



STEADMAN
GROUP, LLC

Effectiveness and Cost Effectiveness of Complementary and Integrated Health Services for Spinal Cord Injury: A Summary of Existing Evidence

June 30, 2017

Table of Contents

Introduction.....	2
Treatment for Spinal Cord Injury.....	2
Colorado’s Home and Community Based Services Waiver for Persons with Spinal Cord Injury	3
Methodology.....	4
Evidence of Effectiveness for Complementary and Integrative Health Services	5
Summary of Evidence by Research Objectives	12
Evidence from the Colorado Waiver	13
Discussion of Evidence on Cost Effectiveness.....	14
Recommendations	15
References.....	17
Appendix A: Literature Search Strategy	22

Introduction

This report summarizes the current evidence for the use and effectiveness of complementary and integrative health services for spinal cord injuries (SCI). This report was drafted for the Colorado Department of Health Care Policy & Financing (HCPF), in preparation for an independent evaluation of the complementary and integrative therapies offered in its Home and Community Based Services waiver for Persons with a Spinal Cord Injury (HCPF-SCI). The evaluation will be presented to the state legislature in 2020 and will measure the costs, health outcomes, and quality of life for waiver participants receiving complementary and integrative health services, which include acupuncture, massage therapy, and chiropractic services.

This report addresses the following key research objectives:

1. Discuss existing evidence of efficacy of providing complementary and integrative therapies to persons with SCI versus using pain medication.
2. Examine evidence of costs and benefits noted in existing research.
3. Assess existing evidence linking complementary and integrative therapies to the prevention or reduction of opioid abuse and dependence.

Treatment for Spinal Cord Injury

Spinal cord injury is an injury to the spinal cord from the base of the skull to the lumbar region as a result of “compulsion, incision, or contusion,” resulting in a loss of motor and sensory functioning.¹ The degree of functioning loss after SCI can be acute or chronic, depending on the severity and location of the injury. Such an injury can result in several complications over the life course, including bladder infections, bladder or bowel control problems, depression, pressure ulcers, and pain.^{1,2}

Treatment for SCI tends to focus on improving functionality, treating complications, and managing pain. This process can involve a range of long-term treatments, which are often emotionally and economically exhausting for the patient and caretakers.¹ Standard care for this population includes surgical and pharmacological treatments, and often results in extended or repeated hospital stays, missed workdays, and reduced overall quality of life.^{1,2} The wide variation in the symptoms and complications for SCI makes it difficult to calculate average costs of care for this population. Studies have estimated acute costs between \$72,000-\$220,000 (2009 \$USD), and between \$60,000 -\$76,000 annually for rehabilitation (2009 \$USD), with annual costs on the rise.¹

Nationwide, complementary and integrative therapies are increasingly used either alone or alongside standard care for chronic pain management as part of a holistic approach to care.³ Cost effectiveness of these treatments is contested in the medical community, with some arguing that these therapies are utilized in addition to standard care practices and are thus additional costs. Others argue that the treatments are highly cost effective when considering costs avoided due to prevention of further damage, improved functioning, and pain management, especially in light of rising costs of medical care.^{3,4} If these therapies can manage pain effectively, they have the potential to reduce the use of opioid painkillers and the risk of opioid addiction. For patients with SCI, many of whom require long-term or lifetime treatment, these therapies present a promising treatment for improving both physical and psychosocial functioning over the life course.

Colorado's Home and Community Based Services Waiver for Persons with Spinal Cord Injury

About the Waiver

Colorado Medicaid's waiver for Persons with a Spinal Cord Injury (SCI) was implemented in July 2012 as a pilot waiver and was renewed for a five-year period in July 2015. It is set to expire June 30, 2020. The waiver is limited to 120 participants each year with no waitlist, and serves only the Denver Metro Area. To qualify, an individual must be at least 18 years old and be diagnosed with SCI. Currently, 79 individuals are receiving services through the waiver.ⁱ Services offered include day services, complementary and integrative therapies (acupuncture, massage therapy, chiropractic care), Consumer-Directed Attendant Support Services, In-Home Support Services, personalized emergency response system, home modifications, homemaker services, non-medical transportation, personal care, and respite care.

