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Having the Courage to be Proven Wrong

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Abstract

In 1919, osteopathic researchers used survey data to conclude that osteopathic treatment was superior to usual care in treating influenza. While the study had several notable shortcomings, it continues to be used as evidence supporting the effectiveness of osteopathic manipulative medicine (OMM). For more than 100 years, osteopathic researchers have designed studies that showcase the clinical utility of osteopathic manipulative medicine at the expense of designing studies that carefully build reality-based models of manual medicine. Osteopathic manipulative treatments are often based on premises such as Fryette's laws, Chapman's points, and the primary respiratory mechanism, which have not been subjected to rigorous scientific scrutiny within the osteopathic profession. As these models are supposedly based in biologic reality, the claims they make should be subject to falsifiability. Thorough scientific investigation of the foundational tenets of OMM will either lead to their reinforcement or their dismissal. Either outcome will place OMM on more solid ground in the eyes of the medical and scientific community. We must have the courage to be proven wrong. Only then can we move forward as a profession to discover what is true.

1 Main Text

In 1918, the world was shocked by the emergence of a global pandemic, its repercussions lasted far longer than expected. The public was warned to wear masks and self-isolate, yet they continued to die in record numbers. Tireless physicians and scientists tried to understand the disease in order to bring it under control. The pandemic eventually reached a point of more tempered mortality, and the public moved on. Almost 100 years later, we lived through an experience that is strangely similar to the influenza pandemic of 1918. Understandably we have tried to learn as much as possible about COVID-19 from our experience with the 1918 influenza pandemic, but have we learned the right lessons? A famous study from 1919 holds a lesson for how to become more effective clinicians and scientists.

In 1919, the Journal of the American Osteopathic Association reported that the pandemic "caused the death of 500,000 of our citizens" [1]. A group of osteopathic physicians on the front lines of influenza treatment set out to assess whether their method manual therapy would be more effective than standard treatment at helping save lives. They published results of a survey showing substantially reduced mortality among patients treated "osteopathically" when compared with patients obtaining conventional treatment [2,3]. In describing their methods, the contemporary newspaper *The Osteopathic Physician* stated that a "blank questionnaire on Flu and Pneumonia" was sent "to all practicing Osteopaths in the United States and Canada." They used the survey responses to calculate that "in every 1,000 cases of Flu treated osteopathically, only 2 ½ died." They compared that death rate (around 2.5/1,000) with the published death rate overall (around 53/1000) to conclude, "if you were stricken with the Flu, there were 400-chances-to-1 in favor of your recovery if you were treated osteopathically; but only 19-to-1 in favor of your recovery if you were treated medicinally" [4].

At the surface, these results strongly support the practice of osteopathic medicine. Even today, it seems to validate a long-held belief that OMM is an evidence-based treatment option that helps patients live longer, healthier lives. However, several difficulties limit our ability to use their data to answer the question, "is osteopathic manual medicine superior to standard medicine?" Recall bias, in-group bias, confirmation bias, and the availability heuristic would all be expected to affect the survey results. If their findings were accurate and replicable, then teaching this treatment to all physicians could have saved millions of lives. However, if their findings were simply the accumulated result of a number of ordinary biases, they were wrong to hold it up as evidence of their success.

In truth, we will never know how accurate their findings were. Nobody at the time did the science rigorously enough to find out. Further research would have been able to reveal which specific practices employed by the physicians were successful, if any. Yet even without taking these logical next steps in investigation, they concluded that osteopathic treatment resulted in "a death rate of one-fortieth of that reported by the health commissioners of the various states" [5].

It would be a mistake to hold evidence from more than 100 years ago to the standards of today. The scientists who designed the 1919 influenza study did more than most of their contemporaries to understand their experiences. We should follow their commendable example striving towards scholarship. We should not, however, follow the same motivated reasoning that led to exaggerating unwarranted conclusions. Unfortunately, this study continues to be used as evidence in peer-reviewed publications supporting the power of osteopathic treatment [6,7].

This prompts the following question: what is the purpose of OMM research? Often, we aim to design studies to provide evidence that can convince others of the effectiveness of OMM. Such studies may use the tools of scholarship, but subtly falls short of being true science. The best science available to mankind is built off of carefully considered and broadly tested models that offer the ability to predict not only the past, but the future as well. True research begins with a hypothesis, not a conclusion. A hypothesis acknowledges that the proposed outcome may be false. Experiments should not be designed to inflate the convinced, but to encourage the skeptic. The inexorable march of science is based on the acknowledgement that the skeptic is usually right.

In 1919, the osteopathic physicians who inquired whether osteopathic manual therapy improved outcomes never found a satisfactory answer. The cautionary lesson to us is that they thought they did. Modern osteopathic physicians are the inheritors of their knowledge and practices, many of which haven't changed since that survey was performed more than 100 years ago. How much has the science of osteopathic medicine grown in that time? There are many important questions about our profession that we face in much the same way they did. Why do we practice manual medicine using techniques from their time? Does this represent an admirable trust in time-honored practices, or a slavish adherence to antiquated philosophies? Is there a better way to practice manual medicine? How would we really know?

As much as we are the inheritors of their manual techniques, we must not be the inheritors of their scientific methods. They set out to prove themselves right. We must allow ourselves to be proven wrong. This maxim was well-phrased by Ronald Davis, a prominent geneticist, who said "It's a scientist's job to disprove his own theories. Only after he utterly fails to do that, then maybe there is something to it" [8]. This is the standard scientific principle of falsifiability. Osteopathic manipulative medicine is based off foundational tenets that should be subject to falsifiability, including as Fryette's laws, the existence and nature of Chapman's points, and the primary respiratory mechanism (used as the basis of cranial manipulation). These models are subject to investigation based on observed physiology, and many of their claims are inconsistent with current understanding of anatomy and disease [9,10]. As

Thomson and MacMillan have stated: "Implausible claims such as these pose a fundamental question for osteopathy—to what degree can osteopaths' accounts of their manual interaction with patients and their bodies legitimately represent an independent biological reality?" [11].

If these foundational models are fundamentally flawed, the conclusions that are drawn from them must be met with an extra level of scrutiny. Research that seeks to elevate the conclusions made by the claims of disciplines such as osteopathy in the cranial field are not science because they do not allow for the falsifiability of their foundational tenets. What they become in this case is pseudoscience [12]. Many claims asserted as fundamental to the practice of osteopathic medicine are falsifiable if we choose to allow ourselves to be proven wrong. Unfortunately, many of the foundational tenets of osteopathic medicine such as those listed above have not been subjected to this level of scrutiny.

The foundational tenets of OMM are worthy of thorough scientific investigation. This will either lead to their reinforcement or their dismissal; either outcome will place OMM on more solid ground in the eyes of the medical and scientific community. We must be ready to live by the answers we find. We cannot be afraid that we have been wrong all these years. We must have the courage to be proven wrong. Only then can we move forward as a profession to discover what is true.

Abbreviations

COVID-19: Coronavirus disease 2019
OMM: Osteopathic Manipulative Medicine

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