Systematic Reviews from the Cochrane Musculoskeletal Group

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Do you use evidence to inform your clinical decisions?

Faced with the plethora of information and the number of trials and articles published every day, finding, reading, analysing and using research to inform decision making is a challenge. In 1995, it was estimated that a clinician would need to read 19 articles per day to keep abreast of the research.[1] Today that tally has likely increased – the amount of research information is overwhelming. If research could be summarised, it may be easier to use evidence in decision making. But where can clinicians find reliable evidence that has already been summarised?

Textbooks, while a synthesised body of information, may already be out of date by the time they are published. Colleagues, a phone call or email away, may provide valuable clinical expertise but the information may be biased. The Internet may provide quick access to health information, but much of it is unfiltered and misleading. Vast medical databases retrieve hundreds of articles in response to a search and those articles still need to be critically appraised and synthesised. Reviews of the literature, on the other hand, synthesise evidence making it ready to be used in decision making.

But not all reviews of the literature are created equal. A distinction between narrative reviews and systematic reviews has been made.[2] Narrative reviews are often wrongly assumed to provide definitive and comprehensive overviews of a disease or condition – one stop shops. These reviews are usually unfocused describing all areas of a topic: the condition, etiology, diagnosis, prognosis, and the effects of a range of treatments. They are often too broad and generalised, and include references to studies solely to prove a point. These reviews usually do not describe how the studies that support the claims were found, quality appraised, or analysed. It is also not clear whether recommendations for treatment are based on the totality of the literature or the literature the author wanted to bring to the attention of the reader. The potential for a biased presentation of the evidence is great. While useful to provide background information or the history of a disease and its management, narrative reviews are not likely to be the most reliable source of evidence to inform clinical decision making.

A systematic review, by contrast, is

a review of a clearly formulated question that uses sys-

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tematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyze data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyze and summarise the results of the included studies.[3]

The value of systematic reviews is a result of the explicit methodology. Systematic reviews focus on a specific question and identify studies to answer that question. Rigorous methods to find relevant studies according to strict criteria ensure that conclusions are based on all of the evidence and not just a few selected studies. Appraisal of the studies according to quality, and the methods for analyses of the results are transparent so that readers can understand how the authors made their conclusions and recommendations and can replicate the methods if needed.[4] The explicit methods used to summarise the large amounts of data limits bias and improves the accuracy of the conclusions making systematic reviews a reliable source of evidence to use in decision making.[4] Recognising and critically appraising reviews to ensure that they are reliable and systematic can be done using critical appraisal checklists, like the one found at http://www.phru.nhs.uk/casp/critical_appraisal_tools.htm. Or you can look for high quality systematic reviews that have been prepared by the Cochrane Collaboration.

The Cochrane Collaboration has prepared, maintained and updated systematic reviews since 1993. It is a not-for-profit organisation funded by a large variety of governmental, institutional and private funding sources, with a policy wide limit on the use of funds from corporate sponsors. In Canada, the Canadian Cochrane Network and Centre and Cochrane entities are funded by many of the Canadian Institutes of Health Research and the Canadian Agency for Drugs and Technologies in Health. In addition, organisations affiliated with the Canadian Centre, such as the Canadian Chiropractic Association, often support significant projects and initiatives. This support across Canada is testimony to the increasing recognition of the value of synthesising knowledge and systematic reviews in the research and clinical community.

Knowledge synthesis and systematic reviews are valuable to provide answers to different types of questions. Systematic reviews can answer questions such as "What are the effects of treatment X and is it safe?", "What is the risk of a disease Y", and "what are the views and experiences of patients with disease Y?" Cochrane systematic reviews focus on the question "What are the effects of treatment X and is it safe??" Cochrane has developed and uses a systematic approach and explicit methods to identify, analyse and summarise the results of randomised clinical trials – the most rigorous study design to evaluate whether an intervention has an effect. While other study designs can provide important information about long-term and rare toxicity (e.g. observational studies) or important information about reasons for non-compliance (e.g. qualitative designs), randomised controlled trials and systematic reviews of those trials provide best estimates of the benefits and often harms of a treatment.[5] To date, there are over 2 800 Cochrane systematic reviews evaluating the effects of health care interventions for the prevention, treatment and management of a large number of diseases.

