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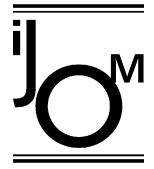


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Commentary

Teaching critical thinking in osteopathy – Integrating craft knowledge and evidence-informed approaches

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Abstract

Educators in the field of osteopathic manipulative medicine have a responsibility to encourage critical thinking and integration of evidence-based knowledge. Important strategies for osteopathic educators include discussion of relevant evidence as part of classroom osteopathic manual technique training; problem-based or case-based critical appraisal exercises which focus on the management of actual patients; and provision of adequate information resources in teaching clinics to support evidence-based practice. Where evidence conflicts with a particular paradigm, educators should be prepared to adapt and modify their teaching. A pragmatic approach for teaching osteopathic technique where evidence conflicts with aspects of theory and practice is outlined, using a case study from the author's experience in teaching muscle energy technique as an example of using an evidence-informed and critical thinking approach to motivate and empower students, rather than engender disillusionment or 'evidence nihilism'.

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Keywords: Osteopathic medicine; Osteopathy; Evidence-based medicine**1. Introduction**

The teaching of osteopathic manipulative medicine (OMM) has traditionally been based on the opinions of experts and underpinned by biomechanical and physiological models that appeared plausible in light of the evidence that was available at the time of initial development. It may be argued that educators and practitioners in the field of OMM have been slow to adapt to changing – and challenging – scientific evidence, and that collectively the profession has tended to cling to outdated models, theories and practices. Furthermore, some practitioners (and educators) view evidence-based medicine (EBM) as a threat to their style of practice and credibility as an educator. Worse still, critical reflection and

appraisal may be actively discouraged in some academic environments, especially when it is seen to threaten the authority and palpatory abilities of the educator, and a classroom atmosphere of uncritical acceptance of everything 'osteopathic' is created.

Why should educators bother employing critical thinking and evidence-based approaches in their teaching? Hasn't our teaching approach been successful in the past? Will EBM threaten the teaching of a wide range of techniques and approaches? Is EBM compatible with osteopathy?

The manual medicine world has changed over the last few decades, and it is now an expectation – from government bodies, insurers, consumers and students – that health professionals are well informed of current evidence as it relates to their discipline, and that their practice reflects this. In essence, EBM encourages 'best practice', and involves the "integration of best research

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evidence with clinical expertise and patient values”.¹ Failure to adopt and integrate EBM approaches may lead to the osteopathic profession becoming progressively irrelevant in the sphere of manual medicine and healthcare. In order for the profession to remain viable in the face of expectations for evidence-based practice, we need to graduate students who are critical thinkers, who have a sound understanding of the current *best research evidence* that pertains to their practice (especially patient-centered, clinically relevant research), and who can integrate this knowledge with *clinical expertise* and *patient values* to deliver the best holistic approach for patient care. In this context, *clinical expertise* has been defined by Sackett et al.¹ as “the ability to use our clinical skills and past experiences to rapidly identify each patient’s unique health state and diagnosis, their individual risks and benefits of potential interventions, and their personal values and expectations”, and patient values as “the unique preferences, concerns and expectations each patient brings to a clinical encounter and which must be integrated into clinical decisions if they are to serve the patient”.

Educators in the field of OMM have a responsibility to encourage critical thinking and integration of EBM knowledge. It is no longer sufficient for educators to simply teach what they were taught without engaging in critical appraisal of the material, including both practice techniques and theoretical material. The adoption of EBM principles into osteopathic teaching poses many challenges for osteopathic educators, particularly in the case where evidence refutes a particular diagnostic, therapeutic or conceptual approach. To date, the reliability and validity of few manual diagnostic procedures are supported by best research evidence, and this can present challenges for educators tasked with presenting academically sound material but being careful not to engender a dispirited attitude in students. How can we install a sense of evidence-based practice without creating evidence ‘nihilism’ and disillusioning our students at an early stage? What is the best way to encourage practice-based critical thinking in our students? The following sections will overview strategies for teaching critical thinking and the integration of EBM for students, and recommendations are made for osteopathic educators.

