

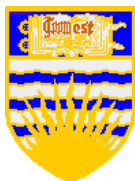
**SYSTEMATICALLY REVIEWING
NON-RANDOMISED CONTROLLED TRIAL
EVIDENCE ON COMPLEMENTARY
MEDICINE: A HEALTH TECHNOLOGY
ASSESSMENT PERSPECTIVE**

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UNIVERSITY OF BRITISH COLUMBIA

Systematically Reviewing Non-Randomised Controlled Trial Evidence on Complementary Medicine: A Health Technology Assessment Perspective

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ABSTRACT

BACKGROUND: Third party payers have recently begun to require assessment of the effectiveness of complementary medicine techniques for which there is research evidence but no randomized controlled trials. The Workers' Compensation Board of BC (WCB) and the British Columbia Office of Health Technology Assessment (BCOHTA) consequently undertook a joint systematic review of craniosacral therapy.

OBJECTIVES: To design a search strategy which was as inclusive as possible without forsaking systematic review and critical appraisal techniques. To gather and critically appraise the scientific basis of craniosacral therapy as a therapeutic intervention.

METHODS: Seven electronic bibliographic databases were searched from their starting date to February 1999 using predetermined search strategies and inclusion criteria. An evaluative framework was developed to accommodate a diverse and difficult literature, using the following dimensions: **A)** craniosacral interventions and health outcomes; **B)** validity of craniosacral assessment; **C)** pathophysiological mechanisms of the craniosacral system.

RESULTS: Thirty-four studies providing primary data on craniosacral therapy met inclusion criteria. The available health outcome research consists of low-grade of evidence derived from weak study designs. Adverse effects were reported when craniosacral therapy was used in brain-injured outpatients. Studies conducted in the 1970s reporting acceptable interrater reliability scores for assessment measures used by craniosacral therapy practitioners were not verified by more recent research using stronger study protocols. A causal relationship between restrictions or misalignments in the movement of cranial bones and health was not demonstrated.

CONCLUSIONS: Craniosacral therapy is not supported by scientific evidence. Policy makers found this systematic review of non-RCT evidence useful in gathering the evidence; rating the evidence against generally accepted research standards; and identifying its limitations.

1.0 INTRODUCTION

The Workers' Compensation Board of BC (WCB) and the British Columbia Office of Health Technology Assessment (BCOHTA) jointly developed a method to assess the effectiveness of complementary medicine techniques for which research evidence exists but does not include randomized controlled trials. The first project in which this method has been applied is a systematic review of craniosacral therapy.

Definition

Craniosacral therapy has been defined variously as:

“a systemic approach to evaluating and treating dysfunction occurring within the articulations of the skull”⁽¹⁾

and

“a structured diagnostic process that evaluates the mobility of the osseous cranium, the related mobility of the skull and sacrum and the palpation of the CRI (craniosacral rhythm impulse) throughout the body. Craniosacral osteopathic manipulative techniques attempt to restore motion to restrictions within individual sutures of the skull, the skull as a total entity, and the skull in relation to the sacrum, and apply inherent force to the articulations of the vertebral axis, rib cage and extremity.”⁽²⁾

Craniosacral practitioners (who include physiotherapists, chiropractors, dentists, and osteopathic, medical or naturopathic physicians, as well as other regulated and unregulated health care practitioners) claim that gentle pressure on external areas, such as the head and back, benefits patients with musculoskeletal problems, learning difficulties, sinusitis, trigeminal neuralgia, colic, and birth trauma.⁽³⁻⁵⁾

2.0 OBJECTIVES

In developing the overall appraisal method, the objective for both the BCWCB and the BCOHTA is to produce scientifically valid systematic reviews conducted with and supported by key individuals in various centres, and in addition, to further the dissemination of systematic review methodology.

The objectives of the present project were:

- To design as inclusive a search strategy as possible without compromising systematic review and critical appraisal techniques;
- To gather and critically appraise the scientific basis of craniosacral therapy as a therapeutic intervention.

3.0 METHODS

Recognizing both the lack of a clear definition and the limited number of studies on this subject, broad criteria were adopted for identifying relevant research.

Search strategy and sources

Seven electronic bibliographic databases were searched from their starting date to February 1999, using predetermined search strategies and inclusion criteria. Studies were included if they met pre-determined criteria, that is, if they reported: 1) primary data on any manual manipulation of the cranial sutures of the skull, and termed by the researchers as craniosacral therapy for the purpose of effecting health benefits; or 2) any primary research on any aspect of the craniosacral system put forward in the literature on craniosacral therapy as providing relevant evidence.

