MASSAGE THERAPY IN INTEGRATIVE CARE & PAIN MANAGEMENT

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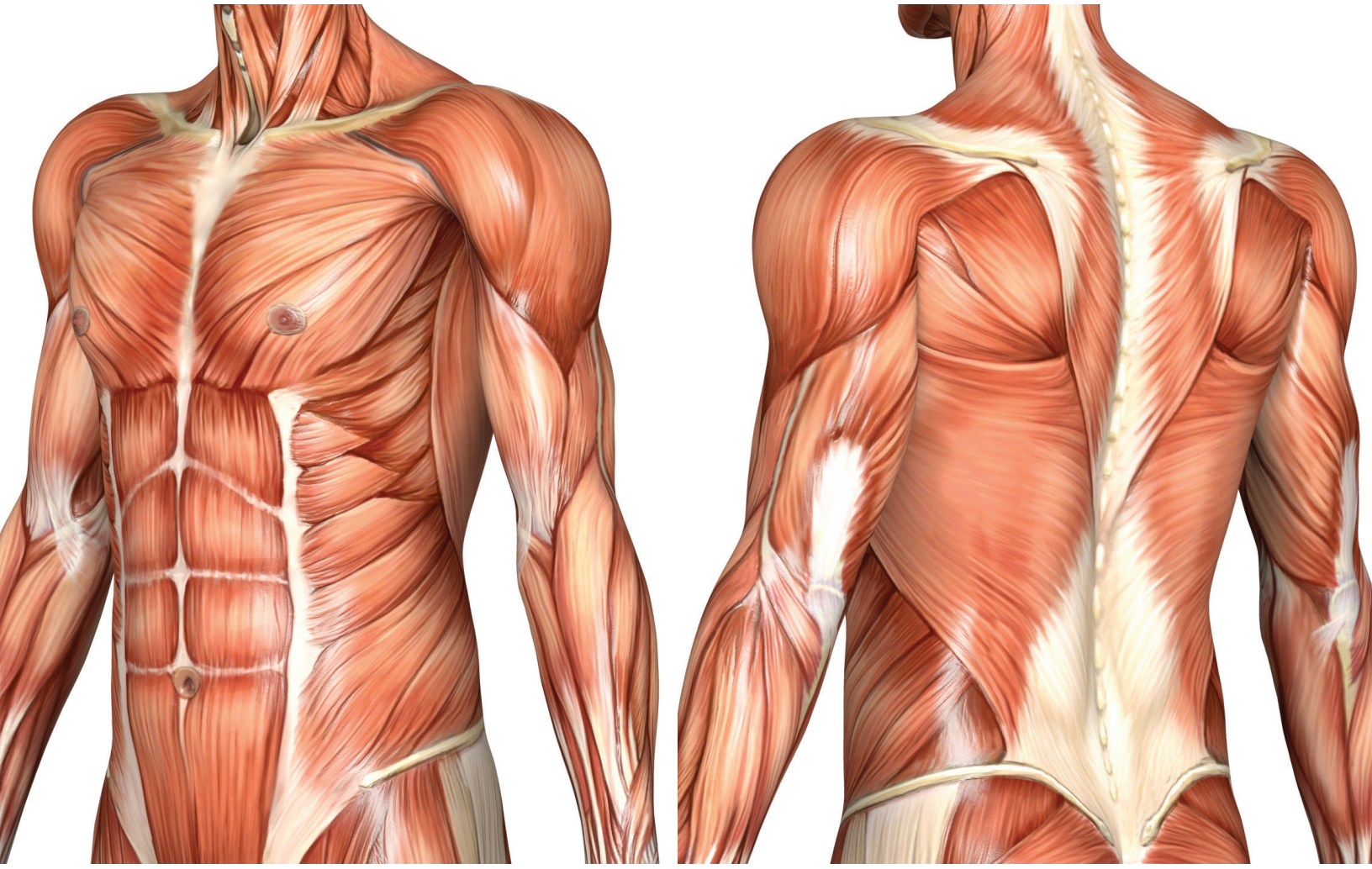

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Introduction

The American Massage Therapy Association (AMTA) has for 75 years worked to advance the massage therapy profession and to foster clinical research on its value and efficacy. A wealth of research has been produced to support the impact of massage therapy for a variety of health issues, especially for pain relief and pain management.

Massage therapy has become widely accepted as part of integrative health care in major hospitals and in daily medical practice. With this in mind, AMTA is publishing this document to highlight both the efficacy of massage therapy and its economic validity. This document provides a summary literature review on the efficacy of massage and examines statistics for its use by the American consumer, sample case studies of its use in health care settings, and summaries of various health issues for which research demonstrates various levels of efficacy.

As the U.S. struggles with an epidemic of opioid use and its devastating effects on lives, society and the economy, a thorough examination of the role massage therapy can play for pain management is of particular importance. Using massage therapy as a first line approach and as an integrated complement to other pharmacological approaches could assist in the overall reduction of medical costs and help to avoid dependence on opioids.

Massage therapy is a well-accepted nonpharmacological therapy for managing pain, which includes a variety of specific chronic and acute pain issues. It is recognized by the National Institutes of Health (NIH), and included in nonpharmacological pain guidelines issued by The Joint Commission, as well as the American College of Physicians (ACP) and the Federation of State Medical Boards. It is recognized by the Department of Defense and the Veterans Health Administration as an effective treatment for chronic pain, is included in DoD/VA pain management guidelines and is a covered service in DoD/VHA facilities. It is specifically mentioned in guidelines for opioid alternatives by the Attorney General of West Virginia; and is referenced in a September 2017 letter from 37 State Attorneys General to the President and CEO of America's Health Insurance Plans, which encourages insurance coverage of alternatives to opioids.

Because research is highlighting the promise massage therapy shows in helping address the ongoing need for pain management therapies that can reduce or prevent the need for opioids, an economic comparison between these two different approaches is also included. This economic model, commissioned by AMTA through John Dunham & Associates (JDA), helps underscore the substantial savings, totaling as much as $25.99 billion per year that can be realized if massage therapy is used as a research-informed substitute for opioids. However, this comparison also suggests there is a real need for further research on the economics of massage as a therapeutic approach for areas in which research already indicates its efficacy.

AMTA provides this information as an educational tool and encourages those in health care, government and health care insurance to take notice of the impact massage already has and can have when strongly supported as an integrative approach to pain management.

Part One: The Value and Efficacy of Massage Therapy

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The Value and Efficacy of Massage Therapy

EXECUTIVE SUMMARY

Massage therapy is the manual manipulation of soft tissue intended to promote health and well-being. More than 325,000 massage therapists in the United States provide essential services to millions of patients/clients, both to improve general health and well-being and to treat specific ailments and medical needs. For many patients, massage therapy is a key component of pain management, as well as overall health and wellness.

There is significant evidence supporting the inclusion of massage therapy for many important patient health treatments, including those for chronic pain management (such as back pain, headache, carpal tunnel syndrome, osteoarthritis, neck and shoulder pain, fibromyalgia, and hospice care), behavioral health treatment (anxiety and stress, depression, PTSD, and substance use disorder recovery), rehabilitation/physical training (athletic training/injury treatment, ergonomics and job-related injuries, cardiac rehab, joint replacement surgery, and scar management), and acute medical conditions (cancer management, post-operative pain, lymphatic drainage, and maternity and newborn care).

Incorporating massage therapy into approaches to pain management, and as an integrated complement to some pharmacological approaches, can help many suffering both chronic and acute pain.

Because massage therapy is an important part of a comprehensive integrative approach to a variety of health conditions, massage therapists are important members of care teams. In team-based care models, health care providers work collaboratively to achieve patient care goals. Using a team approach to care delivery means that physicians can delegate more responsibility to other health professionals, each of whom can then practice "to the top of their license" to support more efficient processes and improve patient health outcomes.

Some examples of health systems in which massage therapists are important and active members of integrative care teams are provided in this document, including: Beaumont Health, Dana-Farber Cancer Institute, Nationwide Children's, Memorial Sloan-Kettering Cancer Center, Mayo Clinic, Duke Health System and M.D. Anderson Cancer Center. Case studies of collaboration demonstrate how massage therapists can function within team-based, integrative care models and deliver better patient results.

Data also indicate significant cost savings for patients, insurers and government when massage therapy is used as a frontline approach to pain management. For a focused economic impact comparison between massage therapy and opioids for pain management, see the last section of this report.

MASSAGE THERAPY CONSUMER TRENDS

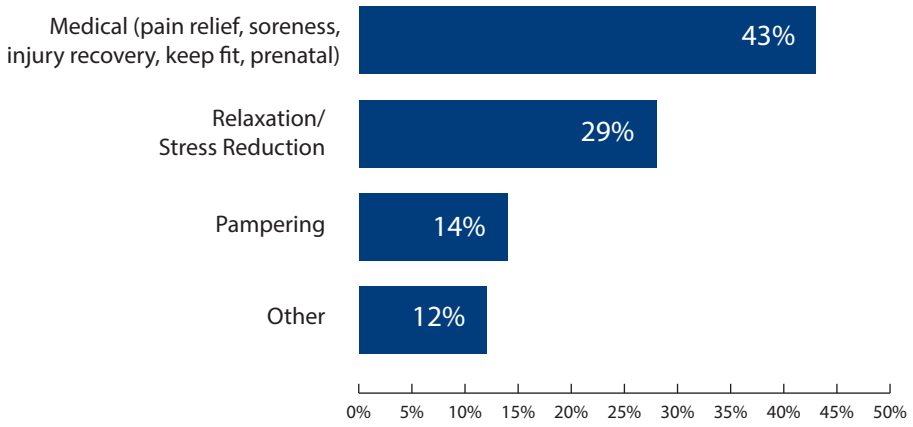
Massage therapy is an important component of health and wellness services for millions of Americans each year. Massage therapy is the manual manipulation of soft tissue intended to promote health and well-being[1], and includes under its umbrella many types of massage that can be applied by trained massage therapists. More than 325,000 massage therapists in the United States provide essential services to millions of patients/clients, both to improve general health and well-being and to treat specific ailments and medical needs. For many patients, massage therapy is a key component of their treatment plans.

According to a recent national survey,[2] an average of 19 percent of adult Americans received at least one massage from a professional massage therapist between July 2016 and July 2017. Of those who had a massage in that timeframe, 72 percent received it for medical or stress-related reasons (Figure 1). Medical reasons include pain relief, stiffness or spasms, injury recovery, migraines, prevention, pregnancy or prenatal care, and general well-being.[2]

Eighty-seven percent of individuals surveyed view massage as beneficial to overall health and wellness, and 71 percent agree that massage therapy should be considered a form of health care. Eighty-nine percent believe that massage can specifically be effective in reducing pain, with 29 percent stating that they have used massage therapy for pain relief.[2]

Research confirms the connections being made between patients, health care providers and massage therapists. According to a recent consumer survey, approximately 50 million American adults (17 percent) discussed massage therapy with their doctors or health care providers in the previous year. Of those, 61 percent of their physicians referred them to a massage therapist, strongly recommended massage therapy or encouraged them to get a massage.[3] While physicians led the way in recommending massage, chiropractors and physical therapists also recommended massage therapy. (Figure 2).