Over 10,000 people across the world have been working to produce systematic reviews of the effects and safety of health care interventions. Orchestrating the production of Cochrane systematic reviews is the responsibility of Cochrane Review Groups. There are 51 Review Groups in the Cochrane Collaboration and each group produces reviews for a specific disease or condition, such as stroke, cancer or hypertension. Three groups, in particular, produce systematic reviews for musculoskeletal conditions: the Cochrane Back Group (http://www.cochrane.iwh.on.ca/), the Cochrane Bone, Joint and Muscle Trauma Group, and the Cochrane Musculoskeletal Group (http://www.cochranemsk.org). The Cochrane Musculoskeletal Group (CMSG) produces, maintains and disseminates systematic reviews of the prevention, treatment and rehabilitation of musculoskeletal diseases, such as rheumatoid arthritis, osteoarthritis, osteoporosis, ankylosing spondylitis and systemic sclerosis. A wide range of interventions are evaluated including prescription drugs, herbal supplements, acupuncture, massage, orthoses, etc.

The Cochrane Musculoskeletal Group coordinates the production and dissemination of these systematic reviews. This work is coordinated from two bases: one in Ottawa, Canada, under the leadership of Dr. Peter Tugwell, a rheumatologist; the other in Melbourne, Australia, under the direction of Dr. Rachelle Buchbinder, also a

FIGURE 1 Peter Tugwell,
Co-ordinating Editor of the Cochrane Musculoskeletal Group,
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FIGURE 2 Rachelle Buchbinder,
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rheumatologist. The core Group consists of an editorial team which includes statisticians, rheumatologists, allied health professionals, librarians, Review Group Coordinators (Lara Maxwell and Renea Johnston), and a Knowledge Translation Specialist (Nancy Santesso). Contributions are also made from peer reviewers and very active arthritis consumers. Peer reviewers are clinicians, researchers and consumers who volunteer to contribute to the group approximately four times a year. But it is the dedicated and hard work of authors who volunteer countless hours to identify, screen and appraise trials, and analyse and write the systematic reviews, who make up a large part of the CMSG group. There are over 200 people from around the world with different backgrounds who have authored CMSG reviews.

Anyone with an interest, time and dedication can write a Cochrane systematic review. But, it is highly recommended that a group of people with a wide range of expertise take on a systematic review. For example, a review team may include a clinician with topic expertise, a statistician, and a researcher. Most times, the team will also require some training in systematic review methodology. Training is provided by Cochrane Centres around the world. The Canadian Cochrane Network and Centre provides training sessions two or three times a year across Canada and there are also guidelines for writing systematic reviews set out in the *Cochrane Handbook for Systematic Reviews of Interventions*.[6] In addition, each Review Group provides varying levels of support to authors who are writing their first Cochrane Review. The team which includes experts from many disciplines including the topic area, statistics and information science can provide support. To help authors who undertake a review for a musculoskeletal disease, the CMSG has also developed tailored recommendations and tips in this area

of the literature.[7] The guidelines also include specific instructions for presenting results in a format that is clear and meaningful to a variety of audiences.[8] The goal is to enable people to write reviews and ensure that those reviews are of high quality and in a format ready to be incorporated into clinical decision making.

From start to finish – from idea to the formulation of a question to the search for articles and screening to the analyses and writing – a Cochrane Systematic review can take up to 2 years. Very similar to the time it might take someone to write any other review of the literature – except authors have the support of a Cochrane Review Group while conducting it. Different from a typical review, the publication of the review is not the finish; Cochrane reviews need to be updated usually every two years. Once authors sign up to write a Cochrane Review, they have an obligation to keep updating that review to ensure that the evidence is current.

