



Evidence-based osteopathic manipulative treatment for common conditions

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Osteopathic manipulative treatment (OMT) is a unique aspect of osteopathic medicine that has served as a useful adjunct to traditional surgical and pharmacological treatment of medical conditions for more than 100 years. Using an approach based on five basic body functions, as well as traditional modern medical and surgical therapeutics, OMT enhances the body's innate ability to fight inflammation and other systemic results of disease states. OMT has been shown to be a safe and cost-effective treatment for back pain, in particular for patients who have continued pain despite standard treatments and for those who are unable or unwilling to take pain relievers. For patients with pneumonia, OMT can reduce the need for potentially dangerous antibiotics and reduce the length of a patient's hospital stay. In addition, in children with otitis media, OMT can be used as an adjunct to antibiotic and surgical treatment to decrease morbidity, reduce antibiotic usage, and decrease the discomfort associated with the symptoms of a middle ear infection.

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Osteopathic manipulative treatment (OMT), a unique aspect of osteopathic medicine, has served as a useful adjunct to traditional surgical and pharmacological treatment of medical conditions for more than 100 years. Although osteopathic medicine initially used OMT exclusively for treatment of all conditions patients presented to a primary care physician's office, nowadays osteopathic medicine in the United States uses all modalities of modern medicine and applies OMT as an adjunct to augment and improve current treatment options.

Basic principles of OMT treatment focus on enhancing the body's innate ability to fight inflammation and other systemic consequences of disease states. This is achieved through a five-pronged approach aimed at: Enhancing the body's ability to mobilize fluid into and out of affected body

areas, normalizing the function of the autonomic nervous system, decreasing or eliminating metabolic imbalances that threaten the homeostatic processes in the body, restoring proper biomechanical relationships in the musculoskeletal and soft tissue systems, and addressing any psychosocial aspects of the patient's life that might affect or impair the proper treatment of the patient's disease state. This approach to treating disease, called the "Five Models" of osteopathic medical treatment, forms a basis of proper treatment from an osteopathic perspective¹ and is summarized in Table 1.

It is worthwhile to note that OMT is used in a way similar to that of modern pharmacotherapeutics. To properly treat a patient's condition with OMT, there has to be a proper diagnosis as well as proper "dosing and frequency" of OMT. This dosing and frequency take into account the general health status of the patient, what the patient can and cannot tolerate, and whether the condition being treated is acute or chronic.² Such an assessment is a necessary part of each patient visit.

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Table 1 Five Models Approach of Osteopathic Medicine¹

Model	Examples of anatomical targets	Examples of affected physiologic functions	Examples of conditions targeted
Biomechanical	Musculoskeletal system	Posture, gait	Anatomic or functional short leg, low back pain, cervical strain, torticollis
Respiratory-circulatory	Vascular and lymphatic systems, thoracic inlet, thoracic and pelvic diaphragms	Breathing and gas exchange, circulation, venous return, lymphatic drainage	Otitis media, pneumonia, COPD, peripheral edema, postoperative ileus
Metabolic-energy	Viscera, endocrine glands	Homeostasis, immune and inflammatory response	Pelvic pain, constipation, dyspepsia
Neurological	Head, peripheral nerves, autonomic nervous system	Sensation, coordination, pain	Fibromyalgia, trigeminal neuralgia, chronic pain, postoperative ileus
Behavioral-psychosocial	NA	Stress, anxiety, sleep patterns, attitude	Insomnia, depression, stress disorders, sexual dysfunction, addictive behavior

In this article we explore ways to apply the osteopathic Five Models in the treatment of several common conditions encountered in a primary care physician’s office and examine the evidence to support the use of OMT for those conditions. Table 2 summarizes the key Clinical recommendations derived from the studies discussed in this article, using the strength of recommendation taxonomy (SORT). To encourage further research, we also list common conditions that appear unresponsive to OMT. Although there are many OMT techniques that can be used when applying the osteopathic Five Models for treatment of medical conditions, an explanation of individual techniques is beyond the scope of this article.