The search was not limited to any specific craniosacral therapeutic technique, research design, health condition, patient population or health outcome. A search protocol was developed, and is detailed elsewhere.⁽⁶⁾

Medline, Embase, Healthstar, Mantis, Allied and Alternative Medicine, Scisearch and Biosis electronic bibliographic databases were searched from their start date to February 1999. Search terms included 'craniosacral', 'cranial bones,' 'cranial sutures,' 'cerebrospinal pulse' and 'cerebrospinal fluid.' A "fugitive" literature search was conducted of relevant websites and professional organisations. Retrieved articles were also scanned for relevant citations.

Evaluative Framework

A three dimensional evaluative framework was specifically developed for assessing craniosacral therapy. Previous work in this area has provided theoretical support for two of the dimensions, namely clinical outcomes (**A**) and test performance (**B**).⁽⁷⁻⁹⁾

Pathophysiology was added as a third dimension (**C**). This aspect is of particular importance to the evaluation of complementary therapies, since, if efficacy is not established, questions arising from deficiencies in understanding or acceptance of underlying mechanisms will continue to fuel debate on the evidence.⁽¹⁰⁾

Critical appraisal criteria appropriate for the class of research were applied by each reviewer independently, compared, and disagreements resolved by discussion.

DIMENSION A. Appraisal of evidence pertaining to the effect of the complementary medicine intervention on health outcomes

Under Dimension A, evidence on the effectiveness of craniosacral therapy in altering health outcomes was graded according to the Canadian Task Force on Preventive Health Care^{*} guidelines⁽¹¹⁾ (**Table 1**). In addition, studies were appraised using a standard BC Office of Health Technology Assessment Intervention Study Appraisal Form (**Table 2**).⁽⁶⁾

Table 1. Canadian Task Force on Preventive Health Care: Grades of Evidence⁽¹¹⁾

GRADE	EVIDENCE
I	Evidence obtained from at least one properly randomized controlled trial.
II-1	Evidence obtained from well-designed controlled trials without randomization.
II-2	Evidence obtained from well-designed cohort or case control analytic studies, preferably from more than one centre or research group.
II-3	Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category.
III	Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.

^{*} Formerly the Canadian Task Force on the Periodic Health Examination.

Table 2: BCOHTA Intervention Study Appraisal Form ⁽⁶⁾



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INTERVENTION STUDY APPRAISAL FORM

Reference	Assessment			
	Excellent	Good	Fair	Poor
WHY	HOW		WHO	
Is sufficient evidence presented to justify the study?	STUDY DESIGN controlled trial <input type="checkbox"/> prospective analytic study <input type="checkbox"/> retrospective analytic study <input type="checkbox"/> before-after study cross-sectional study case series		Is the population from which the sample is drawn CLEARLY described?	
Is there a CLEAR statement of the purpose of the study			Are inclusion and exclusion criteria specified and replicable?	
Is there a CLEAR statement of the study hypothesis?			Do the inclusion and exclusion criteria match the goals of the study?	
<input type="checkbox"/> Is it clearly outlined whether the study is considering: EFFICACY or EFFECTIVENESS?			Do the authors account for every patient who is eligible for the study but does NOT enter it?	
COMMENTS	If it is a controlled trial, is the allocation of subjects TRULY randomized?		Is the baseline comparability of the treatment and control groups documented?	
	BLINDNESS Unblinded double-blind single-blind triple-blind		COMMENTS	
	Was prognostic stratification used?			
	COMMENTS			

2.

WHAT	HOW MANY	SO WHAT
What is the intervention? Is it clearly defined and replicable?	Was statistical significance considered?	ÿ If differences were detected, were they clinically significant?
Was compliance with intervention(s) measured and were non-compliers analyzed correctly?	ÿ Were statistical tests applied appropriately?	ÿ Were the patients entered and analyzed in the study sufficiently representative that the results can be generalized to other patients?
Were CONTAMINATION and CO-INTERVENTION considered?	ÿ How many tests of hypothesis (p-value) appear in the article?	ÿ Was the intervention as performed by those in the study sufficiently representative that the results may be generalized to other settings?
ÿ Were all patients who entered the study accounted for?	ÿ Did the authors consider sample size requirements prior to the study?	ÿ Were the outcomes assessed in the study sufficient to guarantee which of the therapies under study does the greatest good?
ÿ Were withdrawals, drop-outs, cross-overs, and poor compliers analyzed in accordance with the aims of the study?	ÿ When no differences were found, was there any consideration of possible β -error?	COMMENTS
ÿ What outcome measures were utilized? Were all the relevant outcomes reported?	ÿ Was the study large enough to detect important differences?	
COMMENTS	COMMENTS	

DIMENSION B. Appraisal of evidence evaluating the validity of diagnostic methods used by complementary medicine practitioners

Under Dimension **B**, evidence was reviewed on the reliability of craniosacral assessments. Criteria were developed from two relevant sources, relating first to assessment of observer variability, and second to assessment of diagnostic tests.