To date, the CMSG has published 96 reviews and 68 reviews are in the process of being completed. Many of the reviews evaluate the effects of interventions relevant to chiropractors. All Cochrane reviews, including those relevant to chiropractors produced by the Back Group, the Bone, Joint and Muscle Trauma Group, and the CMSG, can be found on the Cochrane Library (http://www.thecochranelibrary.com). The Cochrane Library, with the exception of the northern territories, Saskatchewan, New Brunswick and for some in Nova Scotia, can only be accessed with a subscription in Canada. For now, individuals must obtain a personal subscription or access the Library through a university or hospital affiliation to read a Cochrane Systematic Review. Fortunately, abstracts and plain language summaries are available for free at http://www.thecochranelibrary.com or at the Cochrane Collaboration's web site at http://www.cochrane.org/reviews. Because of a unique relationship with the Arthritis Society of Canada, the plain language summaries of CMSG systematic reviews are also available in French and English on the Arthritis Society's web site at http://www.arthritis.ca/look at research/cochrane reviews.

What evidence does the CMSG have about interventions relevant to chiropractors and their patients? The CMSG has reviews about the effects of glucosamine for osteoarthritis, splints and orthotics, acupuncture, massage, ultrasound and electrical stimulation, and exercise for rheumatoid and osteoarthritis (see Table 1 for the results of a few selected reviews from CMSG). These reviews provide evidence for the effects and safety of interventions. Some reviews may conclude that there is not enough evidence to know whether treatments work or not. Contrary to some beliefs, these reviews with a conclusion of 'no evidence' or 'need more research' are just as valuable as reviews with more definitive conclusions. Consider the clinical decision making process:

There are three elements in evidence-based medicine and decision making: research evidence, clinical expertise and patient values.[8] When faced with a decision about a patient's care, systematic reviews can provide evidence about the benefits and harms of an intervention. That evidence needs to be adapted to the patient's unique condition and health status using clinical expertise. And each patient will place different value on the clinical benefits and harms of the intervention and on other issues, such as cost, convenience, etc. These values will be a factor in the clinical decision making process as well. So if, for example, a systematic review concludes "no evidence" for, say, the benefits and harms of braces and orthoses after 6 months of use, the clinician and patient should know. Knowing there is no evidence for or against the use of braces or orthoses will likely change judgements made according to clinical expertise and the patient's values. In this case, cost, comfort or past experience using a brace may be a considerable factor in the decision making process.

To use evidence to inform clinical decisions, clinicians need access to reliable research that has been synthesised. Clinicians often do not have time to search for, critically appraise, analyse and synthesise primary research to inform clinical decisions. For this reason, the Cochrane Collaboration was established. Members of the Cochrane Collaboration have made it their core business to produce reliable sources of synthesised research – systematic reviews. Continually refined methodology and the ongoing training of authors from across the world has ensured high quality systematic reviews are produced. The expertise that disease specific Cochrane Review Groups have also ensures that relevant questions and issues are addressed in a specific topic/disease area. The Cochrane Musculoskeletal Group answers questions related to musculoskeletal conditions which can be relevant to chiropractic care.

TABLE 1 Summary of results from selected systematic reviews from the Cochrane Musculoskeletal Group

