

New Horizons for Research and Education in Osteopathic Manipulative Medicine

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Methods for evaluating and quantifying manual techniques using modern scientific standards must be established to advance and more fully understand the practice of osteopathic manipulative medicine. I applaud Rafael Zegarra-Parodi, DO (England), MEd, and his colleagues for initiating such research in the field of cranial osteopathy, as described in this month's issue of *JAOA—The Journal of the American Osteopathic Association* (2009;109:79-85).

The goal of this month's cover article was to demonstrate that instructional methods are effective in ensuring adequate replication of cranial palpatory techniques learned by osteopathy students at the European Center for Osteopathic Higher Education in Paris, France.

In their prospective, unblinded observational study, Zegarra-Parodi and coauthors used a flexible force transducer to evaluate the pressures generated during palpation of the frontomalar suture by 24 fourth-year osteopathy students with 2 years of training in cranial osteopathy. Twelve student practitioners randomly assigned to the study group participated in a single 40-minute training session consisting of description, demonstration, and practice of established methods for evaluation of the frontomalar suture. The 12 student practitioners in the control group did not receive training. A third group of 12 students acted as subjects.

Results showed that the mean pressure used during each test ranged from 0.27 N/cm² to 0.98 N/cm². The mean

palpation pressure recorded by the study group was 0.55 N/cm² and by the control group was 0.53 N/cm². The authors concluded that the training protocol was ineffective in improving the precision of cranial palpation.

To identify potential reasons why the training session was ineffective, the current recommendations for teaching palpatory skills must be reviewed. Typically, students obtain cognitive knowledge from didactic presentations in anatomy, biomechanics, and dysfunction and combine that information with the subjective assessment of observing an expert apply the technique. The trainee then performs the technique by attempting to mimic the demonstrated movements^{1,2} and receives verbal feedback from an expert, ideally soon after the technique was performed so the student can easily compare the feedback to the memory of performing the technique. This feedback is considered critical for a student to learn which component of a technique was not adequately applied.³⁻⁵

From that moment on, students generally repeat the technique in unmonitored settings. Theoretically, this process creates skilled and safe clinicians who have developed preprogrammed patterns of action—or *engrams*—to reduce the need of high mental effort during skill performance so interventions can be accurately and efficiently applied within the clinic setting.^{6,7}

In the two primary environments where most nonresidency training in manipulation occurs—colleges of osteopathic medicine or osteopathy schools and continuing medical education programs—there is often only one or a limited number of instructors overseeing numerous trainees. As a result, timely individualized verbal feedback and adequate time for technique repetition and refinement are routinely compromised. With only one instructor for 12 students

in a 40-minute training session in the study by Zegarra-Parodi and coauthors, it appears that students' time for feedback and practice was extremely limited, which is inconsistent with current recommended training standards.

Another assumption made in this study was that the students were "untrained." Both cohorts had 2 years of training in osteopathy in the cranial field. Two years is a substantial amount of time to establish a particular style, pattern, or engrams for cranial palpation. It seems unlikely that a single instructional event would modify the patterns developed in 2 years of training and experience palpating and treating lab partners, family, and friends.

The underlying physiologic processes involved in manual diagnosis and osteopathic manipulative treatment (OMT) are extremely complex, requiring high levels of sensory and motor processing and coordination.⁸ By comparing the complexity of skill performance to the subjective observational aspects of the current model for teaching manual skills, one can see how the educational process may be layered with substantial ambiguity or variation in perception between students and instructors.⁹

To teach and assess manual diagnostic and OMT skills in a manner that would allow students to consistently interpret the complex sensory input and motor control necessary for the performance of techniques from a scientific perspective is unrealistic at this time. Yet by using the scientific reductionist model, modern instrumentation could revolutionize the teaching and performance of palpatory skills by being able to give timely, repetitive objective feedback within the training process.

As noted by Zegarra-Parodi and coauthors, four "components of cranial manipulation may be amenable to [monitoring and thus] standardization," there-

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fore making them useful parameters for modern palpation research. These components are as follows:

- direct vs indirect approach to modifying dysfunctions
- palpation pressure
- localization of practitioner hand contact
- treatment duration

At the A.T. Still Research Institute of Kirksville (Mo) College of Osteopathic Medicine-A.T. Still University, we have used instrumentation to objectify all four of these components. Our experience¹⁰⁻¹³ indicates that the last three of these four components are ripe for research in osteopathic manipulative medicine.

However, the remaining component—stipulating or measuring direct versus indirect approaches—relates to complex forces applied to the patient by the examiner to achieve a therapeutic response. While newly developed technology consists of sensors to quantify the amount and direction of shear-type forces, which are used clinically in both direct and indirect OMT techniques, our experience indicates that this technology is not refined enough to capture the nuances of OMT techniques. Although this level of refinement may soon be available, sensors that measure “general pressure” or unidirectional pressure perpendicular to the surface of the sensors are the best tools currently available to assess palpatory force.

Two items are needed to assess skill development: (1) a reliable system to measure technique performance, and (2) a common definition, understanding, and quantification of the elements of performance that are considered skillful.¹⁴ While most commercially available instruments have been developed and validated within a certain accuracy range, technology cannot establish the elements of performance that are required to demonstrate skill.