Of Colorado's 11 Home and Community Based Services waivers, the SCI waiver is the only one that offers chiropractic and acupuncture services, and is only one of three offering massage therapy. In 2020, there will be an independent evaluation presented to the Colorado General Assembly on the health outcomes, quality of life, and cost expenditures for waiver participants receiving acupuncture, massage therapy, and chiropractic services. The legislature will determine the future of the waiver based on information gathered and recommendations from the report.

ⁱ As of March 2017.

Previous Reports on Complementary and Integrative Health Services Under the SCI Waiver

In fall 2016, HCPF commissioned two papers to investigate 1) best practices for service delivery of complementary and integrative health services for SCI and 2) documentation of other states' coverage of these services through Medicaid.

The first of these reports found evidence supporting the effectiveness of acupuncture, chiropractic care, and massage therapy for chronic pain related to SCI and complications such as bladder dysfunction. The evidence suggests few or no adverse effects for these treatments. While the report did not investigate cost effectiveness in detail, authors noted that the positive evidence of these treatments may be promising for long-term care, potentially alleviating or preventing longer term complications and related costs for people with SCI.⁵

The second report details previous and current Medicaid programs covering complementary and integrative health services, which include acupuncture in Florida and California, chiropractic care in 27 states, and massage therapy waiver programs in Florida and Utah. The report discusses interviews with leaders of Medicaid spinal cord and traumatic brain injury waiver programs in Florida, Mississippi, and South Carolina. Of these, only Mississippi was offering any complementary and integrative health services (chiropractic care) as part of its program. The report concludes that Colorado is “ahead of the curve in systematically offering acupuncture, chiropractic and massage services under its spinal cord injury waiver program,” but that the interviews with other states nevertheless offer insights into the use of Medicaid funds to explore the use of complementary and integrative health services for SCI.⁶

Methodology

Clinical evidence of the effectiveness of complementary and integrative health services specifically for persons with SCI is limited. Where no evidence was found for the use of complementary and integrative health services for SCI, this report discusses the available evidence on the use of these therapies to treat conditions such as lower back pain.

Systematic reviews on the use of complementary and integrative health services for both SCI and lower back pain are limited by the wide variety in study aims and methods, differences in conditions and populations studied, small sample sizes, and lack of long-term follow up. As a result, less evidence exists for long-term clinical or cost effectiveness.⁷⁻⁹ Additionally, opportunities for meta-

analysis across multiple studies are limited by heterogeneity of terminology and study treatments. For example, some studies examine complementary and integrative health services as a sole treatment while some look at the use of these therapies delivered along with traditional treatment.

There are limited studies of cost effectiveness for these therapies. The studies that do exist rarely capture all direct and indirect costs associated with care, such as missed work days or transportation to appointments.^{4,10} A number of issues make it difficult to research cost effectiveness for these therapies, and we discuss these in the “Discussion of Cost Effectiveness” section of this report.

For our literature review, we searched public databases Medline/Pubmed and the Cochrane Collaborative for systematic reviews and meta-analyses, as well as pertinent randomized controlled trials (RCTs), case-control studies, and case studies related to efficacy or cost effectiveness of complementary and integrative therapies. We limited the search to articles from January 2001 to May 2017 to include the most up-to-date information possible and included international studies published in English. See Appendix A for the full search strategy. We also looked through the reference sections of relevant systematic review and meta-analyses articles for additional studies and reports. Finally, we contacted professional associations, experts, and practitioners for both complementary and integrative therapies and SCI for information on emerging research, professional experience, and research recommendations.