Back pain

Nearly 90% of persons in the US will experience back pain at some point in their lives.³ Back pain is also one of the top five patient presentations for the primary care physician.⁴ Its cause is often multifactorial and as a result, OMT for back pain is aimed at the various potential causes of the pain. The *biomechanical model* and *neurological model* are used primarily in the treatment of back pain. The biomechanical model is focused on the musculoskeletal system, which is often a contributing factor in the etiology of back pain. Patients with back pain tend to have a muscle spasm at the site of their pain. It is reasonable to believe that this spasm inhibits the full range of motion of the bones to which these muscles connect. By focusing treatment on alleviating these mechanical restrictions, it is expected that a patient’s back pain will improve as well.

The neurological model is aimed primarily at the nervous system. As is the case with any type of pain, facilitation of a nervous synapse can result in a continuous feedback loop that propagates the pain response. Therefore, treatment tar-

geted at interrupting this feedback loop would aid in resolving back pain.

Several studies have evaluated the effects of OMT on back pain. In 1981, a study was conducted on 95 low back pain patients appropriate for OMT.⁵ Participants were randomly assigned to either receive OMT or soft-tissue massage. The individuals in the OMT group had subjective improvement with sitting, reaching, and dressing, as well as a decreased amount of pain that was statistically significant. However, these findings were only immediately after treatment. There were no statistically significant differences between the two groups at time of discharge or at three weeks after discharge. Such short-term results could be of value in situations in which ongoing biomechanical change is occurring, such as in the third term of pregnancy.

Another study looked at 178 patients randomly assigned to either standard medical treatment or OMT.⁶ At the end of 12 weeks of treatment (a total of 8 visits), the participants in the OMT group were found to have used less medication and required less physical therapy than the participants in

Table 2 SORT Evidence Table of Key Clinical Recommendations

Key clinical recommendation	Strength of recommendation	References
OMT can reduce analgesic use in patients with back pain	A	6, 7
Applying OMT in hospitalized patients with pneumonia can reduce antibiotic use and reduce length of stay	B	14, 15
OMT reduces the recurrence of otitis media when used as an adjunct to traditional treatments	B	17, 18

the standard medical care group. There was no significant difference in pain or function at the end of the study. This suggests that patients who are allergic to or intolerant of nonsteroidal antiinflammatory drugs or those who are poor candidates for chronic narcotic usage, OMT could be of great benefit.

Another study by Licciardone et al. studied 199 patients with low back pain.⁷ These participants were randomly assigned to either OMT, sham treatment, or no intervention. In this study, the sham treatment consisted of range-of-motion activities, light touch, and simulated OMT techniques. The study found that patients in the OMT group had improved subjective pain, less medication use, and less physical therapy use compared with the no intervention group. However, no significant differences were found between the OMT group and the sham treatment group.

OMT is a safe and cost-effective treatment for back pain and may be greatly beneficial for patients who have continued pain despite standard treatments and for patients who are unable or unwilling to take pain analgesics.^{8,9}

Pneumonia

Inflammatory consolidation of the lungs lends itself well to treatment by osteopathic methods. This inflammation often arises from infection.¹⁰ Every year 1.1 million people are diagnosed with pneumonia, and it resulted in approximately 52,000 deaths in 2007.¹¹ Pneumonia can be a complication of or complicated by limited respiration,¹² as is often seen in patients with rib fractures, or with limitations in range of motion of the ribcage.¹³ OMT treatment of pneumonia often relies on the respiratory-circulatory model, which is focused on the vascular and lymphatic systems, as well as the diaphragms of the body such as the thoracic inlet, the respiratory diaphragm, and the pelvic diaphragm. OMT is aimed at improving contraction and relaxation of the muscular diaphragm during respiration and improving lymphatic and blood flow into and out of the thoracic cavity.

Although the literature is limited, a few studies have evaluated the benefits of OMT for patients with pneumonia. In a study conducted in 2000, 58 patients over the age of 60 with pneumonia were randomly assigned to either OMT or light touch.¹⁴ There was no significant difference between the two groups initially. Both groups received standard care. In addition, the OMT group received a specified protocol of OMT for 10 to 15 minutes twice daily and the light touch group received nonmanipulative light touch for 10 to 15 minutes twice daily. This study found that the OMT group required a shorter duration of antibiotic therapy and a mean decrease of two days in hospital length of stay.