2. The challenge of EBM

Evidence-based medicine has many critics. The over emphasis and rigid adoption of the ‘best research evidence’ — particularly when so few studies have even been conducted or their relevance to clinical practice is questionable — may limit practice options in a way that EBM was not intended to do. Evidence-based medicine was intended to *integrate* individual clinical expertise with the best external evidence. Sackett et al.¹ clearly

describe EBM as combining best research evidence and clinical expertise and patient values together. However, some critics consider EBM as having become a rigid dogma, and “a constricting, insensitive religion preached by the few and meant to be followed blindly by the masses.”² Worse still, some see that EBM principles may be increasingly applied to disease management, with its economic and cost-cutting implications, rather than disease cure or treatment.³

Bluhm⁴ argued that the EBM hierarchy of evidence (actually a hierarchy of methods) is short-sighted, and ranks evidence not according to relevancy or effectiveness, but according to study method. Randomised controlled trials and population research is concerned primarily with health outcomes from large groups; however, this may limit the application of the research in informing about individual patients. Bluhm recommended that the hierarchy should be replaced by a network that takes into account the relationship between epidemiological and laboratory research.

Michelson⁵ lamented that the use of common sense is not encouraged in the EBM literature, and events of physically required causality and those that are highly obvious to the casual observer are not well served by the paradigm that ‘truth’ can be gleaned exclusively from statistical studies. The method of gathering evidence to answer a specific clinical question, Michelson noted, is only as reliable as the ability to pose the original question so that it satisfactorily represents the actual clinical situation.

Despite Sackett’s definition of EBM as the “integration of best research evidence with clinical expertise and patient values”, it has been argued that the actual practice of EBM has failed to take into account of other kinds of medical knowledge, such as those derived from clinical experience or based on pathophysiologic rationale.⁶ Avis⁷ suggested that EBM overemphasizes the value of scientific evidence while underplaying the role of clinical judgment and individual expertise, and that critical reflection on evidence derived from science, arts and humanities and, in particular, practice experience is vital.

Mootz⁸ has used the term ‘evidence appropriatism’ for the appropriate integration of evidence to better inform the choices in making clinical decisions, and not to regulate them. Less appropriate responses to EBM include ‘evidence nihilism’, which represents the perspective that one cannot act until definitive evidence is available, and ‘evidence agendaism’, which reflects the selective use of evidence to bolster one’s preconceived notions.⁸

It is clear that critical thinking and honest self-reflection are necessary for successful integration of EBM evidence into practice. The implementation of EBM was never intended to be rigidly governed by the outcomes of a few randomised controlled trials — a picture

sometimes painted by EBM critics. Evidence-based practice, depending on one's definition of evidence, is probably a misnomer, and the term 'evidence-informed osteopathy' may be a more accurate and acceptable term.⁹

It is also clear that exposure to and integration of critical thinking and EBM principles should occur during entry-level professional training, rather than 'one-off' sessions for practicing osteopaths. Although some researchers have reported that workshops for practitioners improves their ability to critique published studies,^{10–12} 'one-off' courses have been found to have little effect on overall attitude toward evidence, other areas of critical appraisal skills ability, as well as practice behaviour.^{12–15} A range of healthcare professionals (including nurses, clinical governance managers, physiotherapists, general medical practitioners and pharmacists) have reported that the main barriers to EBM were time required to keep up to date, access to easily understandable summaries of evidence, journal access and lack of personal skills.^{16,17} This highlights the need to ensure integration of EBM and critical thinking during professional training, in order to develop professionals with an 'evidence-informed' attitude and approach to practice.