Evidence of Effectiveness for Complementary and Integrative Health Services

The following sections present a summary of the evidence on efficacy and cost effectiveness of each complementary and integrative therapy (acupuncture, chiropractic care, massage therapy), as well as other movement-based therapies, for SCI and related complications. The report also discusses the existing evidence on the cost effectiveness of Medicaid coverage for complementary and integrative health services. We also present some analysis of HCPF’s current utilization data for the SCI waiver. Finally, the report examines the evidence for complementary and integrative therapies as a potential alternative treatment to opioid use for pain management.

Acupuncture

Effectiveness

There is evidence that acupuncture can provide pain relief and other benefits for individuals with SCI. Our search yielded two systematic reviews^{11,12} and one systematic review and meta-analysis¹³

of the effectiveness of acupuncture for SCI-related complications. We also found several clinical studies and commentaries.

Wang and colleagues specifically examined the effectiveness of acupuncture for chronic urinary retention in individuals with SCI.¹¹ Their review of three RCTs found evidence that acupuncture was effective as complementary treatment to rehabilitation and intermittent catheterization, and “much better than rehabilitation treatment alone” in reducing postvoid residual urine volume, with no adverse effects.¹¹

Dorsher and colleagues found evidence from 13 RCTs that both acupuncture and electroacupuncture may be effective in improving neurological functioning, including motor and sensory functioning and bladder/bowel control in people with both acute and chronic SCI.¹² A meta-analysis and systematic review of 16 RCTs found evidence of functional recovery and improved bladder control for acupuncture as a complement to standard care, but mixed evidence of pain relief.¹³ All three reviews cited limitations due to lack of rigorous study design, the need for long-term follow up, and the need for further research for this population.¹¹⁻¹³

In a 2001 study of 22 individuals experiencing pain related to SCI, 10 (46%) reported improvement in pain after receiving acupuncture for 7.5 weeks, though 6 reported increases in pain 3 months posttreatment.¹⁴ The authors did not determine why or how acupuncture was affecting the outcome, or the influence of the placebo effect in this study.¹⁴ Further, the study results were limited because the treatment period was short and there was no control group. In another RCT of 30 SCI patients, 8 of 15 in the acupuncture treatment group reported improvement in neuropathic pain.¹⁵ An observational study showed improvements in bowel or bladder functioning for 9 of 14 patients both immediately after an 8-week course of treatment and after a 6-month follow up, with no adverse effects.¹⁶ All three of these studies were limited by small sample sizes.¹⁴⁻¹⁶

Several systematic reviews have found low to moderate evidence for the effectiveness of acupuncture for acute and subacute lower back pain, with mixed findings for chronic pain.^{9,17-20} Results are limited by study quality and heterogeneity of study design.^{9,17-20} Despite limitations in the literature, the American College of Physicians recommends acupuncture as a first-option noninvasive treatment for acute, subacute, and chronic lower back pain, due to its moderate evidence for pain reduction and low risk of adverse effects.¹⁷

Costs and benefits

While we did not find a study of cost effectiveness for SCI specifically, a number of articles have found evidence that acupuncture used either alone or as a complement to standard care is a cost effective therapy for lower back pain.

Several methods can be used to calculate cost effectiveness for interventions. One way is to calculate how much it costs to give someone an additional year of good quality of life, or to have one less year of living with a disability. A systematic review from the United Kingdom found acupuncture to be both clinically effective and cost effective for lower back pain, costing between £2000–£14,000 to gain one quality-adjusted life year (QALY).¹⁸ These costs were less than the threshold established by the World Health Organization (WHO), which is £20,000–£30,000.