In 2010, Noll et al. studied 406 patients over 50 years of age who had been hospitalized with pneumonia.¹⁵ Participants were randomly assigned to either OMT, light touch, or

conventional treatment only. Initially there was no statically significant difference between these groups. When compared with the conventional treatment group, those assigned to the OMT group required fewer days of intravenous antibiotics and had shorter lengths of stay. Although none of the measured outcomes comparing OMT with light touch reached statistical significance, the data did indicate shorter lengths of stay with the OMT group.

These initial studies indicate that OMT can reduce the need for antibiotics and the risks associated with using them. In addition, OMT has been shown to decrease the length of a patient's stay. As we move toward a culture of accountable care organizations, cost-effective medicine with reduced hospital stays and reduced antibiotic use could greatly aid in moving toward this goal.

Otitis media

Acute otitis media is the most common reason for antibiotic prescriptions in pediatric patients in the US.¹⁶ OMT for otitis media is geared toward increasing flow out of the middle ear space by maximizing function of the eustachian tubes, increasing circulatory flow to the affected area for better penetration of antibiotics, and decreasing discomfort and pain. Treatments are also targeted at the autonomic system in the head as well as the soft tissues of the thoracic inlet, which if dysfunctional could prevent proper flow of fluids in and out of the head and neck.

Two relatively recent studies have evaluated the effectiveness of OMT as applied to otitis media. The first study looked at the effectiveness of OMT as an adjuvant therapy to routine treatment of children with recurrent acute otitis media. Fifty-seven children of varying ages were randomized to receive traditional care or traditional care plus seven OMT sessions over a period of six months. The OMT group was shown to have fewer episodes of otitis media as well as fewer surgical procedures.¹⁷

The second study, a small pilot study, evaluated the effects of OMT in reducing the morbidity of otitis media in pediatric patients. The study subjects were children with a history of recurrent otitis media, and all the subjects received traditional treatment plus weekly OMT treatments. At the one-year postsurveillance follow-up, five of the eight subjects in the study had no recurrence of otitis media. Of note in this study, of the four subjects who had their first episode of otitis media before six months of age, two had no recurrence at one-year follow-up.¹⁸ This is interesting considering that there is an 80% chance or greater of persistent middle ear issues when otitis media presents before six months of age. This is not a direct comparison, so the group's responses to OMT could be different.¹⁹ Although the pilot study had a small number of subjects, it does show the potentially impressive results of OMT when used as an adjunct to traditional otitis media treatment.

OMT for otitis media can be used as an adjunct to antibiotic and surgical treatment to decrease morbidity, reduce antibiotic usage, and decrease the discomfort associated with the symptoms of a middle ear infection.

Common conditions requiring further research

The common office conditions discussed previously respond positively to OMT. There are, however, other common conditions for which manipulation has been suggested to be ineffective or has been insufficiently studied. Further research is needed to demonstrate whether OMT may benefit these conditions.

A study conducted in 2008 by Noll et al on the immediate effects of one 20-minute session of OMT in elderly patients with chronic obstructive pulmonary disease (COPD) demonstrated a worsening of air trapping immediately after treatment with several OMT techniques.²⁰ Subjects in the study received multiple OMT techniques during each treatment session. Effects of individual techniques were felt to be important to address in future studies. In addition, the study concentrated on the immediate effects of OMT, and its long-term effects on COPD were not studied. If one were to apply the results of this study to actual patients, it would be ill advised to attempt this combination of OMT techniques on any patient with COPD who may be experiencing an exacerbation. Although a negative conclusion was reached, valuable information was gained for clinical application and for hypotheses to pursue in future studies.

Tension headaches are also a very common complaint in primary care. Although it has been traditionally taught that OMT is effective in reducing the muscular tension that is the hallmark of this condition, a systematic review published in 2006 concluded that there was no rigorous evidence that manual therapies were more effective than placebo in treating patients with tension-type headaches.²¹ The study did not specifically address OMT, and the number of studies was very limited because of the large number of published studies that did not meet the authors' inclusion criteria. However, the techniques represented by the studies that were part of the systematic review included spinal manipulation, connective tissue manipulation, soft tissue massage, and CV-4 craniosacral techniques, all of which can be considered essential aspects of any OMT prescription for tension headaches.