INTERVENTION	*EFFECT*	*GRADE**
Acupuncture for rheumatoid arthritis[9]	Symptoms may not improve.	Silver
Acupuncture for shoulder pain[10]	Pain and function may slightly improve over the short term (2 to 4 weeks)	Silver
Braces and orthoses for osteoarthritis[11]	A brace is better than a neoprene sleeve which is better than no support to improve pain, stiffness and function. A laterally wedged insole may decrease pain and pain medication. Strapped insoles decrease pain and severity of osteoarthritis, but may cause pain in other areas but not severe enough to discontinue use. Follow-up was 6 months.	Silver
Glucosamine for osteoarthritis[12]	Pain does not improve as much as was previously found in another review when taking glucosamine for 2 to 3 months. Function may not improve at all or as much. Glucosamine seems to be safe.	Platinum
Intensity of exercise for osteoarthritis[13]	Status, gait, pain and aerobic capacity may improve with high and low intensity exercise for people with osteoarthritis of the knee.	Silver
Low level laser therapy for osteoarthritis[14]	Symptoms of osteoarthritis may not improve. But there is conflicting evidence that may be due to unknown dose, duration and type of laser and wavelength.	Silver
Low level laser therapy for rheumatoid arthritis[15]	Pain and morning stiffness may improve at 4 weeks. It does not appear, however, to have long-lasting effects. Most of the studies tested laser therapy on the hand, effects on other joints is unknown.	Silver
Shockwave therapy for elbow pain[16]	Pain and function do not improve.	Platinum
Tai Chi for rheumatoid arthritis[17]	Range of motion of the ankle, hip and knee may improve. Activities of daily living, grip strength, number of swollen and tender joints may not improve. No evidence was found for effect on pain or quality of life.	Silver
Thermotherapy for osteoarthritis of the knee[18]	Ice massage could be used to improve range of motion and strength of the knee, and improve function. Cold packs may be used to decrease swelling.	Silver

*Grading of the Evidence:

Platinum A published systematic review that has at least two individual controlled trials each satisfying the following –

- Sample sizes of at least 50 per group – if these do not find a statistically significant difference, they are adequately powered for a 20% relative difference in the relevant outcome.
- Blinding of patients and assessors for outcomes.
- Handling of withdrawals > 80% follow up (imputations based on methods such as Last Observation Carried Forward (LOCF) are acceptable).
- Concealment of treatment allocation.

Gold At least one randomised clinical trial meeting the criteria listed above.

Silver A randomised trial that does not meet the above criteria. Silver ranking would also include evidence from at least one study of non randomised cohorts that did not receive the therapy, or evidence from at least one high quality case-control study. A randomised trial with a 'head-to-head' comparison of agents would be considered silver level ranking unless a reference were provided to a comparison of one of the agents to placebo showing at least a 20% relative difference.

Bronze The bronze ranking is given to evidence if at least one high quality case series without controls (including simple before/after studies in which patients act as their own control) or if the conclusion is derived from expert opinion based on clinical experience without reference to any of the foregoing (for example, argument from physiology, bench research or first principles).

One of the guiding principles of the Cochrane Collaboration is 'wide participation'. Clinicians, researchers and consumers have actively participated in the work of the Collaboration, by writing systematic reviews, peer reviewing, advocating for the use of systematic reviews, and using systematic reviews to inform clinical decisions. New authors and peer reviewers are always welcome. Clinicians interested in becoming involved in the Collaboration or specifically in the Cochrane Musculoskeletal group can contact cmsg@uottawa.ca.