First, the most fundamental of all scientific processes is observation, to be made in accordance with accepted standards appropriate to scientific activity. Such standards strive primarily to ensure *objectiveness*, achieved in part by ensuring the replicability of observations by multiple independent observers. Evidence was therefore appraised following Feinstein's principles for appraising evidence in observer variability⁽¹²⁾ (**Table 3**).

Table 3. Appraisal of evidence on observer variability (Feinstein 1985)⁽¹²⁾

- **Purpose:** Was the goal of the research clearly specified? Was it to demonstrate or to remove observer variability?
- **Input challenge:** Was the group of specimens or subjects suitably representative of both the customary group and the scope of entities exposed to this procedure?
- **Procedural components:** Was the research aimed at the instrumental methods, the performing observers, or both? If the research was aimed at only one of these components, was the other component suitably standardized?
- **Observations:** Were they made independently or, if necessary, "blindly"?
- **Observers:** Were they appropriately competent and suitably chosen for performing the procedure?
- **Scale of reporting output:** Was the scale expressed in a satisfactory manner? Was it chosen and agreed upon before the research began? Should it have been chosen beforehand?
- **Scale of disagreement:** Was a suitable scale desirable or necessary for describing the disagreement between any two readings? If so, was such a scale developed and was it satisfactory? If each specimen received more than two readings (i.e., multiple observers), how did the investigators deal with an index of multiple disagreement?
- **Index of concordance:** Were the results expressed in a suitable statistical index of concordance? Did it make provision for agreement that might have occurred by chance alone?
- **Procedural criteria:** Were criteria stated or developed for the first-phase process of converting observations into raw data?
- **Interpretation criteria:** Were criteria stated or developed for the second-phase process of converting the raw data into the output scale of interpretation?
- **Analysis:** Was the source (or sources) of variability identified by evaluating disagreements in basic raw data as well as in categories of interpretation?
- **Improvements:** Were attempts made to have the observers confront their disagreements and try to determine (or remove) the sources of dissent?
- **Recommendations:** Were any suggestions made about how to improve the defects that were noted?

Second, craniosacral assessments are the means by which dysfunction in the cranio-sacral system is “diagnosed”, and consequently, research methods for comparing the performance of diagnostic tests to a gold standard test apply. Sackett et al.⁽¹³⁾ have described how articles of this nature may be reviewed, and their eight “guides” were therefore adopted (**Table 4**).

**Table 4. Critical appraisal criteria for journal articles on diagnosis
(Sackett et al.)⁽¹³⁾**

1. Is the article a report of an original study or a critical review that is directly relevant to your clinical practice?
2. Purpose of the study?
3. Was the test compared blindly with a gold standard?
4. Was there an adequate spectrum of disease among patients tested?
5. Was the referral pattern described?
6. Was the description of the test clear enough to reproduce it?
7. Was the test reproducible (observer variation)?
8. Was the contribution of the test to the overall diagnosis assessed?

DIMENSION C: Appraisal of evidence relating the pathophysiology of a complementary medicine system to poor health outcomes

Under Dimension C, we reviewed evidence relating the pathophysiology of craniosacral therapy to health outcomes and in support of craniosacral manoeuvres. Evidence was sought that might show a causal relationship between restrictions and misalignments in the movement of cranial bones, and health. The basic features of associations that support causation, outlined by Hill ⁽¹⁴⁾ (**Table 5**), were applied to the available evidence. Given the heterogeneous nature of the study designs employed, other research pertaining to the pathophysiological basis of the therapeutic underpinnings of this therapy was evaluated using relatively non-specific criteria of research quality, as defined in the literature (**Table 6**).

Table 5. Criteria for examining a causal relationship (Hill 1978) ⁽¹⁴⁾

CAUSATION CRITERIA
• Strength of association
• Consistency of the observed evidence
• Specificity of the relationship
• Temporality of the relationship
• Biological gradient of the dose-response
• Biological plausibility
• Coherence of the evidence
• Experimental confirmation
• Reasoning by analogy

Table 6. Appraisal principles applied to research design

PRINCIPLES APPLIED
• Was the research design appropriate?
• Were sampling techniques representative?
• Were the outcome measures reliable and valid?
• Were the methods of analysis appropriate?

3.0 RESULTS

Thirty four studies providing primary data on craniosacral therapy met the inclusion criteria. None of these studies used strong study designs such as RCTs, and therefore efficacy claims remain weak. The available health outcome research consists of low-grade evidence derived from weak study designs. Adverse effects were reported when craniosacral therapy was used in brain injured outpatients. Studies conducted in the 1970s reporting acceptable interrater reliability scores for assessment measures used by craniosacral therapy practitioners were not verified by more recent research using stronger study protocols. A causal relationship between restrictions or misalignments in the movement of cranial bones and health outcomes was not demonstrated.