As an example of the care with which such meta-analysis conclusions must be examined, the three citations on spinal manipulation cited in the meta-analysis were evaluated independently for the current article. This analysis, using their criteria, suggested a different conclusion than that drawn by the authors of the meta-analysis. It should be noted that meta-analyses can be subject to unintentional bias. This becomes apparent when this 2006 article "Are Manual Therapies Effective in Reducing Pain From Tension-Type

Headache?" is examined in light of the three articles it reviewed to draw its conclusion about spinal manipulation. In the discussion section of this meta-analysis the three articles are rated as follows: "There have not been consistent results among studies." Donkin et al²² reported positive results, but Bove et al²³ reported neutral results. Boline et al²⁴ compared spinal manipulation with the use of amitriptyline. The assessment from the meta-analysis was that the Boline study "reported neutral results at the end of treatment and positive results at follow-up." The author of the meta-analysis interpreted these three sets of results as: "spinal manipulative therapy showed inconclusive evidence of effectiveness" (level 4—the lowest level in their hierarchy of effectiveness) because of "inconsistent results among studies." Earlier in the article they stated "spinal manipulation could have achieved a moderate evidence of efficacy (level 2)" except for the "inconsistency among results."

The concern about "inconsistency" seems straightforward upon superficial review, but their analysis does not acknowledge that the study by Boline et al compared spinal manipulation with a standard of treatment, and not placebo. The conclusion of the Boline article stated that placebo was not used but that spinal manipulation was compared with amitriptyline and "proved as effective as a therapy that has been shown to be efficacious in double-blind, placebo-controlled trials of tension-type headaches." Current literature confirms this.²⁵ Therefore, it is reasonable to conclude that a "neutral" finding compared with amitriptyline is the equivalent of a positive finding compared with placebo. Such an acknowledgement would lead to a change in the level of evidence of efficacy from a 4 (inconclusive evidence) to a minimum of a 3 (limited evidence), or more appropriately, a 2 (moderate evidence).

Given all of the above, the meta-analysis conclusions can be construed as misleading. The challenge is that readers may rely merely on the conclusion stated in the abstract without this level of critical evaluation. As such, this article might be used as an evidence base to condemn spinal manipulation.

Another common office condition, asthma, as discussed in a 2005 Cochrane review²⁶ demonstrates another form of challenge in the use of evidence-based medicine to establish guidelines for OMT. There were only three randomized trials that met the inclusion criteria, and the studies did not specifically address OMT but rather chiropractic spinal manipulation and massage therapy. The review's conclusion—"Currently, there is insufficient evidence to support or refute the use of manual therapy for patients with asthma"—is a commonly heard one, with the attending comment that "more research is needed." Along that line of thought, a study published by the *Journal of the American Osteopathic Association* that same year demonstrated a statistically significant improvement in peak expiratory flows of pediatric asthma patients treated with OMT compared with sham treatment.²⁷

Conclusion

Primary care physicians that treat common office conditions with OMT are aware of OMT's efficacy as well as its cost-effectiveness. Many patients benefit daily from the special care that only DOs can deliver. In light of the recent push toward evidence-based medicine, osteopathic physicians should strive to examine OMT in a scientific and unbiased way to determine which conditions can benefit from it. It is our hope that osteopathic researchers continue to produce well-designed studies that prove scientifically what all of us know anecdotally: OMT is a cost-effective way to deliver exemplary care to patients in a primary care office.