3. Strategies for the integration of EBM and critical thinking into osteopathic training

Critical thinking skills and EBM are interdependent approaches; one approach cannot be adequately taught or practiced without the other. Practicing an EBM approach requires critical appraisal to interpret the strength and relevance of research evidence in order to appropriately integrate it with clinical expertise. Many educators and scholars recommend that teaching critical thinking skills should be participatory, practical, problem-based, and that evidence should be interpreted in the context of individual patient decision making.^{18–21}

Important strategies for osteopathic educators include:

1. Introduction and discussion of relevant evidence: As part of classroom osteopathic manual technique training, the instructor should outline the evidence as it relates to the technique and of the reproducibility and accuracy of physical and clinical tests.¹⁸ This material should not be limited to a single course of study (such as a one semester 'EBM' unit), but be integrated across the teaching of all practical and theory based classes. For instance, a class dealing with the teaching of a manual technique should include discussion of the evidence for the reliability of the diagnostic process, the mechanisms underlying the technique and the efficacy of the technique. This is a useful exercise even when there is no
2. high-quality evidence to support or refute an approach. Students are empowered by their perception of having mastery of the relevant evidence concerning a manual approach, even when they know that it is based largely on expert opinion and research is yet to be conducted; conversely, students are disheartened and discouraged when they feel ignorant of the evidence underpinning a therapeutic approach, particularly when they have unanswered doubts concerning the evidence and validity of a manual method.
2. Problem-based or case-based critical appraisal exercises: Participatory activities should focus on high-priority clinical problems, with application of the activities to the management of actual patients.¹⁸ Clinical problems should be delivered in the form of student discussions that are facilitated by faculty¹⁹; the aim of this discussion is to apply critical thinking and EBM to practical patient scenarios. Problem-based learning involves small groups in an open enquiry process with little guidance from the teacher to solve a clinical problem. Case-based learning is similar, but involves more pre-session preparation and guidance from the facilitator. Medical faculty and students have been reported to prefer case-based learning,²² and this is probably more appropriate for osteopathic educational curriculums. Case-based learning should include the goals of precisely defining a patient problem and what information is needed to solve it, conducting efficient searches of relevant literature encompassing the full range of the knowledge base of interest,¹⁹ selecting the best of relevant studies and applying rules of evidence to determine their validity, research critiquing and rating evidence along a continuum for strength and quality.¹⁹ Students should be able to succinctly present to colleagues the important content of an article with its strengths and weaknesses and extract the clinical message and applying it to the patient's problem.¹⁸ Critically appraised topics (CATs) are short, one to two page summaries of the available evidence pertaining to a specific clinical problem or scenario encountered in practice,²³ and students could prepare specific CATs for 'journal club' presentations.²⁴ These problem-based exercises could be taught in units that aim to focus on clinical reasoning and problem solving, but such approaches should be adopted throughout the program, and integrated as part of the teaching of any practical clinical technique or approach.
3. Resources available in teaching facilities and clinics: Easily accessible electronic literature searching and information retrieval (including full text, Evidence Summaries, Best Practice Guidelines, etc.) and case-based interactive software.¹⁸ It is important that critical thinking and EBM strategies are put

into practice during clinical training, so an environment with resources that support and enables these practices is essential.

4. Recruitment of clinical educators who support evidence-informed osteopathy: Efforts need to be made to recruit into teaching roles practitioners who support and practice evidence-informed osteopathy.¹⁸ It is important to encourage osteopaths who have a commitment to critical thinking into teaching, and create opportunities for faculty to share and discuss their approaches to teaching. Commitment to EBM approaches should be included as essential criteria in the position description of any new appointment and staff training and support mechanisms are important for both new and experienced teaching staff. Performance review criteria of all staff (both classroom and clinical) should include reference to implementing critical thinking in teaching.
5. Assessment of searching and critical appraisal skills: Assessment drives student learning and so critical appraisal skills should be assessed throughout a program. There is, however, a lack of research into appropriate measures of critical thinking, particularly for post-graduate education.^{20,25} Seldomridge and Walsh²⁵ noted that existing instruments may be of limited use because they focus on the measurement of formal logic and general thinking skills, and recommended the development of discipline-specific measures to illustrate thought and reflection appropriate to the skills needed for the specialty. It is up to the osteopathic profession to define the critical thinking skills most relevant to the discipline and develop standardized instruments to assess these skills.