The instrument needs to be used numerous times to define the characteristics of the intended palpatory parameter and to determine what is considered

skillful. For example, in the area of high-velocity, low-amplitude techniques, this process was first used more than a decade ago.⁹

Zegarra-Parodi and colleagues did not assess this portion of skill development, which substantially limits the value of the study’s outcome. Therefore, even though instrumentation exists for use in osteopathic palpation research, parameters that determine skill are required and can be defined through collecting normative data. One source of limited yet normative data that could have been used by Zegarra-Parodi and coauthors was the evaluation of the instructor’s technique on the subjects. Such an evaluation would have provided a “gold standard” for the degree of pressure used and its level of variability.

While the outcomes of the study did not support their hypothesis, Zegarra-Parodi and coauthors suggest that quantitative measures could improve student palpatory training. Research^{1,2,9,14-19} has shown value in using instrumentation to provide objective feedback to students during manual therapy training. For example, objective feedback for a high-velocity, low-amplitude technique to the lumbar, cervical, and thoracic areas has demonstrated that several biomechanical parameters can be consistently modified during a routine trimester of chiropractic training compared with the standard curriculum.^{1,14}

One explanation of why feedback from quantitative measures appears to improve palpatory skills comes from the field of motor learning. It has been reported that trainees must characterize both kinematic and kinetic components to coordinate complex skill performance.²⁰ Instrumentation can provide this type of feedback for students immediately at the initial training session but also recurrently as students practice techniques. Within the current teaching model, feedback, which is crucial to successful education, is often compromised as a result of a deficient number of trainers and limited time.

Yet quantitative data that define optimal parameters for the performance of OMT techniques is not available. Likewise, it is unknown if the focus on the development of certain parameters may hinder other aspects of the palpatory process.² Consequently, osteopathic researchers need to use modern instrumentation to observe current practices and learn what aspects of techniques have or have not been correlated to success in clinical practice. This process must be completed before suggesting change in palpation techniques based on assumptions that certain parameters (eg, pressure) need to be standardized just because they can be measured. Only through unbiased, serial observations can we learn more about the important aspects of palpation that have established the value of osteopathic diagnostic and therapeutic palpation since their inception.

This process will not be quick or easy. There are many issues that need to be addressed, some noted by Zegarra-Parodi and colleagues in their study’s discussion. Here are further basic questions:

- Does variation in the amount of pressure result in variation in the interpretation of tissue characteristics?
- Can variation in the amount of pressure result from changes in subject and examiner characteristics?

Perhaps change in pressure is necessary because of differences in the size of the subject’s head and the examiner’s hand. The mechanics of palpation, such as changes in practitioner position (eg, angles of the fingers, wrist, and elbow joints with each examination), may influence pressures used but not necessarily the important diagnostic conclusions being made. Perhaps a variation in force is required for the examiner to internally standardize sensations when diagnosing in varying positions.

While it is assumed that standardized pressures are clinically beneficial, the ability to vary pressures, even in the

diagnostic process, may be necessary to achieve insightful diagnoses that aid in determining which OMT techniques will most likely generate a therapeutic response.

To illustrate this point, I can think of two extremely successful and revered osteopathic physicians: Robert Fulford, DO, and Viola Frymann, DO. Although equally successful, both physicians applied their skills differently, particularly on the level of forces. In training courses I attended, Dr Frymann would stress avoiding heavy handedness, while Dr Fulford would encourage getting in there and getting the job done instead of floating on the surface of the mechanism until something happens.

In the study of motor performance, Scully and Newell²⁰ have suggested that the focus of observational learning should be on *what* is perceived rather than *how* it is perceived (or performed). Therefore, osteopathic researchers should be cautious when assuming that standardization of technique is required for the scientific study of palpation and manipulation. Otherwise, we might not capture those aspects of palpation that contain the potency of the osteopathic approach.

Consequently, it is important for osteopathic researchers to observe how palpation and manipulation are practiced using instrumentation before requiring modifications to those skills, particularly when the only rationale for standardization is the assumption that such modifications are required for the scientific method.

Science has overcome the challenges of understanding variability in measurements. For example, blood pressure always fluctuates. Yet through unbiased systematic observations over time and correlating those observations with meaningful patient-oriented outcomes (eg, headache, stroke rate), a meaningful, scientifically based diagnostic tool and outcome measure was developed.

Osteopathic palpation has been and currently is an art. Transitioning art into science must be done cautiously and

conscientiously. It is critical for osteopathic researchers to begin our work where the scientific process begins—through systematic, unbiased observations. Current instrumentation allows osteopathic researchers to generate large data sets with relative ease. The challenge is interpreting the data so they have relevance to the clinical outcomes that have sustained the osteopathic medical practice for more than a century.

The scientific process can overcome the challenges of understanding variability. It requires answering what may seem to many as unnecessarily small questions, but through disciplined, sequential, and thorough research with unbiased questions and observations, a strong scientific foundation for research and education in osteopathic manipulative medicine can be achieved.

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