Two other systematic reviews of efficacy and cost effectiveness found acupuncture to be cost effective for lower back pain, but reported effects for few studies.^{9,21} In a meta-analysis, acupuncture combined with standard care was found to be highly cost effective, costing \$48,562 per disability-adjusted life year (DALY) avoided, less than the WHO threshold for cost effectiveness of \$52,000.⁷ The same study found acupuncture was also highly cost effective as a treatment for lower back pain with comorbid depression, at \$18,960 per DALY avoided.⁷

Evidence of effectiveness as opioid alternative

There is limited evidence for acupuncture as an alternative to opioid prescriptions for pain management. One systematic review found no evidence of improvements in sleep, anxiety, or drug use for acupuncture vs. control.²² Another systematic review found evidence that post-operative patients treated with acupuncture had less pain and used fewer opioid analgesics on the first day after surgery compared to a control group, though the analysis was limited by heterogeneous study design for the included trials and lack of long-term follow-up.²³

Existing coverage and evidence from state Medicaid programs

California has covered acupuncture since 2014 under State Plan Amendment authority, for two acupuncture visits per month for pregnant women and children eligible for EPSDT. The service is reimbursed as fee-for-service. No information has been published regarding either utilization or cost effectiveness.

Florida covered acupuncture under a pilot program evaluating complementary and integrative health services for pain in a three-county area. An evaluation found significant improvements in both physical and mental health and decreasing Medicaid costs over three years so the pilot was

extended for another three years. The program was discontinued after a second evaluation in 2011 did not find cost savings during the extension period.^{6,24} Florida also covered acupuncture under a waiver program for individuals diagnosed with cystic fibrosis, but it was discontinued because the service was not used.²⁴

Massage Therapy

Effectiveness

To our knowledge, no systematic reviews or meta-analyses have been conducted to examine the effectiveness of massage therapy specifically for SCI, but some research has been done to show the effect of massage on lower back pain. Chou et al. reported moderate to low strength of evidence for massage therapy for chronic lower back pain, which became part of the practice guidelines for the American College of Physicians and the American Pain Society.¹⁹ Other evidence suggests the short-term effectiveness of massage therapy for lower back pain.^{8,25}

In an RCT studying the effects of complementary and integrative health services on 40 patients with SCI, massage therapy was associated with significant reductions in pain and fatigue after a 5-week course of treatment, though reductions were equivalent to those seen in the control group (guided imageryⁱⁱ).²⁶ In another study, Norrbrink et al. reported significant reductions in neuropathic pain after 6 weeks of massage therapy.¹⁵

Costs and benefits

While we did not find cost effectiveness analyses for massage therapy and SCI, three reviews show evidence of cost effectiveness of complementary and integrative health services, including massage therapy, for lower back pain and other conditions. Massage therapy was found to be generally more expensive than other complementary and integrative health services, but was shown to be cost effective when combined with exercise and behavioral counseling for recurrent back pain.²¹ One economic analysis found evidence of the cost effectiveness of massage therapy for neck pain and migraine, but did not assess lower back pain or SCI-related complications.²⁷

Evidence of effectiveness as opioid alternative

To our knowledge, there are no studies or existing programs examining massage therapy as a potential alternative to opioids for pain related to SCI.

ⁱⁱ Guided imagery is considered a noninvasive therapy for pain management and uses narrative to describe scenes and imagery in order to facilitate relaxation.⁴²

Existing coverage and evidence from state Medicaid programs

Florida provides coverage for massage therapy under its Project AIDS Care and Adult Cystic Fibrosis waivers. The Adult Cystic Fibrosis waiver authorizes only 24 users per year for the services. No analysis is available evaluating either utilization or cost effectiveness of the service under either waiver.

Utah provides coverage for massage therapy on its Community Supports 1915(c) Waiver for Individuals w/Intellectual Disability and Other Related Conditions. According to the waiver document, the service is intended to provide comfort, stress and tension relief and reduction, and other health-related benefits consistent with the practice of massage therapy. Further, the service is intended to accomplish a clearly defined outcome that is outlined in the individual support plan. The waiver projects fairly low utilization, with only 217 users per year. No analysis is available evaluating actual utilization or cost effectiveness of the service.