In an EBM environment, it is reasonable to ask whether there is evidence to support the usefulness of critical thinking training. Ironically, there is little data available to assist in making such a judgment.^{25,26} A few studies have reported success after implementation of a critical appraisal or EBM training in education institutions, but these positive results are usually of specific appraisal tasks or student satisfaction.^{27–30} Training sessions for practitioners have been reported to improve appraisal tasks or attitudes,^{10–12} but not to change practice.^{12–15} Consistent with the discussion above concerning evidence nihilism and evidence-informed practice, common sense suggests that critical thinking and EBM training that is integrated into osteopathic entry-level education will produce more reflective practitioners, with high-level problem solving skills and ability to integrate changing evidence into their clinical practice. There is a difference, however, between equipping students with critical thinking skills and having students use these skills in practice, and it is possible that personal character traits and values play an

important role in the application of these skills.³¹ Facione³¹ observed that there are seven aspects of the overall character disposition toward critical thinking: truth-seeking, open-mindedness, analyticity, systematicity, critical thinking confidence, inquisitiveness, and cognitive maturity. Educational institutions may consider employing methods for screening applicants for these characteristics in order to supply the profession with graduates who are more likely to integrate critical thinking in their practice.

4. What to do when evidence clashes with theory and practice?

Many osteopathic educators would recognize the uncomfortable classroom situation where the educator is aware of best research evidence that contradicts aspects of a diagnostic or therapeutic model which is included in the teaching curriculum. Most of our diagnostic and therapeutic approaches lack the support of high-quality evidence, many lacking support of any type of evidence other than expert opinion. Lack of evidence, of course, does not equal disproof, and approaches should not be abandoned on this basis alone. Evidence-based medicine is the “integration of best research evidence with clinical expertise and patient values”¹ and the importance of considering patient preferences and expectations of therapeutic benefit is emerging as a very important variable that is capable of influencing the response to a therapy.^{32,33} When little or no systematic clinical evidence exists to support a therapeutic approach, then practice of the approach may still be justified based on other types of evidence – biological rationale, experimental evidence from basic science, expert opinion – and the practitioner’s clinical judgment. It is a useful classroom exercise to ask “What can we reasonably say...” in regard to the diagnostic, therapeutic mechanisms and efficacy of the particular manual approach being taught.

But what should we do when mounting evidence contradicts a particular diagnostic, biomechanical or therapeutic approach? In this situation, educators are faced with several choices. They may choose to continue teaching as they always have and ignore the conflicting evidence, and hope that students do not raise the issue and challenge their authority. They may decide to mention the existence of conflicting evidence, but be dismissive of its relevance. Alternatively, educators can attempt to examine and – if possible – reconcile the conflicting evidence with osteopathic practice, and modify the content and approach of the teaching session to be based more on substantial supporting evidence and less on promulgating practices that are clearly not supported by evidence. This last approach is pragmatic in that it does not dispose of everything that is

unsupported by evidence. However, such an approach requires a willingness to change and adapt when the circumstances make it reasonable to do so. This approach to teaching should result in thoughtful reflection by staff and students on the current theory and practice of the technique or modality. If teaching staff adopt a more critical (but not cynical) approach to previous practice and theory, they should be more open to change when the weight of evidence makes inaction nothing short of clinging to dogma.