Figure 1: Top Reasons for Getting a Massage in 2017

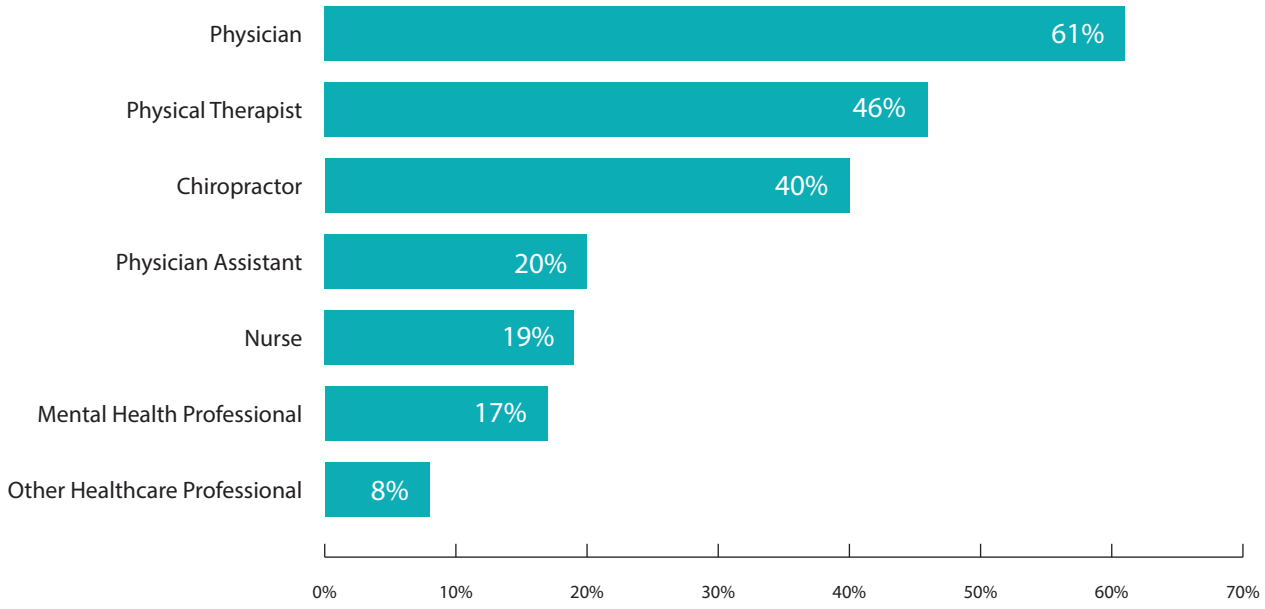


[1] Moyer CA, Rounds J, Hannum JW (2004) A meta-analysis of massage therapy research. Psych Bulletin 130: 3–18.

[2] AMTA's 21st annual consumer survey conducted by ORC International. This report presents the findings of a telephone survey conducted among two national probability samples, which, when combined, consists of 1,005 adults, 504 men and 501 women 18 years of age and older, living in the continental United States. 504 interviews were from the landline sample and 501 interviews from the cell phone sample. Interviewing for this survey was completed on July 20-23, 2017.

[3] AMTA 2017 Consumer Survey

Figure 2: Health Care Professionals Who Recommended Massage



NOTE: Respondents could indicate as many as applied to their experience.

Massage therapists report that they receive more referrals from chiropractic offices than other sources, with 12 percent of therapists reporting referrals at least once a week, and another 24 percent receiving referrals several times per month. Fifty-four percent of massage therapists received at least one referral every six months or less from a hospital or medical office in 2017.[4]

HEALTH BENEFITS OF MASSAGE THERAPY

There is a significant focus among health care policymakers and professionals on "team-based care" as a foundation for health system transformation and improvement.[5] The National Academy of Medicine defines team-based care as "...the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively with patients and their caregivers—to the extent preferred by each patient—to accomplish shared goals within and across settings to achieve coordinated, high-quality care."[6] Using a team/integrative approach to care delivery means that physicians can delegate more responsibility to other health professionals, each of whom can then practice "to the top of their license" to support more efficient process and improve patient health outcomes.[7]

Because massage therapy can be a significant component of an integrative approach to a variety of health conditions, massage therapists can be im-

[4] AMTA 2017 Industry Survey

[5] Lisa P. Shock, MHS, PA-C, *North Carolina Medical Journal*, July-August 2016 vol. 77 no. 4 273-274

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Table 1: Conditions and Treatment Approaches for Massage Therapy

CHRONIC PAIN MANAGEMENT (pages 9–11)	BEHAVIORAL HEALTH TREATMENT (pages 12–13)	CARE FOR REHABILITATION/ PHYSICAL TRAINING (pages 13–16)	ACUTE MEDICAL TREATMENT (pages 16–20)
Back pain	Anxiety and stress	Performance training/ injury treatment	Cancer management
Neck and shoulder pain	Depression	Ergonomics and job-related injuries	Post-operative pain
Headache	PTSD	Cardiac rehab	Lifestyle diseases
Carpal tunnel syndrome	Substance use disorder recovery	Joint replacement surgery	Maternity and newborn care
Osteoarthritis		Scar management	
Fibromyalgia			
Hospice			

portant members of care teams.[8] A first step in the process is to understand and clearly articulate the clinical benefits of massage therapy for specific patient needs. This section details evidence supporting the inclusion of massage therapists to treat many important patient health conditions (listed in Table 1). Case examples of health systems in which massage therapists are important and active members of integrative teams are included later in this document.

Of particular relevance, massage therapy may offer some mitigation of overuse of opioids. Massage therapy is an accepted nonpharmacological therapy option for managing pain, including a variety of specific chronic pain issues. It can be an important alternative to opioids or as a means to mitigate the overuse of opioids. It is recognized by the National Institutes of Health (NIH), and included in nonpharmacological pain guidelines issued by The Joint Commission, as well as the American College of Physicians (ACP). It is specifically mentioned in guidelines for opioids alternatives issued by the Attorney General of West Virginia in 2017; and it is referenced in a September 18, 2017 letter from 37 State Attorneys General to the President and CEO of America's Health Insurance Plans, which encourages insurance coverage of alternatives to opioids.

The following section lists sample conditions for which massage therapy has been demonstrated to be effective in managing pain or other health issues. These are listed with citations in the areas of chronic pain management, behavioral health (including stress reduction), rehabilitation/physical therapy, and issues associated with acute medical treatment.

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Care for Chronic Pain Management

BACK PAIN. Numerous studies demonstrate that massage therapy can provide relief for patients with chronic back pain.[9,10,11,12,13,14,15,16,17] Furlan and colleagues' 2012 systematic review highlighted the evidence indicating that massage therapy reduced chronic low back pain and was superior to sham laser control, relaxation therapy, as well as self-care education and equal to exercise.[9] Studies have also found that significant improvements in acute or subacute low back pain or function when using massage therapy. One study compared the effects of two types of massage therapy to usual care on 401 participants suffering from nonspecific low-back pain and found that participants who received massage had superior functional outcomes and symptom improvement than those in the usual care group, with benefits lasting at least six months.[11] Another study of women with chronic low back pain indicated that participants who received massage therapy had a greater decrease in pain intensity and disability than the participants who received physical therapy.[15] These results suggest that massage therapy is a viable, effective treatment option for people who deal with chronic back pain.

NECK AND SHOULDER PAIN: Additionally, there is growing evidence of the effect of massage therapy on neck and shoulder pain.[18,19,20] Two meta-analyses found that massage therapy yielded greater pain reduction when compared to inactive therapies for neck and shoulder pain.[21,22] For example, one randomized controlled trial showed that individuals that were randomized to 30 minutes of massage therapy weekly for four weeks combined with daily self-massage had improvements in pain and range of motion compared with those who were randomized to a wait-list control.[23] Another controlled trial in which participants were either randomized to 10 massage therapy sessions over 10 weeks or a self-care book on managing neck problems found significant improvement in the Neck Disability Index score for those who received massage therapy.[24] Interestingly, researchers discovered a dose-response relationship between the number and duration of

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[9] Furlan AD, Yazdi F, Tsertsvande A, Gross A, Van Tulder M, Santaguida L, Gagnier J, Ammendolia C, Dryden T, Doucette S, Skidmore B, Daniel R, Ostermann T, Tsouros S (2012) A systematic review and meta-analysis of efficacy, cost-effectiveness, and safety of selected complementary and alternative medicine for neck and low-back pain. Evidence-Based Comp Alt Med 2012:1-61 Article ID 953139.

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[22] Kong LJ, Zhan HS, Cheng YW, Yuan WA, Chen B, Fang M (2013) Massage therapy for neck and shoulder pain: a systematic review and meta-analysis. Evid Based Complement Alternat Med Epub. PMCID: PMC3600270

[23] Field T, Diego M, Gonzalez G, et al. Neck arthritis pain is reduced and range of motion is increased by massage therapy. Complement Ther Clin Pract. 2014;20(4):219–223.

[24] Sherman KJ, Cherkin DC, Hawkes RJ, et al. Randomized trial of therapeutic massage for chronic neck pain. Clin J Pain. 2009;25(3):233–238.

massage sessions and the improvement in neck pain intensity and the Neck Disability Index score.[25] Other initial studies have shown that massage therapy can also help relieve cervicogenic headaches caused by neck pain.[26]

The specific effect of therapeutic massage on the upper trapezius muscles (commonly associated with increased muscle tension) was also investigated through a randomized crossover study. Seventeen healthy individuals participated in two sessions. Participants sat quietly in one session and received a moderate pressure massage applied to the shoulders and neck in the other. The study found that a short-duration moderate pressure massage leads to a decrease in upper trapezius muscle activity. That is, therapeutic massage for a minimum of five minutes resulted in skeletal muscle relaxation of approximately 20 percent.[27]

HEADACHE. Massage therapy has also shown promise for individuals who deal with the pain of both chronic headaches and migraines. Patients who experience tension headaches (which may be connected to ergonomic issues as well as emotional issues) and who receive massage therapy experience a decrease in the physical pain of the headache in addition to significant reductions in stress, anxiety and depression, which may be associated with headache pain.[28,29] In one study, researchers investigating the effects of massage therapy on migraine randomly assigned 47 participants to massage or a control group. Participants completed daily assessments of migraine experiences and sleep patterns for 13 weeks, with those assigned to massage receiving weekly massage therapy during weeks five and 10 of the study. Anxiety levels, heart rate and salivary cortisol were assessed before and after each massage session. Perceived stress and coping efficacy were evaluated at weeks four, 10 and 13. Results showed that massage participants had greater reductions in migraine frequency and improved sleep quality during the intervention weeks, as well as the three follow-up weeks.[30]

CARPAL TUNNEL SYNDROME. Consumers looking to ease hand and arm pain due to conditions such as carpal tunnel syndrome are also finding success with massage therapy.[31,32,33] For example, a study of 21 participants with carpal tunnel syndrome found that two weeks of 30-minute massages twice per week resulted in significantly reduced pain and increased functional activity.[33] In another study, 46 adults with hand pain were randomly assigned to a massage therapy or standard treatment control group. The massage group received massage on the affected hand once a week for four weeks, as well as being taught self-massage techniques. When compared to the control group, those participants receiving massage had less pain and greater grip strength after the first and last session. Lower scores on anxiety, depressed mood and sleep disturbance scales were also realized.[32]

OSTEOARTHRITIS. The pain from the slow degeneration of the knee joint caused by osteoarthritis is

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[32] Moraska A, Chandler C, Edmiston-Schaetzel A, Franklin G, Calenda EL, Enebo B (2008) Comparison of a targeted and general massage protocol on strength, function and symptoms associated with carpal tunnel syndrome: a randomized pilot study. J Altern Complement Med 14: 259-267.