References

- Chila AG (ed): *Foundations of Osteopathic Medicine*. 3rd ed. Philadelphia: Lippincott Williams & Wilkins, 2011, pp 4-7
- Nelson KE (ed): *Somatic Dysfunction in Osteopathic Family Medicine*. Philadelphia: Lippincott Williams & Wilkins, 2007, pp 27-31
- Frymoyer JD: Back pain and sciatica. *N Engl J Med* 318:291-300, 1988
- Hart LG, Deyo RA, Cherkin DC: Physician office visits for low back pain. Frequency, clinical evaluation, and treatment patterns from a U.S. national survey. *Spine* 20:11-19, 1995
- Hoehler FK, Tobias JS, Buerger AA: Spinal manipulation for low back pain. *JAMA* 245:1835-1838, 1981
- Andersson GB, Lucente T, Davis AM, et al: A comparison of osteopathic spinal manipulation with standard care for patients with low back pain. *N Engl J Med* 341:1426-1431, 1999
- Licciardone JC, Stoll ST, Fulda KG, et al: Osteopathic manipulative treatment for chronic low back pain: a randomized controlled trial. *Spine* 28:1355-1362, 2003
- DiGiovanna EL, Shiwitz S, Dowling DJ: *An Osteopathic Approach to Diagnosis and Treatment*. Philadelphia: JB Lippincott Co., 2005, pp 651-659
- Ward RC (ed): *Foundations of Osteopathic Medicine*. 2nd ed. Philadelphia: Lippincott Williams & Wilkins, 2003
- Cleveland Clinic: Pneumonia. Available at: http://my.clevelandclinic.org/disorders/pneumonia/hic_pneumonia.aspx. Accessed February 18, 2011.
- FastStats: Pneumonia. Available at: <http://www.cdc.gov/nchs/fastats/pneumonia.htm>. Accessed February 18, 2011.
- Mayo Clinic: Broken Ribs: Complications. Available at: <http://www.mayoclinic.com/health/broken-ribs/DS00939/DSECTION=complications>. Accessed February 26, 2011.
- Ward RC (ed): *Foundations of Osteopathic Medicine*. 2nd ed. Philadelphia: Lippincott Williams & Wilkins, 2003
- Noll DR, Shores JH, Gamber RG, et al: Benefits of osteopathic manipulative treatment for hospitalized elderly patients with pneumonia. *J Am Osteopath Assoc* 100:776-782, 2000
- Noll DR, Degenhardt BF, Morley TF, et al: Efficacy of osteopathic manipulation as an adjunctive treatment for hospitalized patients with pneumonia: a randomized controlled trial. *Osteopath Med Primary Care* 4 (2), 2010. Available at: <http://www.om-pc.com/content/4/1/2>.
- Ramakrishnan K, Sparks RA, Berryhill WE: Diagnosis and treatment of otitis media. *Am Fam Physician* 76:1650, 2007
- Mills MV, Henley CE, Barnes LLB, et al: The use of osteopathic manipulative treatment as adjuvant therapy in children with recurrent acute otitis media. *Arch Pediatr Adolesc Med* 157:861-866, 2003
- Degenhardt BF, Kuchera ML: Osteopathic evaluation and manipulative treatment in reducing the morbidity of otitis media: a pilot study. *J Am Osteopath Assoc* 106:327-334, 2006
- Casselbrant ML, Mandel EM: Epidemiology. In: *Rosenfeld RM, Blue-stone CD* (eds). *Evidence-Based Otitis Media*. Hamilton, Ontario: BC Dekker; 1999, pp 117-136
- Noll DR, Degenhardt BF, Johnson JC, et al: Immediate effects of osteopathic manipulative treatment in elderly patients with chronic obstructive pulmonary disease. *J Am Osteopath Assoc* 108:251-259, 2008
- Fernandez de las Penas C, Alonso-Blanco C, Cuadrado ML, et al: Are manual therapies effective in reducing pain from tension-type headache? A systematic review. *Clin J Pain* 22:278-285, 2006
- Donkin RD, Parkin-Smith GF, Gomes AN: Possible effect of chiropractic manipulation and combined manual traction and manipulation on tension-type headache. A pilot study. *J Neuromusculoskeletal Sys* 10:89-97, 2002
- Bove G, Nilsson N: Spinal manipulation in the treatment of episodic tension-type headache. A randomized controlled trial. *JAMA* 280:1576-1579, 1998
- Boline P, Kassak K, Bronfort G, et al: Results of two different manual therapy techniques in chronic tension-type headache. A randomized controlled trial. *J Manip Physiol Ther* 18:148-154, 1995
- Torrente CE, Vazquez DE, Gay EC: Use of amitriptyline for the treatment of chronic tension-type headache. Review of the literature. *Med Oral Pathol Oral Cir Buccal* 13:E567-E572, 2008
- Hondras MA, Linde K, Jones AP: Manual therapy for asthma. *Cochrane Data Syst Rev* 2:CD001002, 2005
- Guiney PA, Chou R, Vianna A, et al: Effects of osteopathic manipulative treatment on pediatric patients with asthma: a randomized controlled trial. *J Am Osteopath Assoc* 105:7-12, 2005