The educator has a duty to critically examine evidence and change their teaching accordingly. When sufficient evidence exists that change becomes necessary, educators have a responsibility to engage in scholarship in order to establish and document new theoretical knowledge that underpins teaching and practice. Educators who intentionally choose to sustain the status quo, despite the emergence of evidence that is sufficient to support change, may be guilty of academic dishonesty. Such actions may repress critical thought and perpetuate unscientific dogma to future clinicians. Such educators do their students, their profession and not least of all patients a disservice and may ultimately threaten the credibility and viability of the profession. The profession has been changing and developing since its inception, but fear of scrutiny and of change from elements within the profession (who may believe they are protecting 'real osteopathy', despite the fact that their preferred approach most likely evolved from clinicians who were not scared of change) is not warranted. Osteopathy must continue to develop; if it is 'time capsuled' by modern practitioners, it will become isolated from mainstream healthcare practice and health policy, and will atrophy and eventually become recognised as an unscientific craft group.

5. Case study: muscle energy technique: an approach for reconciling a clash

The author has taught muscle energy technique (MET) to osteopathy students at university level for 10 consecutive years and will outline one approach that attempts to reconcile conflicting evidence in a way that empowers students, rather than disempowers and disillusion them. As evidence of the deficiencies in the widely accepted diagnostic, biomechanical and therapeutic models became apparent,^{34–37} the author appealed to the profession for more critical consideration and the need for change.^{38–40} In short, many of the diagnostic approaches traditionally taught in MET – based on Fryette's biomechanical principles and Mitchell's pelvic model – have been demonstrated to have poor reliability and questionable validity. Additionally, the traditional explanations for the therapeutic effect of the MET approach lacks support from

contemporary research, and explanations more consistent with modern evidence have been offered.^{38,40}

The author progressively introduced overview and discussion of the related evidence (basic science; diagnostic reliability and validity) in the classroom, and modified the teaching of the subject using a more evidence-informed and pragmatic approach. In the author's experience, when students have a clear idea of the evidence base for practices and techniques, their confidence in the approach can be strengthened because they become empowered by perceived intellectual mastery of the relevant literature. This in turn inspires confidence and allows informed choice to base treatment on methods supported by scientific evidence or – when appropriate in their judgment – to use approaches that are less supported.

In MET teaching sessions, discussion of the evidence relating to diagnostic procedures allowed students to choose whether to base diagnosis on approaches that had relatively limited – but supported – evidence (palpation for tenderness, pain provocation tests, gross and regional motion asymmetry, single plane motion restriction, a cluster of sacroiliac joint tests) or choose – based on their clinical reasoning and the weighing of a range of different types of evidence – to incorporate diagnostic elements that were not well supported by scientific evidence. Over-reliance on palpation of static landmark asymmetry or the isolated use of the flexion tests to identify the putative dysfunctional sacroiliac joint, as advocated by many MET authorities,^{34–37} was discouraged. A pragmatic approach of treating what dysfunction was reasonably apparent was adopted, rather than the insistence that students locate joint barriers in all three planes of motion, something which is routinely conveyed in textbooks but that evidence informs us is unachievable in most situations.

The teaching approach of encouraging students to engage in exploring the existing supporting evidence, combined with a pragmatic common sense ('reasonableness') approach to diagnosis and treatment, allowed students to gain confidence by a sense of mastery of knowledge (knowing 'exactly where they stand'), while developing the necessary hands-on skills. This approach still allowed students sufficient attitude to explore and use techniques that are less supported by evidence. Anonymised student evaluations of the course including the teaching approaches were conducted each year to assess the level of student satisfaction and motivation to learn as well as to provide an opportunity for student feedback and suggestions. Based on student evaluation data from this course, students responded very positively to this teaching approach. The incorporation of critical thinking and evidence-based principles in osteopathic programs can be achieved in a way that has a positive influence on students, despite the limited support of evidence for many manual techniques.

6. Web resources

The following web resources provide useful information for teaching critical thinking and evidence-informed practice:

<http://www.cebm.net/>
<http://www.cebm.utoronto.ca/teach/materials/>
<http://www.eboncall.org/>
<http://www.cochrane.org/>

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