[33] Elliott R, Burkett B. Massage therapy as an effective treatment for carpal tunnel syndrome. J Bodyw Mov Ther. 2013;17:332–338.

also reduced with massage therapy.[34,35,36,37,38] Several randomized controlled trials and prospective investigations indicate that massage therapy has positive results with respect to osteoarthritis and rheumatoid arthritis related outcomes, including less pain and stiffness, and enhanced function.[34,35] For example, one randomized controlled study found that participants who received an eight-week massage therapy intervention for symptoms associated with osteoarthritis of the knee had significant improvements compared to those who received usual care.[36] A similar study of 125 patients with osteoarthritis of the knee showed that a one-hour course of massage given for eight weeks provided better pain relief than usual medical care.[37] Even when compared to just exercise, researchers found that patients with knee arthritis pain who received massage therapy with exercise showed significant improvement on the pain scale, get up and go test, and the WOMAC index.[38]

FIBROMYALGIA. Massage therapy can relieve pain in conditions that are not localized to a specific part of the body, such as fibromyalgia. Fibromyalgia is a syndrome that can produce chronic fatigue, muscle pain, and depression, among other symptoms. Massage therapy has been shown to relieve pain and attenuate the general effect of symptoms in fibromyalgia patients.[39,40] A meta-analysis pooled from 145 study participants indicated that myofascial release has positive effects on fibromyalgia symptoms such as pain, anxiety, and depression compared to placebo.[41] Experts have recommended that massage therapists be regular partners in a team-based treatment of the syndrome, along with physicians, psychologists, and physical and exercise therapists.[42] It is estimated that between one-quarter and one-half of fibromyalgia patients seek treatment from a massage therapist.[43]

HOSPICE. For those who are coping with terminal illnesses, massage therapy can be a particularly effective method of providing comfort and easing pain, stress, depression, nausea and fatigue. The benefits of massage therapy make a compelling argument for its presence in palliative care facilities.[44] A 2018 study found that massage therapy reduced the need for administration of rescue doses for pain and anxiety and improved well-being in palliative care patients.[45] A survey of hospice facilities found some include massage therapy as part of a comprehensive approach to decreasing pain and improving quality of life.[46]

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Care for Behavioral Health (Including Stress Reduction)

ANXIETY AND STRESS. Anxiety and stress are common life experiences that, when prolonged over days or experienced at extreme levels, can seriously impact mental and physical health.[47,48] Both anxiety and stress can be associated with existing health problems—particularly chronic problems—or may be experienced as part of a work environment. The need for stress and anxiety reduction is among the most common physician referrals and patient requests for massage therapy. Massage therapy has been shown to help reduce stress and anxiety while simultaneously addressing related physical repercussions.[49,50,51] For example, a meta-analysis of 37 randomized studies indicated that massage therapy is effective in addressing elevated anxiety, negative mood, and ongoing non-acute pain.[52]

A proof-of-concept, randomized, single-masked, clinical trial suggests that Swedish massage therapy is an effective acute treatment for generalized anxiety disorder.[53] Researchers also studied the effect of massage therapy in specific settings and for specific conditions in a pilot study that assessed the feasibility and effectiveness of chair massage for nurses during work hours to help relieve stress. Thirty-eight nurses were offered weekly 15-minute massages during work hours. Symptoms were assessed at baseline, five and 10 weeks. At 10 weeks, assessment scores showed that massage helped reduce stress-related symptoms during work hours.[54] Researchers also investigated the effect back massage might have on chemotherapy-related fatigue and anxiety for cancer patients. They found that for the 40 study participants, back massage given during chemotherapy significantly reduced anxiety and acute fatigue, suggesting that massage therapy may play a key role in helping patients better manage symptoms associated with cancer treatment.[55] A third study of patients with brain tumors determined that a four-week massage therapy intervention not only decreased stress, but also improved emotional well-being, brain tumor concerns, and social/family well-being.[56]

Massage therapy's flexibility and diversity is notable in that it can be used in combination with other relaxation techniques, psychiatric methods, and therapeutic interventions for those whose constant anxiety is at the extreme of severity.

DEPRESSION. The National Quality Forum (NQF) rated clinical depression as the most important high-impact Medicare condition capable of significantly raising the price of health care and reducing the health of patients.[57] Clinical depression can manifest concurrently with a number of other medical conditions, and contribute to the outcomes patients achieve for those conditions. Massage therapy has been shown to help relieve depression and some of its symptoms.

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Meta-analysis has indicated a significant association between massage therapy and alleviated symptoms of depression.[58] For example, researchers studying HIV patients found that massage therapy helped to reduce depression significantly compared to no interventions or light touching.[59] Massage therapy can also reduce depression in pregnant women (pregnant mothers, both before and after delivery, can experience bouts of depression that can affect their infant) and is correlated to better birth outcomes, especially when used with other effective modalities, such as yoga.[60] Not only can massage therapy help ease the emotional pain of depression itself, it can be effective in helping to deal with some of the side effects of depression medications, which can include headaches, anxiety and insomnia.

Stress, anxiety and depression may also have physiological symptoms that can be helped by massage therapy. For example, hypertension is associated with stress, and is a risk factor for many cardiovascular illnesses. Massage therapy has been shown to acutely reduce blood pressure and heart rate, so can be used to supplement plans that include combinations of medical and behavioral interventions to reduce blood pressure, particularly when a patient's need for reduced blood pressure is considered urgent.[61,62]

PTSD. In 2012, research published in *Military Medicine*[63] showed that massage therapy helped military veterans significantly reduce anxiety, depression, worry and physical pain. Declining levels of tension and irritability following massage were also reported. A 2016 study of the Mission Reconnect program for military veterans showed significant improvements in measures of PTSD and significant reductions in self-reported levels of pain, tension, irritability, anxiety and depression.[64]

SUBSTANCE USE DISORDER RECOVERY. Massage therapy may also be helpful for people who are recovering from substance use, specifically when they are dealing with withdrawal symptoms, such as the anxiety, stress and sleep problems that often accompany recovery.[65,66]

Care for Rehabilitation/ Physical Training

PERFORMANCE TRAINING/INJURY TREATMENT. Massage therapy has long been included in training and recovery plans for athletes. One review of the literature on sports injuries noted several studies in which athletes with some form of injury (ligament tears, sub-acute back pain, etc.) were able to recover fully from their injuries through a combination of physical therapy, exercise and massage therapy.[67] Further work published in *Science Translational Medicine* showed that massage therapy after exercise attenuated production of cellular inflammatory signals in muscle tissue, thereby supporting post-exercise healing and making the case for massage

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therapy as part of the wellness regimen for athletes and others.[68]

Studies in non-athlete specific populations also lend supportive evidence regarding massage therapy for injury treatment. For example, results from one study suggest that massage therapy weakens the impairment of upper extremity function resulting from an exertion-induced muscle injury,[69] and a similar study on eccentric exercise found that groups that received massage therapy experienced reduced muscle soreness and increased range of motion compared to control groups.[70] Another randomized blinded trial was conducted to determine if lower extremity exercise-induced muscle injury decreased vascular endothelial function of the upper extremity and if massage therapy improved peripheral vascular function after an exercise-induced muscle injury. Thirty-six sedentary young adults were randomly divided into three groups. One group experienced an exercise-induced muscle injury and massage therapy, another experienced an exercise-induced muscle injury only, and one experienced massage therapy only. Results indicated that massage therapy improves endothelial function with or without a muscle injury.[71]

Researchers also conducted a randomized, controlled trial to assess if massage therapy can reduce pain and perceived fatigue in the quadriceps of athletes after a long-distance triathlon race. The study participants were 74 triathlon athletes who completed an entire Ironman triathlon race and whose primary complaint was regarding pain in the anterior portion of the thigh. Massage therapy aimed at recovery after the competition was given to the experimental group while the control group rested. The study found that massage therapy was more effective than no intervention in post-race recovery from pain as well as perceived fatigue.[72]

Research on the value of massage therapy for elite para-cyclists followed the impact of massage therapy on para-cyclists as they trained and competed in national and international events, including the 2016 Summer Paralympic games in Rio. The research indicates massage therapy helps para-cyclists recover quicker, train harder and increases their flexibility.[73]

ERGONOMICS AND JOB-RELATED INJURIES. Injuries can also occur due to less-than-optimal ergonomic configurations in the workplace (e.g., poor configurations of office space, or workers in assembly lines who must perform repetitive functions in awkward positions).[74] These injuries can lead to acute and chronic issues, such as carpal tunnel syndrome and neck pain.

Workers who are receiving workers' compensation for injuries incurred on the job may seek massage therapy to aid in their recovery.[75] Generally, workers' compensation programs around the country will cover massage therapy if the therapy is referred by a physician as a potential means of getting the individual back to the workplace.

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The frequent use of massage therapy for people injured in the workplace suggests a high level of national recognition of massage therapy's ability to help people return to productivity, and research helps confirm the positive results achieved. For example, in 2013 the Department of Labor recognized the potential benefit of massage therapy in helping injured employees under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA), which provides compensation to those who work on certain high-risk projects for the Department of Energy. The Department cited the potential benefits of massage therapy as "reducing pain and muscle tension, increasing flexibility and range of motion, and improving blood circulation."[76]

CARDIAC REHAB. Massage therapy may be particularly helpful for patients recovering from cardiac surgery who might, in some cases, suffer from back pain, anxiety and stress. Studies on coronary artery bypass surgery and elective cardiac surgery found that patients who received massage therapy experienced decreased pain intensity, greater reduction in pain, muscle tension, and anxiety, or increased relaxation.[77,78,79] One study on the effects of massage in the postoperative cardiovascular surgery setting looked at 113 patients who were randomized to either receive massage therapy or quiet relaxation time. Results showed the 62 participants who received massage had significantly decreased pain, anxiety and tension.[80] Research also found that massage therapy was efficacious for improving sleep quality after cardiopulmonary artery bypass graft surgery.[81]

Studies on coronary care patients found that patients who experience massage therapy had decreased systolic and diastolic blood pressure, heart rate, and respiratory rate.[82,83,84] One study on prehypertension found that there was a greater sustained decrease in systolic and diastolic blood pressure in the group that received massage compared to the standard treatment control group.[85,86] Another study of hypertensive patients found that participants who received massage had lower high blood pressure symptoms, including systolic and diastolic blood pressure, as well as depression and urinary and salivary cortisol.[87]

Researchers also evaluated the effect of a single 10-minute head massage on the activity of the cardiac autonomic nervous system through the measurement of heart rate variability through a randomized crossover trial. Ten study participants randomly received both 10 minutes of head massage therapy and the control intervention of sitting quietly for 10 minutes on the same chair with eyes closed. Results showed that a single 10-minute

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head massage had a significant positive impact on heart rate variability, which can modulate the cardiac autonomic nervous system.[88] A more recent study suggests that a 20-minute hand massage in addition to routine postoperative pain management can concomitantly reduce pain intensity, pain unpleasantness, and anxiety by two points on average on a 0–10 scale.[89]

JOINT REPLACEMENT SURGERY. Patients who have undergone joint replacement can also benefit from massage therapy. For example, a study on the effects of relaxation techniques and back massage on postoperative pain, anxiety and vital signs of patients who had undergone total hip or knee arthroplasty found that both these interventions helped decrease pain and anxiety.[90] Massage therapists, in close collaboration with physical therapists, can help to reduce pain perception and anxiety in patients, both before and after hip or knee joint replacements.[91,92]

SCAR MANAGEMENT. Massage therapy can also be effective for scar tissue management, such as scars resulting from surgical incisions. Once a wound has closed, healed and is approved as safe to work on by a physician, massage therapists can apply techniques to break down the scar tissue and promote minimum observability of the healed scar.[93,94] A literature review found that of the 30 surgical scars that received massage therapy, 90 percent resulted in improved appearance or higher Scar Assessment Scale scores.[95] Researchers also found that massage therapy on patients with burn scars decreased pain, pruritis, and scar tissue.[96] One study found that massage therapy on cleft-lip scars for five weeks improved range of motion, strength, and symmetry. Client confidence in the scar's appearance also increased.[97]

Care for Issues Associated with Acute Medical Treatments

CANCER MANAGEMENT. The effectiveness of massage therapy in helping patients cope with both illnesses and treatments has been demonstrated in studies of cancer care. Studies have corroborated the helpful role of massage therapy in reducing cancer-related discomfort. Several have found that massage therapy was effective for managing pain for various types of cancer, including metastatic cancer, colorectal cancer, and breast cancer. Studies also indicate that massage therapy is effective for

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physiological outcomes of cancer-related pain populations.[98,99,100,101,102] A meta-analysis on the effects of massage therapy on cancer found that massage therapy significantly reduced cancer pain compared to no massage control conditions.[103]

Studies regarding children with cancer found consistent results. One study on the effects of massage therapy on chemotherapy-associated nausea and vomiting in children found that participants in the massage group experienced decreased pain severity and fewer bouts of vomiting.[104] Another controlled pretest/post-test, quasi-experimental study was conducted to investigate the effect of massage therapy on pain and anxiety arising from intrathecal therapy or bone marrow aspiration in children with cancer. Twenty-five children were divided into two groups. The experimental group received massage therapy while the control group received standard treatment. The children who received massage therapy had less acute procedural pain from intrathecal therapy or bone marrow aspiration than children receiving standard treatment.[105]