Chiropractic Care

Effectiveness

To our knowledge, there is no systematic review or meta-analysis of the effectiveness or cost effectiveness of chiropractic care as a treatment for SCI, though many systematic reviews have found evidence of effectiveness of chiropractic care for lower back pain.^{4,25,28,29} One clinical study of 47 patients with SCI in Italy found that spinal manipulation therapy, a technique used in chiropractic care, was not significantly better than pharmaceutical treatment for pain relief, but that combined, the two treatments performed better than either treatment alone.³⁰

There is also evidence that spinal manipulation provides pain relief similar to anti-inflammatory drugs and performs better than placebo for acute and chronic lower back pain.^{25,31,32} Spinal manipulation is recognized as an evidence-based practice for lower back pain by the Cochrane Collaboration, the American College of Physicians, and the American Pain Society.¹⁹

Costs and benefits

While we were unable to find studies examining cost effectiveness of chiropractic care specifically for SCI, many analyses have found evidence of cost effectiveness for chiropractic care to treat lower back pain. Chiropractic care was found to be cost effective for lower back pain in two systematic reviews.^{9,21} Chiropractic care was associated with slightly higher office costs than a general practice setting but appeared cost effective when including referrals for chronic lower back pain.²⁸ Another

systematic review found evidence of lower costs for treating spinal pain with chiropractic care, but limited evidence of improved outcomes compared to general care.²⁹

One study examining the use of chiropractic manipulation therapy for lower back pain found that this therapy alone resulted in lower costs of care and lower costs per episode of care for Medicare patients. Chiropractic manipulation was also associated with lower expenditures across all categories of medical expenses.³³

Evidence of effectiveness as opioid alternative

To our knowledge, there are no studies or existing programs explicitly examining chiropractic care as a potential alternative to opioids for pain related to SCI. Weeks et al. found no evidence of reduced pharmaceutical use in Medicare patients accessing chiropractic care.³³

Existing coverage and evidence from state Medicaid programs

According to Kaiser Family Foundation, 27 states cover chiropractic care in their Medicaid programs and 29 do not.³⁴ We were not able to locate any studies or evidence addressing utilization or cost effectiveness specific to this coverage. Twenty-four states provide coverage under their State Plans and three under Section 1115 waivers. For those states using State Plan authority, they report data to the federal government on chiropractic services in the general category of “other practitioners services,” so chiropractic information is not separated and readily available. For the states with Section 1115 waivers, recent reports filed with the Centers for Medicare and Medicaid Services did not address chiropractic care.

Combined and Movement-Based Complementary and Integrative Therapies

Beyond acupuncture, massage therapy, and chiropractic care, research has examined the effectiveness of other complementary and integrative therapies, both singly and in combination with standard care or other therapies. We limited the discussion of these treatments to those focused on movement to improve functioning and pain management for patients with SCI. These treatments include yoga, tai chi, qigong, exercise and stretching, and strength training programs.

Effectiveness

Very few studies have examined effectiveness of movement-based therapies specifically for spinal cord injury. Our search yielded one Cochrane review from 2014 finding positive but limited evidence for exercise programs as effective for SCI-related pain.³⁵ The authors found only three studies examining the effects of exercise on SCI-related pain, and found significant limitations in

study design, including lack of randomization and control groups.³⁵ Most recently, a broader analysis of Cochrane reviews for exercise and chronic pain found positive but limited evidence of the effectiveness of exercise for reducing pain, and mixed results for psychological benefits and quality of life measures.³⁶ A systematic review from the Veteran's Administration found similarly mixed and limited evidence for yoga and qigong for chronic pain.²⁵ A recent systematic review examining the comparative effectiveness of exercise versus other treatments for lower back pain found positive results for exercise, but no difference between exercise and spinal manipulation after 8 weeks of treatment. However, the study included only two RCTs.³⁷

Costs and benefits

The sole study we found examining the cost effectiveness of any movement-based therapies for pain reported insufficient evidence to determine cost effectiveness for exercise versus standard care or other complementary and integrative therapies.³⁷

Evidence of effectiveness as opioid alternative

This is an emerging area of research, so we did not find any systematic reviews or meta-analyses examining movement-based therapies as an alternative to opioids.