References

1 Davidoff F, Haynes B, Sackett D, Smith R. Evidence-based medicine: a new journal to help doctors identify the information they need. BMJ 1995; 310:1085–6.
2 Cook DJ, Mulrow CD, Haynes RB. Systematic reviews: synthesis of best evidence for clinical decisions. Ann Intern Med 1997; 126(5):376–80.
3 Higgins JPT, Green S, editors. Glossary of terms in the Cochrane Collaboration. Cochrane Handbook for Systematic Reviews of Interventions 4.2.5 [updated May 2005]. http://www.cochrane.org/resources/handbook/hbook.htm (accessed 30 August 2006).
4 Mulrow CD. Rationale for systematic reviews. BMJ 1994; 309(6954):597–9.
5 Tugwell P, Shea B, Boers M, Brooks P, Simon L, Strand V, Wells G (editors). Evidence-based Rheumatology. London: BMJ Books, 2004: xiv.
6 Higgins JPT, Green S, editors. Cochrane Handbook for Systematic Reviews of Interventions 4.2.5 [updated May 2005]. http://www.cochrane.org/resources/handbook/hbook.htm (accessed 30 August 2006).
7 Maxwell L, Santesso N, Tugwell PS, Wells GA, Judd M, Buchbinder R and the Editorial Board of the Cochrane Musculoskeletal Group. Method guidelines for Cochrane Musculoskeletal Group systematic reviews. J Rheum 2006 (in press).
8 Santesso N, Maxwell L, Tugwell PS, Wells GA, O'Connor AM, Buchbinder R, and the Editorial Board of the Cochrane Musculoskeletal Group. Knowledge Transfer to Clinicians and Consumers by the Cochrane Musculoskeletal Group. J Rheum 2006 (in press).
9 Casimiro L, Barnsley L, Brosseau L, Milne S, Robinson VA, Tugwell P, Wells G. Acupuncture and electroacupuncture for the treatment of rheumatoid arthritis. Cochrane Database of Systematic Reviews 2005, Issue 4. Art. No.: CD003788. DOI: 10.1002/14651858.CD003788.pub2.
10 Green S, Buchbinder R, Hetrick S. Acupuncture for shoulder pain. Cochrane Database of Systematic Reviews 2005, Issue 2. Art. No.: CD005319. DOI: 10.1002/14651858.CD005319.
11 Brouwer RW, Jakma TSC, Verhagen AP, Verhaar JAN, Bierma-Zeinstra SMA. Braces and orthoses for treating osteoarthritis of the knee. Cochrane Database of Systematic Reviews 2005, Issue 1. Art. No.: CD004020. DOI: 10.1002/14651858.CD004020.pub2.
12 Towheed TE, Maxwell L, Anastassiades TP, Shea B, Houpt J, Robinson V, Hochberg MC, Wells G. Glucosamine therapy for treating osteoarthritis. Cochrane Database of Systematic Reviews 2005, Issue 2. Art. No.: CD002946. DOI: 10.1002/14651858.CD002946.pub2.
13 Brosseau L, MacLeay L, Robinson VA, Tugwell P, Wells G. Intensity of exercise for the treatment of osteoarthritis. Cochrane Database of Systematic Reviews 2003, Issue 2. Art. No.: CD004259. DOI: 10.1002/14651858.CD004259.
14 Brosseau L, Robinson V, Wells G, deBie R, Gam A, Harman K, Morin M, Shea B, Tugwell P. Low level laser therapy (Classes I, II and III) for treating osteoarthritis. Cochrane Database of Systematic Reviews 2004, Issue 3. Art. No.: CD002046. DOI: 10.1002/14651858.CD002046.pub2.
15 Brosseau L, Robinson V, Wells G, deBie R, Gam A, Harman K, Morin M, Shea B, Tugwell P. Low level laser therapy (Classes I, II and III) for treating rheumatoid arthritis. Cochrane Database of Systematic Reviews 2005, Issue 4. Art. No.: CD002049. DOI: 10.1002/14651858.CD002049.pub2.
16 Buchbinder R, Green SE, Youd JM, Assendelft WJJ, Barnsley L, Smidt N. Shock wave therapy for lateral elbow pain. Cochrane Database of Systematic Reviews 2005, Issue 4. Art. No.: CD003524. DOI: 10.1002/14651858.CD003524.pub2.
17 Han A, Judd MG, Robinson VA, Taixiang W, Tugwell P, Wells G. Tai chi for treating rheumatoid arthritis. Cochrane Database of Systematic Reviews 2004, Issue 3. Art. No.: CD004849. DOI: 10.1002/14651858.CD004849.
18 Brosseau L, Yonge KA, Robinson V, Marchand S, Judd M, Wells G, Tugwell P. Thermotherapy for treatment of osteoarthritis. Cochrane Database of Systematic Reviews 2003, Issue 4. Art. No.: CD004522. DOI: 10.1002/14651858.CD004522.
19 Sackett DL, Straus SE, Richardson WS, Rosenberg W, Haynes RB. Evidence-based Medicine: How to Practice and Teach EBM. 2nd ed. Edinburgh: Churchill Livingston, 2000: 1.