Studies for women with a history of gynecologic or breast cancer also confirmed the benefits of massage therapy. When compared to active comparators (e.g. caring presence, reading group, attention), pooled studies favored massage therapy for cancer-related fatigue. One randomized control trial compared Anma massage therapy with no therapy in gynecologic cancer survivors. The study observed a decrease in subjective severity of physical complaints after one 40-minute massage. This decrease was sustained with continuous weekly sessions for eight weeks.[106] Studies on breast cancer patients found that women who received massage therapy had significantly reduced depression and anxious depression compared to the control condition, as well as an increase in sleep quality, dopamine, serotonin, natural killer cell number, and lymphocytes.[107,108,109]

Researchers also found that massage therapy was beneficial for cancer-related sleep disorders and fatigue. One randomized controlled trial on 60 patients with acute leukemia undergoing chemotherapy was conducted to examine the effects of slow-stroke back massage. The experimental group received slow-stroke back massage three times a week for four weeks. The study results show that massage significantly reduced progressive sleep disorder, pain and fatigue, and improved sleep quality over time.[110] Another study of 66 breast cancer survivors found that Swedish massage produced clinically significant relief of cancer-related fatigue.[111]

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Massage therapy research for cancer-related concerns has been conducted in multiple environments, including cancer-specific health care settings. For example, Memorial Sloan-Kettering Cancer Center in New York City studied their use of massage therapy for their patients at a time when 12 massage therapists were employed across their inpatient and outpatient centers. Massage therapists provided care for patients who either requested the service themselves or were referred by their physician. As a result of massage therapy treatments, patients who had reported relatively high levels of pain, fatigue, anxiety, nausea and depression subsequently reported a nearly 50 percent reduction in the levels of all of their symptoms. Both patients and staff reported generally high approval and appreciation for massage therapy.[112]

POSTOPERATIVE PAIN. Several studies have been undertaken to examine the effectiveness of massage therapy to aid in healing following other inpatient medical interventions. Pooled results indicate that pain intensity/severity can be reduced by massage therapy for surgical patients. For example, massage therapy was more efficacious in reducing pain than standard care plus self-directed relaxation pre-surgery in one study and more efficacious in reducing pain than rest, usual care and guided relaxation post-surgery in another.[113] Research has also demonstrated reductions in postoperative pain and anxiety and improved patient disposition following thoracic surgeries,[114] mastectomies[115] and heart surgeries.[116,117,118]

Other cancer-related side effects may be addressed by massage therapy as well. One case study examining the effectiveness of massage therapy following lumbar spine surgery suggests massage therapy provides short-term improvements in pain and may have assisted in the lengthening of hamstrings bilaterally, resulting in improved range of motion.[119]

LIFESTYLE DISEASES. There are instances when massage therapy can be used to help manage unwanted physical side effects or repercussions of "lifestyle diseases," such as lymphedema from bariatric surgery, heart failure and chronic venous disease. For example, one study evaluated the effects of manual lymphatic drainage and postural drainage techniques on edema in the lower limbs of women with morbid obesity submitted to bariatric surgery. Forty-seven women were randomly divided into three groups: a control group that received conventional physical therapy, a group that received six sessions of manual lymphatic drainage in addition to conventional physical therapy, and a group that received six sessions of postural drainage in addition to conventional physical therapy. Results showed that the group that received manual lymphatic drainage had the largest change in volume.[120] Another study of 9 patients in heart failure found that manual lymphatic drainage significantly decreased the circumferential measurements of edematous limbs. It also discovered that heart rate decreased following manual lymphatic drainage.[121] A third study of 70 patients with chronic venous disease that qualified for elective surgery of the venous

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system was conducted. Results found that manual lymphatic drainage alone significantly reduced foot volumetry in patients with chronic venous disease, improving their quality of life.[122]

MATERNITY AND NEWBORN CARE. Pregnancy/labor is another area where massage therapy has been demonstrated to improve outcomes. One study-control experimental type study of 62 pregnant women found that lower back massage has a significant impact on reducing labor pain and increasing satisfaction with birth.[123] Another quasi-experimental study of 80 women discovered that back massage may be a more effective pain management approach than change in position during the first stage of labor.[124] A comprehensive review in 2018 also found that massage could have a role in reducing pain intensity, increasing a woman's sense of control, and improving satisfaction with the childbirth experience.[125] For women undergoing caesarean delivery, studies have found that hand and foot massage therapy can reduce pain, anxiety, and stress postoperatively.[126,127]

Researchers have also assessed the effectiveness of back massage in improving sleep quality in postpartum women via a randomized controlled trial. Sixty postpartum women who reported poor quality of sleep were randomly divided between two groups. One group received one 20 minute back massage per day by a massage therapist for five days while the other received routine care. Results of the study indicate that those in the massage therapy group had significantly improved postpartum sleep.[128]

Massage therapy has been shown to play a critical role in newborn care. Several studies have shown that massage therapy by a therapist and by significant others decreases a mother's prenatal depression, which increases gestational age and birth weight.[129] Two randomized clinical trials that examined the effect of massage therapy on the neurobehavioral development of infants found that newborns born to mothers in a massage therapy group had lower cortisol levels, better neonatal outcomes with fewer incidences of low birth weight and prematurity. Newborns and mothers in the massage group had better scores on many factors, including habituation, range of state, autonomic stability, withdrawal, depression, motor maturity, and orientation compared to the control group.[130,131] Another prospective, randomized, controlled intervention trial was conducted to assess the effect of massage therapy on the growth and development of infants of HIV-infected mothers who were enrolled in a prevention of mother-to-child transmission program. The mothers in the experimental group were trained to massage their infants daily for 15 minutes. Results of the study indicate that massage therapy improved the overall development of HIV-exposed

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[129] Field T. Massage therapy research review, Complement. Ther Clin Pract. 2014;20:224–229.

[130] Field T, Diego MA, Hernandez-Reif M, Schanberg S, Kuhn C (2004) Massage therapy effects on depressed pregnant women. J Psychosom Obstet Gynaecol. 25(2)115-22.

[131] Field T, Diego M, Hernandez-Reif M, Deeds O, Figueiredo B (2009) Pregnancy massage reduces prematurity, low birthweight and postpartum depression. 32(4):454-60.

infants and had an especially significant positive impact on their hearing and speech.[132] Researchers also found that infants with gastroesophageal reflux disease that received massage therapy twice a week for six weeks had significantly lower cortisol levels over time compared to the control group.[133]

Studies have further demonstrated the benefits of massage therapy for preterm infants. Greater weight gain and earlier hospital discharges are the most frequently reported effects of preterm infant massage therapy.[134,135,136] Meta-analyses have found that massaged preemies have five to six fewer days on average in neonatal intensive care, massaged preterm and low birth weight infants in neonatal units have a modest improvement in weight gain, and massaged infants had significantly enhanced mental development.[137,138] Recent studies have further highlighted the positive impact on weight gain for preterm infants.[139,140] One study of preterm infants showed that infants who received massage two times a day for two weeks experienced increased heart rate variability during caregiving[141] while another on the immune function of preterm infants found that infants in the massage therapy group had more natural killer cell activity, were heavier, and had greater daily weight gain compared to the control group.[142] A randomized controlled trial also evaluated the effects of massage therapy on transcutaneous bilirubin of stable preterm infants. Forty preterm newborns in the neonatal intensive care unit were divided into two groups. The experimental group received massage therapy in addition to routine therapy while the control group only received routine therapy. Results from the study indicate that massage therapy can control bilirubin levels in preterm newborns and delay the need for phototherapy.[143]

CASE STUDIES

Following are example case studies of the integration of massage therapy into patient care at major medical centers. These examples indicate ways massage therapy as part of integrative care can be effective and of significant benefit to patients and treatment outcomes.

BEAUMONT HEALTH

Beaumont Health is Michigan's largest health care system. Formed in 2014 as a not-for profit, Beaumont Health consists of eight hospitals, 174 health centers, almost 5,000 physicians and 38,000 employees. Beaumont Health's Integrative Medicine massage therapy program began in 2005 with one massage therapist. The number of massage therapists rapidly grew to 38 in 2018. Though the program started in oncology, massage therapy quickly expanded to

[132] Perez EM, Carrara H, Bourne L, Berg A, Swanevelder S, Hendricks MK. Massage therapy improves the development of HIV-exposed infants living in a low socio-economic, peri-urban community of South Africa. Infant Behav Dev. 2015 Feb;38:135-46.

[133] Neu M, Pan Z, Workman R, Marcheggianni-Howard C, Furuta G, Laudenslager ML. Benefits of massage therapy for infants with symptoms of gastroesophageal reflux disease. Biol Res Nurs. 2014;16:387–397.

[134] Field T. Massage therapy research review. Complement Ther Clin Pract. 2016 Aug;24:19-31.

[135] Saeadi R, Ghorbani Z, Shapouri Moghaddam A. The effect of massage with medium-chain triglyceride oil on weight gain in premature neonates. Acta Med Iran. 2015;53:134–138.

[136] Choi H, Kim SJ, Oh J, Lee MN, Kim S, Kang KA. The effects of massage therapy on physical growth and gastrointestinal function in premature infants: a pilot study. J Child Health Care. 2015 Epub ahead of print.

[137] Wang L, He JL, Zhang XH. The efficacy of massage on preterm infants: a meta-analysis. Am J Perinatol. 2013;30:731–738.

[138] Badr LK, Abdallah B, Kahale L. A Meta-Analysis of Preterm Infant Massage: An Ancient Practice With Contemporary Applications. MCN Am J Matern Child Nurs. 2015 Nov-Dec;40(6):344-58.

[139] Taheri PA, Goudarzi Z, Shariat M, Nariman S, Matin EN, The effect of a short course of moderate pressure sunflower oil massage on the weight gain velocity and length of NICU stay in preterm infants, Infant Behav Dev. 2018 Feb;50:22-27.

[140] Jabraeile M, Rasooly AS, Farshi MR, Malakouti J, Effect of olive oil massage on weight gain in preterm infants: A randomized controlled clinical trial, Niger Med J. 2016 May-Jun;57(3):160-3.

[141] Smith SL, Haley S, Slater H, Moyer-Mileur LJ. Heart rate variability during caregiving and sleep after massage therapy in preterm infants. Early Hum Dev. 2013;89:525–529.

[142] Ang JY, Lua JL, Mathur A, Thomas R, Asmar BI, Savasan S, Buck S, Long M, Shankaran S. A randomized placebo-controlled trial of massage therapy on the immune system of preterm infants. Pediatrics. 2012;130:1549–1558.

[143] Basiri-Moghadam M, Basiri-Moghadam K, Kianmehr M, Jani S. The effect of massage on neonatal jaundice in stable preterm newborn infants: a randomized controlled trial. J Pak Med Assoc. 2015 Jun;65(6):602-6.

other departments, including cardiology, urology, pediatrics and beyond. In part, program expansion was the result of monthly educational and outreach efforts to stakeholders across the hospital and within the broader community. Physician orders are not required for patients to receive massage, and massage therapists chart in the same electronic medical record system as doctors and nurses. Funding for massage therapy comes from fee for service, grants for free massage and donations for free massage. Notably, Beaumont Health System's health insurance for employees covers massage therapy for musculoskeletal conditions.

DANA-FARBER CANCER INSTITUTE

Dana-Farber Cancer Institute, a Harvard University academic medical center and world-renowned cancer patient care and research institute in Boston, Massachusetts, developed one of the first successful models for a hospital-based integrative therapies center. Through the Leonard P. Zakim Center for Integrative Therapies and Healthy Living, Dana-Farber brings together leading experts in cancer with integrative therapy practitioners to offer patients more comprehensive, holistic cancer care. The Zakim Center is an interdisciplinary program that 1) offers integrative therapies including massage therapy to improve patients' quality of life and help with symptom management, 2) educates staff and patients about integrative therapies, and 3) researches integrative therapies to advance the scientific evidence base. All Dana-Farber patients are eligible to partake in the Zakim Center's offerings, free group classes, lectures and educational seminars.

DUKE HEALTH SYSTEM

Duke University, in Durham, North Carolina, has an extensive health system that includes the medical school hospital and Duke Integrative Medicine. Duke Integrative Medicine providers integrate the best of conventional medicine with proven integrative therapies to address the whole person—body, mind, spirit and community. This model of care includes primary care, physician consultations, health coaching, and an array of clinical services, classes, workshops and trainings.