4.0 DISCUSSION

Some advocates of complementary medicine argue that complementary methods cannot be adequately evaluated using rigorous scientific methodology.⁽¹⁵⁾ This point of view has been countered successfully by groups such as the Quantitative Methods Working Group of the U.S. National Institutes' of Health Office of Alternative Medicine,⁽¹⁶⁾ as well as the Cochrane Complementary Medicine Field.⁽¹⁷⁾ Many validated measures of a variety of health outcomes exist to measure 'positive patient outcomes'. Complex complementary medical systems can be studied as 'gestalts' (integrated wholes) for the purpose of evaluation from within an intervention/trials framework. Claims that the scientific methods currently available are not suitable for evaluating the therapies variously categorized as 'non-traditional', 'alternative', or 'complementary' are not valid.

4.0 CONCLUSION

This systematic review and critical appraisal found that craniosacral therapy is not supported by scientific evidence. Research methods able conclusively to evaluate effectiveness or lack of effectiveness of craniosacral therapy as an intervention have to date not been applied.

This project succeeded in disseminating techniques of systematic review and critical appraisal methodology for subsequent application by the WCB committee facing a series of clinical efficacy questions similar to those arising from craniosacral therapy. The committee and the WCB remain committed to supporting therapies which have a defined clinical benefit for an identifiable condition in a recognizable patient population.

REFERENCES

1. Rogers JS, Witt PL. The controversy of cranial bone motion. *J Orthop Sports Phys Ther* 1997 Aug;26(2):95-103.
2. Greenman PE, McPartland JM. Cranial findings and iatrogenesis from craniosacral manipulation in patients with traumatic brain syndrome. *J Am Osteopath Assoc* 1995 Mar;95(3):182-88.
3. Hollenbery S, Dennis M. An introduction to craniosacral therapy. *Physiotherapy* 1994 Aug;80(8):528-32.
4. Upledger JE. The relationship of craniosacral examination findings in grade school children with developmental problems. *J Am Osteopath Assoc* 1978 Jun;77(10):760-76.
5. Frymann VM, Carney RE, Springall P. Effect of osteopathic medical management on neurologic development in children. *J Am Osteopath Assoc* 1992 Jun;92(6):729-44.
6. Green CJ, Martin CW, and Bassett K. A systematic review and critical appraisal of the scientific evidence on craniosacral therapy. Vancouver, BC: University of BC, 1999. British Columbia Office of Health Technology Assessment Report 99:1J
7. Kazanjian A, Cardiff K, Pagliccia N. Design and development of a conceptual and quantitative framework for health technology decisions: a multi-project compendium of research underway. Vancouver, BC: University of BC, 1995. BC Office of Health Technology Assessment Report 95:2D.
8. Kazanjian A. Doing the right thing, not just doing things right. In: Gender Working Group, United Nations Commission on Science and Technology for Development. Missing links: gender equity in science and technology for development. New York: International Development Research Centre in association with Intermediate Technology Publications and UNIFEM, 1995, p. 159-80.
9. Green CJ, Bassett K, Kazanjian A. Bone mineral density testing: Does the evidence support its selective use in well women? Vancouver, BC: University of BC, 1997. BC Office of Health Technology Assessment Report 97:2R.
10. Lewith G, Kenyon J, Lewis P. Complementary medical research: tactics strategies, and problems. In: *Complementary Medicine: An integrated approach*. Oxford: Oxford University Press; 1996. p 14-20.
11. Dingle JL. Methodology. In: *The Canadian Task Force on the Periodic Health Examination. The Canadian guide to clinical preventive health care*. Ottawa: Minister of Supply and Services; 1994
12. Feinstein AR. *Clinical epidemiology: the structure of clinical research*. Philadelphia (PA): WB Saunders; 1985. p.648
13. Sackett DL, Haynes RB, Tugwell P. *Clinical Epidemiology: a basic science for clinical medicine*. Boston (MA): Little, Brown; 1991.

14. Hill AB. Principles of medical statistics. New York: Oxford University Press; 1971.
15. Upledger JE. Research and observations that support the existence of a craniosacral system. 1995 [cited 1998 Apr 15]. Available from: URL: http://www.cranio.org/JEU_Article_en.htm.
16. Levin JS, Glass TA, Kushi LH, Schuck JR, Steele L, Jonas WB. Quantitative methods in research on complementary and alternative medicine. A methodological manifesto. NIH Office of Alternative Medicine. Med Care 1997 Nov;35(11):1079-94
17. Cochrane Collaboration. Cochrane complementary medicine field. In: The Cochrane Library [database on CDROM]. Oxford: Update Software; 1998. Issue 3.