (EndNote). Upon completion of the literature search, the researcher receives a methodology document outlining the exact search strategy used in each database, how many citations were retrieved, and the date each resource was searched. Sample methodology text is also included that can be used in a published version of the systematic review. In addition to the methodology document, researchers receive the complete library of citations in a bibliographic management program file, and in an Excel workbook. The systematic review or meta-analysis researchers are then able to move forward with selecting articles to include in their review, analyzing data, and discussing their findings. Becker Medical library also has several computers with a specialized suite of software including

SPSS and STATA , which can be utilized to pool and analyze statistics, and Endnote, used to manage citation libraries. Finally, Becker's scholarly communications experts can assist researchers with selecting the best journals to submit their final systematic review or meta-analysis.

The number of published practice guidelines is growing and these can play a significant role in evidence-based medicine if they originate from a foundation of quality studies. The literature search involved for creating guidelines should be as thorough as those done for systematic reviews.[15] The difference between the creation of systematic reviews and patient care guidelines lies mostly with what happens after the literature search is complete. Committees or work groups are usually formed to assess or grade the evidence found, and often have procedures in place to vote on which articles will be included in their final analysis. Practice guidelines are sometimes published by various professional societies or in journals, but often they are designed exclusively for in-house use by a hospital or health system. Though systematic reviews and practice guidelines may serve different purposes, the literature search process used to inform them is similar and the search services that Becker Medical Library offers for systematic reviews can be used in the creation of practice guidelines as well.

Readers interested in learning more about the resources and services available for Evidence-Based Medicine at Becker Medical Library should see our subject guide, *Evidence at Becker: http://beckerguides.wustl.edu/ebm.* For our systematic review services, please see our subject guide, *Systematic Reviews: http://beckerguides.wustl.edu/SystematicReviews*

Practicing evidence based medicine is essential and highly encouraged in the current health care environment. Resources like systematic reviews, meta-analyses, and practice guidelines can help make it easier to apply current information to patient care. Becker Medical library facilitates the creation of quality systematic reviews by offering a comprehensive systematic review service to the Washington University School of Medicine.

[1] Sackett, DL. How to read clinical journals: I. Why to read them and how to start reading them critically. 1981; 124: 5, 555-558.
[2] Guyatt, G, Rennie, D., Meade, MO, Cook, DJ. *Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice*. 2nd ed. New York: McGraw Hill; 2008.
[3] Hughes, GB. Evidence-Based medicine in health care reform. *Otolaryngology—Head and Neck Surgery.* 2011; 145:4, 526-529
[4] Khan, K, Kunz, R., Kleijnen, J., Antes, G. *Systematic Reviews to Support Evidence Based Medicine*. London: Hodder Arnold; 2011.
[5] Doust, JA, Silagy, CA. Applying the results of systematic review in general practice. *The Medical Journal of Australia*, 2000; 172:4, 153-156.
[6] Moher, D, Liberati, A, Tetzlaff, J, Altman, D. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *BMJ*. 2009; 339:b2535
[7] Cochrane Collaboration. *Methodological Expectations of Cochrane Intervention Reviews (MECIR)*. http://www.editorial-unit.cochrane.org/mecir. Updated December 13, 2013. Accessed February 4, 2014.
[8] Stroup, DF, Berlin, JA, Morton, SC, et. al. Meta-analysis of observation studies in epidemiology: A proposal for reporting. *Journal of the American Medical Association*, 2000; 283: 15, 2008-2012.
[9] Grant, MJ, Booth A. A typology of reviews: an analysis of 14 review types and associated methodologies, *Health Information and Libraries Journal*. 2009; 26, 91-108.
[10] Haines, T, McKnight, L, Duku, E, Perry, L, Thoma, A. The role of systematic reviews in clinical research and practice. *Clinics in Plastic Surgery*, 2008; 35; 207-214.
[11] Moher, D, ibid.
[12] Prisma Endorsers. Available at: http://www.prisma-statement.org/endorsers.htm. Accessed January 23, 2014.
[13] Moher, 333
[14] Fowler, S. Becker Library Services for Systematic Reviews. 2013. Available at: http://beckerguides.wustl.edu/content.php?pid=382127&sid=3137773. Accessed January 23, 2014.
[15] Chung, KC, Shauver, MJ. Crafting practice guidelines in the world of evidence-based medicine. *Plastic and Reconstructive Surgery*. 2009; 124:4; 1349-1354.