Massage therapy services are offered throughout the Duke health system. Patients do not need a physician referral to access massage therapy but can instead go directly to the integrative health program and request it themselves.

Massage therapists employed by Duke Health Systems practice throughout the facility and have extensive interaction with physicians, nutritionists, acupuncturists and other caregivers. They share space and discuss patient needs in informal settings, and also have formal treatment team meetings when difficult cases arise. The teams are diverse, and discussions surrounding patient care are regularly approached from many different perspectives. The massage therapist is seen as an equal in the care team; physicians, nurses and patients can approach the massage therapist and ask for consultations. The massage therapist works with the system's electronic health records, and is provided opportunities to address different groups of caregivers, including medical students, to educate them on the benefits of massage therapy.

MAYO CLINIC

Mayo Clinic has led the integration of massage therapy into the hospital setting since 2002, providing inpatient and outpatient massage therapy to thousands of people each year. Massage therapy is an integral part of the services offered by the Mayo Clinic Integrative Medicine and Health team, which promotes physical, emotional, mental and spiritual well-being through the use of health and wellness practices. These integrative practices—that complement instead of replace traditional Western medicine—help people cope with the stress and pain of cancer, stomach problems, fatigue, fibromyalgia, heart disease, and other health conditions.

Doctors and professional massage therapists work together to coordinate a massage therapy treatment plan for their patients. While massage therapy can be an outpatient procedure, it can also be incorporated into hospital stays. Many massage therapists at Mayo Clinic have additional training in mobilization of scar tissue, lymphedema drainage, acupressure, reflexology or other techniques.

Researchers at Mayo also play a critical role in furthering the integration of massage therapy into the hospital experience. Several studies conducted at Mayo have demonstrated the safety and benefit of massage therapy for multiple surgeries and procedures, including heart surgery, breast cancer, colon and rectal surgeries, and more. In fact, Mayo Clinic has developed a training program to prepare massage therapists due to the high volume of hospital patients that have surgical wounds and medical equipment attached to them.

M.D. ANDERSON CANCER CENTER

The University of Texas MD Anderson Cancer Center is one of the leading cancer hospitals in the country. Its Integrative Medicine Center Clinical Services help patients cope with the stress and anxiety of cancer treatment, reduce pain, and also improve their sense of well-being. The Center addresses the social, mind-spirit, and physical aspects of health by providing guidance on comprehensive and integrative approaches to cancer care.

Integrative oncology physicians at the Integrative Medicine Center meet with a team of professionals that have experience in both conventional approaches and integrative treatments like oncology massage. Oncology massage is massage therapy that has been adapted for patients with cancer, which can help reduce nausea, as well as reduce pain and anxiety for all types of cancer patients. This service is offered for both inpatients and outpatients. Outpatients also have the option to self-refer for a chair massage that is funded through a foundation.

MEMORIAL SLOAN-KETTERING CANCER CENTER (MSKCC)

MSKCC is a renowned cancer center in New York City, and is credited with being the oldest and largest cancer center in the world. The National Cancer Institute designated MSKCC a Comprehensive Cancer Center, meaning it serves patients and conducts population-based research.

Today, MSKCC employs 12 massage therapists who work throughout the center. Patients can select from a range of massage therapy options, including Swedish, shiatsu and aromatherapy massage. Inpatients at the hospital can self-refer or be referred by a physician, while outpatient requests are exclusively self-referred. In 2013, MSKCC reported that they provided about 75 hours a week of 20-30 minute massage sessions to cancer patients.

NATIONWIDE CHILDREN'S

Nationwide Children's is one of the country's largest pediatric health care and research centers with 68 facilities across Ohio and beyond. Massage therapy is mainly available to patients admitted at the main campus in Columbus, Ohio, and includes children of all ages who have been diagnosed with childhood disease or illness and functional problems. Nationwide Children's leads the country in massage therapy as one of the few children's hospitals to staff a department of full-time, licensed massage therapists. Massage therapy is part of a child's entire inpatient medical course, from initial diagnoses and onset to treatment and recovery to discharge. The massage therapy team, part of the multi-disciplinary medical team, provides personalized treatment for each patient and diagnosis. The team works with every patient and family to identify functional treatment goals so that individualized plans of care can be created. The massage therapy team has extensive training in hospital-based massage therapy that includes specializations in burns/scar tissue massage therapy, CIMI/infant massage therapy, cranial sacral, fragile infant/NICU massage therapy, lymphatic drainage, myofascial release, neuromuscular massage therapy, oncology massage therapy, trigger point, and sports/event massage therapy.

"Nonpharmacologic strategies: physical modalities (for example, acupuncture therapy, chiropractic therapy, osteopathic manipulative treatment, **massage therapy**, and physical therapy) relaxation therapy and cognitive behavioral therapy..."

Joint Commission Perspectives, Volume 34, Number 11, November 2014, pp. 11-11(1).
Clarification to Standard PC.01.02.07.

"Recommendation 1: Given that most patients with acute or subacute low back pain improve over time regardless of treatment, clinicians and patients should select nonpharmacologic treatment with superficial heat (moderate-quality evidence), **massage**, acupuncture, or spinal manipulation (low-quality evidence)."

Chou, R, et al. Nonpharmacologic Therapies for Low Back Pain:
A Systematic Review for an American College of Physicians Clinical Practice Guideline.
Ann Intern Med. 2017; doi: 10.7326/M16-2459.

"The treatment plan may contain information supporting the selection of therapies, both pharmacologic (medications other than opioids to include anti-inflammatories, acetaminophen, and selected antidepressants and anticonvulsants) interventional, and non-pharmacologic therapies such as cognitive behavioral therapy, **massage**, exercise, multimodal pain treatment, and osteopathic manipulative treatment. The plan should document any further diagnostic evaluations, consultations or referrals, or additional therapies that have been considered to the extent they are available."

Guidelines for the Chronic Use of Opioid Analgesics.
Adopted as policy by the Federation of State Medical Boards April 2017.

"Medically-Approved Non-Opioid Pain Management (PBP B13d, e, or f): Medically-approved non-opioid pain treatment alternatives, including **therapeutic massage furnished by a state licensed massage therapist**. "Massage" should not be singled out as a particular aspect of other coverage (e.g., chiropractic care or occupational therapy) and must be ordered by a physician or medical professional in order to be considered primarily health related and not primarily for the comfort or relaxation of the enrollee. The non-opioid pain management item or service must treat or ameliorate the impact of an injury or illness (e.g., pain, stiffness, loss of range of motion)."

Medicare Managed Care Manual Chapter 4 - Benefits and Beneficiary Protections.
Revised for 2019 coverage Year.

Part Two: The Economic Case for Incorporating Massage Therapy into the Health Care System as an Effective Cost-Reducing Approach to the National Opioid Crisis

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The Economic Case for Incorporating Massage Therapy into the Health Care System as an Effective Cost-Reducing Approach to the National Opioid Crisis

EXECUTIVE SUMMARY

Opioid medications used for pain management have become a highly abused drug, leading to one of the worst public health crises in recent history. While at first opioids may be perceived as an effective and inexpensive pain treatment, the continual rise in the number of patients who come to struggle with opioid addiction increases both the human and financial costs in the long run. The widespread nature of this crisis has compelled leaders in medical, research, public health and political arenas to actively provide guidance and seek out viable and economically feasible non-pharmacologic interventions, which include massage therapy.

The opioid crisis, in part, lies with the health care systems' reliance on medications for problems big and small.[144] Patients are given opioids for their pain issues when, often times, there are alternative means of treatment or strategies that augment medication and reduce potential addiction, such as massage therapy.

According to the Joint Commission and the American College of Physicians,[145] nonpharmacologic approaches or techniques like massage therapy can replace opioids for many types of pain. John Dunham and Associates calculates that number to be as many as 5 million patients in the United States, with the potential to reduce the number of people with addiction disorder by nearly 111,137 per year. This projection suggests providing massage therapy as a tool for pain management instead of opioids can save the United States as much as $25.99 billion per year (see Table 1).

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[144] Volkow and McLellan, *Opioid Abuse in Chronic Pain Misconceptions and Mitigation Strategies*, The New England Journal of Medicine, March 31, 2016, On-line at: http://www.nejm.org/doi/full/10.1056/NEJMra1507771#t=article

[145] The Joint Commission, *The Joint Commission Elevates Acupuncture, Chiropractic, Massage, and Relaxation in Pain Care in Response to Integrative Team's Advocacy*, Integrative Medicine: A Clinician's Journal, April 2015, On-line at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4566474/

Table 1: Benefits of Substituting Massage for Opioids in the United States[146]
Massage Cost: Low Estimate $60; Medium Estimate $80; High Estimate $100

	Using Massage Therapy When Effective				Opioid Prescription Only	
	Patients	**Low Cost - $60**	**Medium Cost - $80**	**High Cost - $100**	**Patients**	**Costs**
Massage Therapy	5,015,499*	$3,611,159,467	$4,814,879,290	$6,018,599,112	-	$0
Opioid Medication	22,110,187	$552,754,664	$552,754,664	$552,754,664	27,125,686	$678,142,146
Opioid Addiction	462,502	$122,684,830,584	$122,684,830,584	$122,684,830,584	573,639	$152,165,416,736
Total	27,125,686	$126,848,744,715	$128,052,464,538	$129,256,184,360	27,125,686	$152,843,558,882
Savings		**$25,994,814,166**	**$24,791,094,344**	**$23,587,374,521**		
* Patient numbers were rounded from 5,015,499.2603						

Opioid addiction is a national crisis, costing the United States economy about $500 billion annually and leading to unnecessary suffering and loss of life.[147] Loss of life associated with opioid use has grown to such levels that its effects are measurable through drops in life expectancy across the nation. Life expectancy has fallen for two years in a row, a trend we haven't seen in this country since the HIV/AIDS epidemic of the 90's.

A drop in life expectancy has ripple effects across the nation's economy. For example, a one percent drop in life expectancy is associated with a reduction in economic activity of about $177 billion—which doesn't even account for the suffering and damage addiction causes patients and their families.

Simply using massage therapy instead of opioid medication for client conditions where massage is proven effective can reduce overall addiction rates in the United States by about 111,137 people. In this sense, the benefits of massage therapy are twofold: reducing the number of people who potentially struggle with opioid addiction and reducing the impact on the American economy by up to $25.99 billion annually.

Massage therapy is an effective and cost-efficient pain management approach. Encouraging medical practitioners to prescribe its use in cases where it would be an effective pain management tool and insurance companies to cover massage therapy can help decrease the costs of opioid addiction. As stated in a recent letter from the National Association of Attorney's General to the America's Health Insurers Plans (AHIP),[148] massage therapy is not the only solution to this problem, but it is an important part of a comprehensive national approach to reducing addiction and its attendant costs.

Massage therapy is a well-accepted nonpharmacological therapy for managing pain, including a variety of specific chronic pain issues. It is recognized by the National Institutes of Health (NIH), and included in nonpharmacological pain guidelines issued by The Joint Commission, as well as the American College of Physicians (ACP) and the Federation of State Medical Boards.

[146] The Opioid Addiction line item in the table above is a sub-category of total opioid medication patients.

[147] President's Council of Economic Advisers, *The Underestimated Cost of the Opioid Crisis*, November 17, 2017, On-line at: www.whitehouse.gov/sites/whitehouse.gov/files/images/The%20Underestimated%20Cost%20of%20the%20Opioid%2 0Crisis.pdf

[148] National Association of Attorneys General, *Letter to America's Health Insurance Plans (AHIP) regarding the Prescription Opioid Epidemic*, September 18, 2017, On-line at: https://law.georgia.gov/sites/law.georgia.gov/files/related_files/press_release/Final%20NAAG%20Opioid%20Letter%20to%20AHIP%20%282%29.pdf

INTRODUCTION

The opioid crisis in America has reached a tipping point. A study by the Council of Economic Advisors (CEA) released in November of 2017 suggests that the opioid crisis has a social cost of over $504 billion.[149] These costs are primarily the result of early deaths of people who have become addicted to opioid medications prescribed as part of normal health care measures.

The surge in opioid deaths has been cited as a key driver of the recent decline in life expectancy. As highlighted by Robert Anderson, chief of the Mortality Statistics Branch at the National Center for Health Statistics:

> "I'm not prone to dramatic statements, but I think we should be really alarmed. The drug overdose problem is a public health problem, and it needs to be addressed. We need to get a handle on it."[150]

Not addressing the opioid crisis presents tremendous economic consequences for the country. As the President's Council of Economic Advisors (CEA) reported, the social cost of opioid use and addiction has generally been underestimated. Additionally, these immediate economic costs will be compounded by a decrease in capable people joining the labor force as the mortality rate rises, leading to a decline in overall economic activity.

While opioid addiction is an obvious problem, so too is the need to manage pain, including for related medical conditions like cancer, joint replacement and amputation. According to the CDC, sales of prescription opioids in the U.S. nearly quadrupled from 1999 to 2014, while there was not a similar overall change in the amount of pain Americans reported.[151]

There are several tactics that can better address addiction to, or dependence on, opioids. Utilizing less addictive pain killers is one approach, while augmenting over-the-counter and prescription pain medications with other approaches is another possibility. Where appropriate and when patients will respond, replacing pain medication with massage therapy may be another effective approach to reducing the risk for opioid addiction while effectively addressing pain. This analysis specifically examines the costs and benefits of replacing opioid pain killers with massage therapy in cases where effectiveness evidence deems this approach to be appropriate.

ECONOMIC LANDSCAPE OF THE OPIOID CRISIS

The onset of the opioid epidemic has not only increased the costs of treating addiction, it has also impacted the overall health of the nation. According to a study released in December of 2017 by the Centers for Disease Control's National Center for Health Statistics, U.S. life expectancy fell from 78.7 in 2015 to 78.6 in 2016 and is down from 2014's 78.9 years.[152]

The recent two-year downturn from 2014–2016 is stark (see Figure 1). In 1993, the ongoing AIDS epidemic led to a one-year reduction in life expectancy that was considered a national issue. Life expectancy also stagnated during the Vietnam War, with a two-year decline seen from 1962–1963. This current opioid epidemic is the first time since the Second World War that a two-year decline has occurred this quickly and this dramatically, pushing our current life expectancy to roughly 2009 levels.

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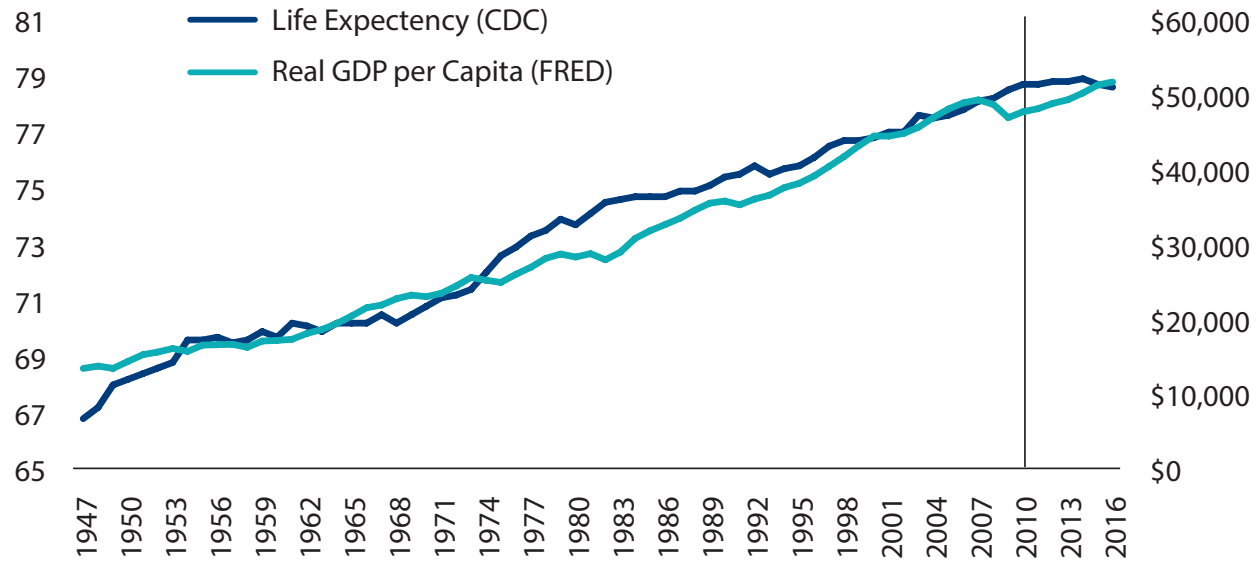
[149] President's Council of Economic Advisers, *The Underestimated Cost of the Opioid Crisis*, November 17, 2017, On-line at: https://www.whitehouse.gov/sites/whitehouse.gov/files/images/The%20Underestimated%20Cost%20of%20the%20Opioid%20Crisis.pdf

[150] Stein, Rob, *Life Expectancy Drops Again as Opioid Deaths Surge in U.S.*, National Public Radio (NPR), December 21, 2017, On-line at: https://www.npr.org/sections/health-shots/2017/12/21/572080314/life-expectancy-drops-again-as-opioid-deaths-surge-in-u-s

[151] Centers for Disease Control and Prevention, *Opioid Overdose - Prescribing Data*, On-line at: https://www.cdc.gov/drugoverdose/data/prescribing.html

[152] National Center for Health Services, *Mortality in the United States 2016*, December, 2017, On-line at: https://www.cdc.gov/nchs/data/databriefs/db293.pdf

Figure 1: Life Expectancy at Birth and Real GDP Per Capita (1947-2016)



The reduction in life expectancy is highly correlated with economic growth. As Figure 1 shows, the correlation between U.S. real GDP per capita and U.S. life expectancy at birth is extremely high (0.98),[153] meaning a one percent decrease in life expectancy is correlated to an almost one percent loss in GDP per capita. Even as life expectancy is falling, the United States continues to spend more on health care per capita than any other country in the world.[154]

The CEA estimates that in 2015, more than 33,000 Americans died of a drug overdose involving opioids.[155] The study also found that previous estimates of the economic cost of the opioid crisis undervalued the most important component—fatalities resulting from overdoses—and that both opioid- and heroin-related deaths, as well as nonfatal opioid misuse, were under-reported and required cost adjustment. Using the same economic estimates for valuing life as U.S. Federal agencies, the CEA estimated that in 2015, the economic cost of the opioid crisis was $504 billion. This figure is over six times larger than several recent estimates, but also more conservative than a recent study by Altarum, which found that the crisis has a per person cost of $800,000 in lost productivity and earnings, and has cost the country more than $1 trillion from 2001 to 2017.[156]

With costs that high, it is imperative that other treatment programs for pain management be examined. There are potential long-term benefits resulting from minimal short-term costs of switching from opioids to non-pharmacologic treatments, such as massage therapy, acupuncture, physical therapy or bio-feedback, with or without use of non-addictive pain medications.

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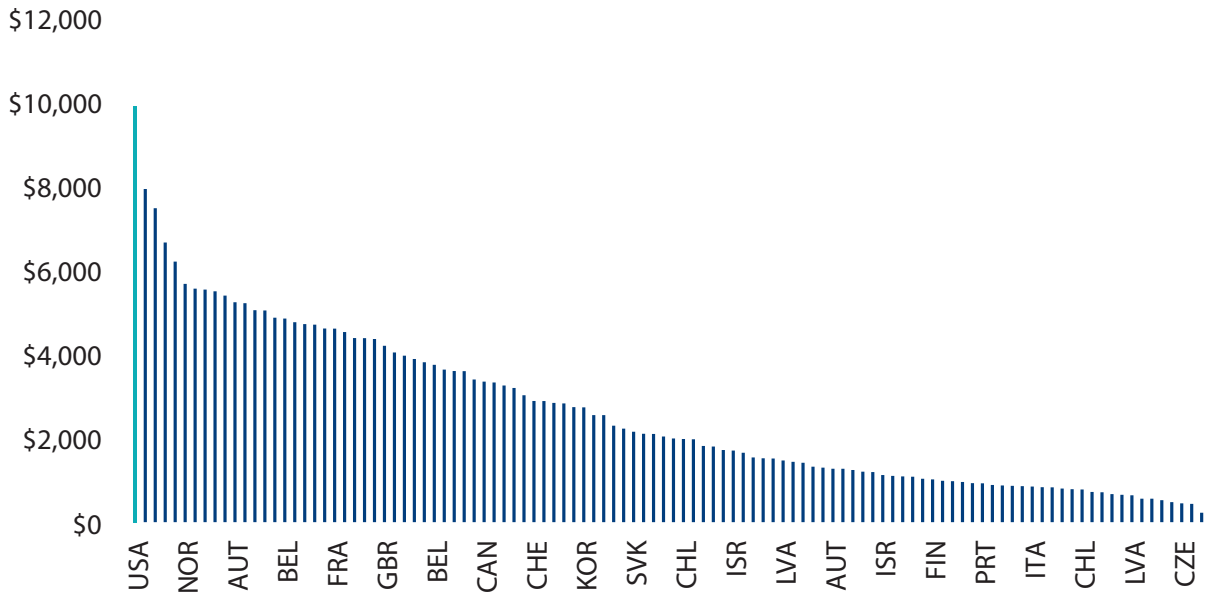
[153] Centers for Disease Control and Prevention, *Death Rates and Life Expectancy at Birth*, December 2017, On-line at: https://data.cdc.gov/NCHS/NCHS-Death-rates-and-life-expectancy-at-birth/w9j2-ggv5, and the Federal Reserve Bank of St. Louis, Real Gross Domestic Product per Capita, December 2017, On-line at: https://fred.stlouisfed.org/series/A939RX0Q048SBEA

[154] *OECD Family Database*, Organization for Economic Cooperation and Development, on-line at: https://data.oecd.org/healthres/health-spending.htm

[155] Op. cit., President's Council of Economic Advisers.

[156] King, Robert, *Opioid Crisis Cost the US More Than a Trillion Since 2001*, The Washington Examiner, February 13,2018, On-line at: http://www.washingtonexaminer.com/opioid-crisis-cost-us-more-than-1-trillion-since-2001/article/2648931

Figure 2: Health Care Spending by Nation in 2016 (U.S. dollars per capita)



MASSAGE THERAPY COST-BENEFIT ANALYSIS AND RESULTS

In order to determine the cost-benefit ratio for substituting massage therapy for opioids as a pain management tool, John Dunham & Associates (JDA) performed an analysis based on data from the Federal Government, the American Massage Therapy Association (AMTA), and peer-reviewed medical journal articles. The analysis estimates the number of patients currently prescribed opioids who could theoretically be prescribed massage therapy instead. Costs assumed in the analysis are the cost of massage therapy treatment, the cost of a prescription opioid and the cost of addiction. Benefits are calculated by comparing the total costs of treatments and the cost of addiction for both groups of patients.

This analysis finds that substituting massage therapy for opioids when appropriate can have tremendous benefits to the economy. In fact, the analysis shows that massage therapy could yield an economic benefit up to $25.99 billion annually, and save more than 111,137 people from addiction.

Estimate of The Number of Patients Who Could Benefit from Massage Therapy

In order to determine the number of patients that could be treated either by massage therapy or opioid prescriptions, JDA used data published by Medicare in a report for calendar year 2015.[157] The report details inpatient and outpatient discharge data by type of procedure and state.[158] Those patients undergoing procedures that could be treated with either massage or opioids were identified, and that percentage to total Medicare patients in each state was calculated. In order to determine which pro-

[157] Center for Medicare & Medicaid Service, *DRG Summary for Medicare Inpatient Prospective Payment Hospitals, FY2015*, August 30, 2017, Online at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Inpatient2015.html and Center for Medicare & Medicaid Service, *APC Summary for Medicare Outpatient Prospective Payment System Hospitals, CY2015*, August 30, 2017, Online at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Outpatient2015.html

[158] Outpatient data for the state of Maryland was not released and is not used in this analysis.

cedures are responsive to massage, extensive published, clinical research was reviewed.[159]

Individual patients can differ, and there may be cases that could generally be treated with massage therapy where it would be contraindicated or ineffective. Those inpatient and outpatient procedures that are assumed to be treatable with both opioids or massage therapy are listed in Appendix A.

Next, an estimate of the effectiveness of massage therapy was applied to each condition and differential costs and benefits were derived. The effects of massage therapy vary tremendously between procedures and patients. In order to account for this, a level of effectiveness of massage therapy was assigned to each procedure based on research done by JDA for the American Massage Therapy Association, using published clinical research.[159]

To further illustrate this methodology, consider the case regarding the impact of massage therapy on a sample population suffering with spinal injury. A 2016 study found that massage therapy is very effective for treating pain and fatigue caused by spinal cord injury.[161] Chronic pain and fatigue were both significantly reduced in the massage group, which was assessed at the end of a 5-week period ($P<0.05$), with large effect sizes.

Table 3 outlines the effectiveness rates used in the analysis.

Table 3: Estimated Effectiveness Rates Used in the Analysis

Level	Rate
Small	10%
Small-Medium	20%
Medium	30%
Medium-Large	45%
Large	60%

The resulting number of treatments/patients was then expanded to the entire population based on the percentage of each state's population that was eligible for Medicare.[162] The result was a total of 27.13 million patients who could be treated by massage therapy or opioid prescriptions. This estimate is likely high since Medicare recipients tend to have a higher usage rate for health care services than does the general population.[163]

Table 2: Estimated Patients* Who Can be Treated with Massage Therapy and Opioid Prescriptions[160]

	Using Massage Therapy When Effective	Opioid Prescription Only	Difference
Massage Patients	**5,015,499**	**-**	**5,015,499**
Opioid Patients	**22,110,187**	**27,125,686**	**-5,015,499**
Addicts Within Patient Pool	462,502	573,639	-111,137
Total	27,125,686	27,125,686	
* Patient numbers were rounded from 5,015,499.2603			

[159] See Appendix C – Additional Clinical Research

[160] The Opioid Addiction line item in the table above is a sub-category of total opioid medication patients.

[161] J Lovas, Y Tran, J Middleton, R Bartrop, N Moore & A Craig, *Managing Pain and Fatigue in People with Spinal Cord Injury: A Randomized Controlled Trial Feasibility Study Examining the Efficacy of Massage Therapy, Spinal Cord*, Volume 55, November 29, 2016, On-line at: https://www.nature.com/articles/sc2016156

[162] U.S. Census Bureau, Population Division, *Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties, and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2016*, June 2017.

[163] Medicare patients are Americans over 65 or those receiving Social Security Disability Insurance. These patients are more likely to visit the doctor, whether because of age or disability. This means that Medicare discharge data as a percent of all Medicare recipients is likely higher than discharge data as a percent of all insurance recipients in the United States. See also for example: Aaron, Henry J., Bruce and Virginia MacLaury, *The Current State of Medicare*, Testimony at a hearing before the House Ways and Means Subcommittee on Health, April 27, 2012, on-line at: https://www.brookings.edu/testimonies/the-current-state-of-medicare/

While the pool of patients is potentially too large, the addiction rates used in this analysis are more conservative. The rate of addiction was determined from a report published in the Annals of Internal Medicine in 2017.[164] The report determines that one third of the U.S. population reported prescription opioid use and 1.9 million of these people have a use disorder. This translates to a 2.07 percent addiction rate. Research by Michigan Medicine in 2017 found that cancer patients have a 10 percent chance of becoming dependent on opioids after surgery.[165] These two addiction rates were applied to non-cancer and cancer patents respectively. This report is also unable to take into account the effects of massage as an integrative treatment alongside an average opioid prescription.

Estimated Costs Associated with Massage Therapy and Opioid Treatments

In a study published in the Annals of Family Medicine, researchers found that massage therapy for chronic neck pain was most effective if prescribed for 60-minute sessions, three times a week for four weeks.[166] Additional massage therapy sessions were found to have statistically insignificant results. Based on this level of treatment and an assumed price of $60, $80 and $100 per massage (Table 4), the cost of treatment comes to $720, $960 and $1,200 per patient, respectively.[167]

Table 4: Cost of Massage Treatment*

	Using Massage Therapy When Effective	
Cost of Massage	**Patients**	**Costs**
$60	5,015,499	$3,611,159,467
$80	5,015,499	$4,814,879,290
$100	5,015,499	$6,018,599,112
* Patient numbers were rounded from 5,015,499.2603		

The cost of treating a patient using opioids was assumed to be $25 for 120 pills.[168] In both cases, costs for massage treatments and opioid prescriptions were assumed to be the same across states. Table 5 illustrates the estimated opioid patients and costs.

The cost of addiction was based on the $504 billion national cost estimate published by the CEA.[169] According to the report, the major costs are from early death. As discussed in previous sections, the study estimates the economic cost of these deaths using conventional economic estimates for valuing life routinely used by Federal agencies. It also adjusts for underreporting of opioids in overdose deaths, includes heroin-related fatalities, and incorporates nonfatal costs of opioid misuse. Referring back to

Table 5: Cost of Opioid Prescriptions

	Using Massage Therapy When Effective		Opioid Prescription Only	
	Patients	**Costs**	**Patients**	**Costs**
Opioid Patients	22,110,187	$552,754,664	27,125,686	$678,142,146

[164] Han, Beth, et. al., *Prescription Opioid Use, Misuse, and Use Disorders in U.S. Adults: 2015 National Survey on Drug Use and Health*. Annals of Internal Medicine, September 5, 2017.

[165] *For 1 in 10 cancer patients, surgery means opioid dependence*. Michigan Medicine - University of Michigan. Retrieved November 1, 2017. Online at: www.sciencedaily.com/releases/2017/11/171101151338.htm

[166] Sherman, Karen, et al., *Five-Week Outcomes From a Dosing Trial of Therapeutic Massage for Chronic Neck Pain*, Annals of Family Medicine, March-April, 2014. Online at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3948757/

[167] Burgan, Beth, *How Much Does Massage Therapy Cost?* University of Minnesota, April 15, 2007, Online at: https://www.takingcharge.csh.umn.edu/explore-healing-practices/massage-therapy/how-much-does-massage-theraphy-cost

[168] Based on prices gathered from www.goodrx.com for a 30-day supply of 5 mg tablets of oxycodone.

[169] Op. cit., President's Council of Economic Advisers.

Table 6: Cost of Addiction

	Using Massage Therapy When Effective		Opioid Prescription Only	
	Patients	Costs	Patients	Costs
People with Opioid Use Disorder	462,502	$122,684,830,584	573,639	$152,165,416,736

the report used to determine addiction rates for non-cancer patients, as of 2015, there are an estimated 1.9 million people with an opioid use disorder.[170] This means that the societal cost per person struggling with opioid addiction is $265,200.[171]

This cost is applied to each person with addiction, just as the cost of massage therapy and the cost of prescriptions are applied to other patients. In an attempt to account for the cost of becoming addicted, the model also assumes that each person with an addictive disorder is receiving an initial prescription for opioids. Table 6 illustrates the costs assumed to be attributed to people with opioid addiction.

Estimated Benefit/Cost Calculation

The overall benefit that can be realized by substituting massage therapy for opioids as a measure of pain management is as much as $25.99 billion. Based on this analysis, the cost of substituting massage treatments for opioids as a method of pain management for approximately 5 million cases was calculated to be $3.61 billion annually. The cost of remaining opioid prescriptions for the 22.11 million patients who were ineffectively treated by massage and resumed their opioid regimen totals $552.75 million.

While initial costs are substantially higher, the long-term benefits to both those individuals who have an addictive disorder and society as a whole are significant. A comparison of just the initial cost of treatments shows that treating all patients with opioids is far cheaper—just $678.14 million to treat 27.13 million people. But that analysis is missing a critical piece of the total cost: what is spent on treating opioid addiction, as well as the lives that are lost. Sub-

Table 7: Results

1. Summary of results—Low massage cost, $60				
	Using Massage Therapy When Effective		Opioid Prescription Only	
Massage Therapy	5,015,499*	$3,611,159,467	-	$0
Cancer	*92,503*	*$66,601,880*	-	$0
Noncancer	*4,922,997*	*$3,544,557,587*	-	$0
Opioid Medication	22,110,187	$552,754,664	27,125,686	$678,142,146
Cancer	*61,588*	*$1,539,698*	*154,025*	*$3,850,618*
Noncancer	*22,048,599*	*$551,214,966*	*26,971,661*	*$674,291,527*
Opioid Addiction	462,502	$122,684,830,584	573,639	$152,165,416,736
Cancer	*6,159*	*$1,633,700,757*	*15,402*	*$4,085,708,745*
Noncancer	*456,344*	*$121,051,129,827*	*558,237*	*$148,079,707,990*
Total	27,125,686	$126,848,744,715	27,125,686	$152,843,558,882
Savings				**$25,994,814,166**

[170] Op. cit., Han, Beth.

[171] This is likely a low estimate considering that the recently released report by Altarum found that the cost per person with opioid use disorder was $800,000.

Table 7: Results (continued)

2. Summary of results—Medium massage cost, $80				
	Using Massage Therapy When Effective		Opioid Prescription Only	
	Patients	Costs	Patients	Costs
Massage Therapy	5,015,499*	$4,814,879,290	-	$0
Cancer	*92,503*	*$88,802,507*	-	$0
Noncancer	*4,922,997*	*$4,726,076,783*	-	$0
Opioid Medication	22,110,187	$552,754,664	27,125,686	$678,142,146
Cancer	*61,588*	*$1,539,698*	*154,025*	*$3,850,618*
Noncancer	*22,048,599*	*$551,214,966*	*26,971,661*	*$674,291,527*
Opioid Addiction	462,502	$122,684,830,584	573,639	$152,165,416,736
Cancer	*6,159*	*$1,633,700,757*	*15,402*	*$4,085,708,745*
Noncancer	*456,344*	*$121,051,129,827*	*558,237*	*$148,079,707,990*
Total	27,125,686	$128,052,464,538	27,125,686	$152,843,558,882
Savings				**$24,791,094,344**

3. Summary of results—High massage cost, $100				
	Using Massage Therapy When Effective		Opioid Prescription Only	
	Patients	Costs	Patients	Costs
Massage Therapy	5,015,499*	$6,018,599,112	-	$0
Cancer	*92,503*	*$111,003,134*	-	$0
Noncancer	*4,922,997*	*$5,907,595,979*	-	$0
Opioid Medication	22,110,187	$552,754,664	27,125,686	$678,142,146
Cancer	*61,588*	*$1,539,698*	*154,025*	*$3,850,618*
Noncancer	*22,048,599*	*$551,214,966*	*26,971,661*	*$674,291,527*
Opioid Addiction	462,502	$122,684,830,584	573,639	$152,165,416,736
Cancer	*6,159*	*$1,633,700,757*	*15,402*	*$4,085,708,745*
Noncancer	*456,344*	*$121,051,129,827*	*558,237*	*$148,079,707,990*
Total	27,125,686	$129,256,184,360	27,125,686	$152,843,558,882
Savings				**$23,587,374,521**

* Patient numbers were rounded from 5,015,499.2603

stituting opioid prescriptions with massage therapy for 5 million patients has the potential to eliminate the possibility of addiction for 111,137 people, which would mean a savings of between $23.59 and $25.99 billion annually in social and economic costs associated with early death, treatment and crime prevention.[172]

Estimated Results Across States

Opioid addiction is everywhere, across rural and urban areas and in communities of all socio-economic status. The growth of a reliance on opioid prescriptions has exposed a larger share of the population to drugs like oxycodone and fentanyl. And while these can be part of a healthy pain management regi-

[172] Massage therapy costs assumptions are $60, $80 and $100.

men, increased exposure could lead to an increase in addiction. More populated states will likely have more people with substance abuse disorder—and therefore bear higher costs resulting from opioid abuse—but even states like Vermont and Wyoming are experiencing high addiction levels.

The table in Appendix B presents data on the number of patients being prescribed opioids by state based on detailed data from Medicare.[173] The number of people with addictive disorder is calculated using the national addiction rates of 2.07 percent for non-cancer patients and 10 percent for people receiving cancer treatment. The results are also broken out into the three massage therapy cost levels of $60, $80 and $100 per patient per appointment. As the table shows, the number of estimated people with addictive disorder ranges from a low of 1,304 in Wyoming (or about 0.2 percent of the entire population of the state) to a high of 44,698 in Texas (also about 0.2 percent of the population). The differences are a result of the kinds of treatments being sought in each state.

Based on the cost-benefit analysis, every state stands to gain from the substitution of massage therapy for opioids in cases where it can be effective. These savings to the state's economies range from almost $41 million in Wyoming to nearly $2 billion in Texas in a low-cost scenario, to $36 million and $1.8 million in the same states under a high-cost scenario. In all scenarios, the potential savings in five large states amounts to billions of dollars, with all other states saving millions.

CONCLUSIONS

Based on the best available data, this study finds that massage therapy yields an economic benefit of between $23.59 and $25.99 billion annually, and saves about 111,137 people and their families from the crippling costs associated with addiction.

And, the longer this opioid crisis goes unaddressed, the higher the potential for it to affect broader economic advancement of the overall economy. With the national outcry for action related to the opioid epidemic, and significant resources being spent on treatment, policymakers at both the state and federal level should consider how to integrate massage therapy into routine approaches for pain management.

[173] *DRG Summary for Medicare Inpatient Prospective Payment Hospitals, FY2015*, Center for Medicare & Medicaid Service, August 30, 2017. Online at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Inpatient2015.html
APC Summary for Medicare Outpatient Prospective Payment System Hospitals, CY2015, Center for Medicare & Medicaid Service, August 30, 2017. Online at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Outpatient2015.html

Appendix

APPENDIX A

Inpatient Procedures (For both Opioids and Massage Therapy)
057 - Degenerative Nervous System Disorders W/O Mcc
060 - Multiple Sclerosis & Cerebellar Ataxia W/O Cc/Mcc
074 - Cranial & Peripheral Nerve Disorders W/O Mcc
093 - Other Disorders Of Nervous System W/O Cc/Mcc
230 - Other Cardiothoracic Procedures W/O Cc/Mcc
232 - Coronary Bypass W Ptca W/O Mcc
234 - Coronary Bypass W Cardiac Cath W/O Mcc
236 - Coronary Bypass W/O Cardiac Cath W/O Mcc
238 - Major Cardiovasc Procedures W/O Mcc
241 - Amputation For Circ Sys Disorders Exc Upper Limb & Toe W/O Cc/Mcc
257 - Upper Limb & Toe Amputation For Circ System Disorders W/O Cc/Mcc
311- Angina Pectoris
346 - Minor Small & Large Bowel Procedures W/O Cc/Mcc
387 - Inflammatory Bowel Disease W/O Cc/Mcc
455 - Combined Anterior/Posterior Spinal Fusion W/O Cc/Mcc
458 - Spinal Fus Exc Cerv W Spinal Curv/Malig/Infec Or 9+ Fus W/O Cc/Mcc
460 - Spinal Fusion Except Cervical W/O Mcc
473 - Cervical Spinal Fusion W/O Cc/Mcc
482 - Hip & Femur Procedures Except Major Joint W/O Cc/Mcc
489 - Knee Procedures W/O Pdx Of Infection W/O Cc/Mcc
494 - Lower Extrem & Humer Proc Except Hip,Foot,Femur W/O Cc/Mcc
505 - Foot Procedures W/O Cc/Mcc
506 - Major Thumb Or Joint Procedures
508 - Major Shoulder Or Elbow Joint Procedures W/O Cc/Mcc
509 - Arthroscopy
512 - Shoulder,Elbow Or Forearm Proc,Exc Major Joint Proc W/O Cc/Mcc
514 - Hand Or Wrist Proc, Except Major Thumb Or Joint Proc W/O Cc/Mcc
517 - Other Musculoskelet Sys & Conn Tiss O.R. Proc W/O Cc/Mcc
520 - Back & Neck Proc Exc Spinal Fusion W/O Cc/Mcc
538 - Sprains, Strains, & Dislocations Of Hip, Pelvis & Thigh W/O Cc/Mcc
547 - Connective Tissue Disorders W/O Cc/Mcc
552 - Medical Back Problems W/O Mcc
561 - Aftercare, Musculoskeletal System & Connective Tissue W/O Cc/Mcc
572 - Skin Debridement W/O Cc/Mcc
596 - Major Skin Disorders W/O Mcc
630 - Other Endocrine, Nutrit & Metab O.R. Proc W/O Cc/Mcc
776 - Postpartum & Post Abortion Diagnoses W/O O.R. Procedure
822 - Lymphoma & Leukemia W Major O.R. Procedure W/O Cc/Mcc
825 - Lymphoma & Non-Acute Leukemia W Other O.R. Proc W/O Cc/Mcc
836 - Acute Leukemia W/O Major O.R. Procedure W/O Cc/Mcc
838 - Chemo W Acute Leukemia As Sdx W Cc Or High Dose Chemo Agent

Inpatient Procedures (For both Opioids and Massage Therapy)
839 - Chemo W Acute Leukemia As Sdx W/O Cc/Mcc
842 - Lymphoma & Non-Acute Leukemia W/O Cc/Mcc
848 - Chemotherapy W/O Acute Leukemia As Secondary Diagnosis W/O Cc/Mcc
880 - Acute Adjustment Reaction & Psychosocial Dysfunction
881 - Depressive Neuroses
882 - Neuroses Except Depressive
883 - Disorders Of Personality & Impulse Control
884 - Organic Disturbances & Mental Retardation
885 - Psychoses
886 - Behavioral & Developmental Disorders
887 - Other Mental Disorder Diagnoses
903 - Wound Debridements For Injuries W/O Cc/Mcc
905 - Skin Grafts For Injuries W/O Cc/Mcc
927 - Extensive Burns Or Full Thickness Burns W Mv >96 Hrs W Skin Graft
929 - Full Thickness Burn W Skin Graft Or Inhal Inj W/O Cc/Mcc
934 - Full Thickness Burn W/O Skin Grft Or Inhal Inj
976 - Hiv W Major Related Condition W/O Cc/Mcc
977 - Hiv W Or W/O Other Related Condition

Outpatient Procedures (For both Opioids and Massage)
0012 - Level I Debridement & Destruction
0015 - Level II Debridement & Destruction
0017 - Level IV Debridement & Destruction
0203 - Level IV Nerve Injections
0204 - Level I Nerve Injections
0206 - Level II Nerve Injections
0207 - Level III Nerve Injections

APPENDIX B

Addicts Estimated with Each Scenario and the Total Savings Through Massage Therapy Implementation, by State						
	Current			Potential		
	Opioid Patients	Addicts	Massage Patients	Savings, Cost $60	Savings, Cost $80	Savings, Cost $100
Alabama	519,402	10,896	96,982	$488,246,487	$464,970,860	$441,695,234
Alaska	64,395	1,333	11,103	$53,245,456	$50,580,783	$47,916,111
Arizona	354,828	7,521	65,970	$344,615,552	$328,782,862	$312,950,172
Arkansas	330,560	6,949	67,020	$338,372,291	$322,287,437	$306,202,583
California	1,996,849	42,572	414,727	$2,186,422,538	$2,086,888,005	$1,987,353,471
Colorado	382,376	8,117	65,129	$344,627,853	$328,996,818	$313,365,784
Connecticut	294,107	6,212	47,905	$249,653,882	$238,156,653	$226,659,424
Delaware	80,981	1,676	13,229	$63,445,685	$60,280,833	$57,105,981
District of Columbia	122,576	2,577	24,563	$124,195,552	$118,300,431	$112,405,310
Florida	1,485,253	31,551	327,806	$1,700,921,904	$1,622,248,447	$1,543,574,990
Georgia	673,060	14,220	123,896	$640,345,868	$610,610,916	$580,875,964
Hawaii	46,046	953	11,002	$52,745,278	$50,104,803	$47,464,328
Idaho	153,245	3,194	25,769	$127,125,271	$120,940,720	$114,756,170
Illinois	1,370,454	29,018	255,703	$1,330,179,274	$1,268,810,472	$1,207,441,670
Indiana	665,452	14,086	124,958	$648,944,609	$618,954,646	$588,964,683
Iowa	426,967	8,954	78,368	$394,323,787	$375,515,510	$356,707,232
Kansas	421,818	8,806	67,240	$334,437,975	$318,300,266	$302,162,556
Kentucky	416,649	8,806	88,626	$453,995,052	$432,724,784	$411,454,515
Louisiana	411,078	8,738	63,895	$343,108,081	$327,773,168	$312,438,255
Maine	199,059	4,155	31,098	$154,654,053	$147,190,472	$139,726,890
Maryland	516,265	11,037	163,280	$838,747,454	$799,560,371	$760,373,288
Massachusetts	902,604	19,085	144,776	$758,486,054	$723,739,846	$688,993,637
Michigan	890,073	18,855	145,127	$764,936,687	$730,106,182	$695,275,677
Minnesota	634,609	13,373	119,967	$613,137,969	$584,345,992	$555,554,016
Mississippi	307,759	6,462	66,459	$333,307,549	$317,357,363	$301,407,176
Missouri	819,664	17,340	151,775	$787,513,169	$751,087,163	$714,661,156
Montana	125,394	2,595	20,266	$97,178,738	$92,314,919	$87,451,100
Nebraska	202,272	4,270	40,061	$205,442,773	$195,828,030	$186,213,287
Nevada	169,175	3,531	29,969	$148,463,963	$141,271,429	$134,078,895
New Hampshire	212,271	4,393	29,014	$139,138,887	$132,175,413	$125,211,939
New Jersey	601,855	12,893	139,847	$740,001,875	$706,438,631	$672,875,386
New Mexico	132,183	2,736	23,033	$110,435,242	$104,907,211	$99,379,180
New York	1,267,581	27,090	231,114	$1,244,358,702	$1,188,891,396	$1,133,424,089
North Carolina	913,784	19,390	158,039	$833,856,760	$795,927,365	$757,997,969
North Dakota	215,868	4,468	26,709	$128,085,479	$121,675,202	$115,264,925
Ohio	1,177,868	24,664	186,997	$942,226,038	$897,346,681	$852,467,325
Oklahoma	441,823	9,317	74,547	$384,883,053	$336,991,889	$349,100,724
Oregon	214,815	4,548	37,754	$197,216,276	$188,155,434	$179,094,591

Addicts Estimated with Each Scenario and the Total Savings Through Massage Therapy Implementation, by State						
	Current			Potential		
	Opioid Patients	Addicts	Massage Patients	Savings, Cost $60	Savings, Cost $80	Savings, Cost $100
Pennsylvania	1,149,571	24,412	205,989	$1,086,271,289	$1,036,833,822	$987,396,355
Rhode Island	77,671	1,634	16,831	$84,949,551	$80,910,003	$76,870,454
South Carolina	375,342	7,918	62,352	$322,914,084	$307,949,666	$292,985,248
South Dakota	226,600	4,690	32,122	$154,026,306	$146,317,100	$138,607,894
Tennessee	504,270	10,790	102,977	$550,040,715	$525,326,127	$500,611,540
Texas	2,112,634	44,698	384,657	$1,999,486,665	$1,907,169,077	$1,814,851,489
Utah	239,787	5,032	37,799	$192,352,527	$183,280,655	$174,208,783
Vermont	90,910	1,882	13,284	$63,695,021	$60,506,839	$57,318,657
Virginia	748,042	15,821	134,549	$699,122,206	$666,830,561	$634,538,916
Washington	517,451	11,004	83,869	$449,107,616	$428,979,008	$408,850,400
West Virginia	185,096	3,875	29,697	$149,414,606	$142,287,379	$135,160,152
Wisconsin	674,270	14,196	109,151	$561,644,590	$535,448,235	$509,251,881
Wyoming	63,025	1,304	8,498	$40,755,873	$38,716,471	$36,677,070
United States	**27,125,686**	**573,639**	**5,015,499**	**$25,994,814,166**	**$24,791,094,344**	**$23,587,374,521**

APPENDIX C

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