Existing coverage and evidence from state Medicaid programs

Rhode Island's Communities of Care chronic pain management program was born out of the need to decrease emergency room costs. The program is available to patients with four or more emergency visits in a year and provides access to case management and a peer navigator as well as alternative pain management therapies, including massage, acupuncture, and chiropractic services. A qualitative evaluation in early 2017 with 24 patients shows that it is difficult to keep members engaged and there is need for additional behavioral interventions, but patient satisfaction for participating patients is high.³⁸ An extensive evaluation of the program is underway and the state expects it will show a reduction in costs and emergency room use.

The **Oregon** Health Authority (OHA) began covering non-interventional treatments for conditions of the back and spine in July 2016. These treatments include:

- Acupuncture
- Chiropractic manipulation
- Cognitive behavioral therapy
- Osteopathic manipulation

- Physical and occupational therapy
- Yoga, intensive rehabilitation, massage, and/or supervised exercise therapy

The OHA's Health Evidence Review Commission based its decision to cover these services on the recommendations of the Back Lines Reorganization Task Force, a special workgroup focused on assessing treatments for back pain. The task force was made up of a neurosurgeon, a chiropractor, an acupuncturist, an orthopedic surgeon, a primary care physician, a physiatrist, physical therapists, specialists in mental health and addiction, a health plan medical director, pain specialists, and a national expert in the evidence on treatments for back pain. This Task Force reviewed a large body of evidence about the effectiveness of various treatments and the potential harms of certain therapies.³⁹ Because of the recent implementation of the program, there is not yet any data available on utilization or cost effectiveness.

Summary of Evidence by Research Objectives

1. Efficacy of providing complementary and integrative health services to persons with SCI versus using pain medication.

While there is not much evidence that addresses complementary and integrative therapies for pain management in persons with SCI, research on the use of these therapies for chronic pain indicates that these may be effective treatments for managing pain. In much of the research, complementary and integrative therapies were used along with pain medication, so we do not yet have enough evidence to assert that these therapies provide equal pain relief as pain medication.

2. Costs and benefits noted in existing research.

Most complementary and integrative therapies cost less than pain management with medications, surgery, or other medical methods. Complementary and integrative health services also come with fewer risks than these medical interventions. The evidence suggests the potential for complementary and integrative therapies to reduce pain independent of other therapies, but not enough evidence exists yet to say this definitively for persons with SCI.

Of the complementary and integrative therapies, massage therapy seems to be the most expensive service when used on its own for pain management.

3. Existing evidence linking complementary and integrative health services to the prevention or reduction of opioid abuse and dependence.

If complementary and integrative health services are established as effective in managing pain, they can be used as another tool in a provider's pain management toolbox and replace the need for opioid prescriptions. Opioid addiction often starts with a legitimate prescription, so if fewer opioids are prescribed, it is reasonable to conclude that some opioid addiction will be prevented. However, there is little research at this time that complementary and integrative therapies can replace pain medication effectively, or that providers are using these services in this way.

Changing public perceptions and experiences with opioids may also have an influence on the receptiveness to complementary treatments, for both patients and providers. One recent study examining patient and provider perceptions of acupuncture and chiropractic care as alternatives to opioids found that “despite widespread dissatisfaction with opioid medications for pain management, many practical barriers challenged access to other options.”⁴⁰ Common barriers noted by participants included difficulties in timing, plan coverage, and altered expectations for pain relief from alternative treatments.

Evidence from the Colorado Waiver

Table 1 shows 2015-2016 utilization data for the HCPF-SCI waiver.

1. Of waiver services, complementary and integrative therapies account for approximately 6 percent of waiver costs and less than 3 percent of total costs per member.
2. For patients in the data set for more than 12 months, those receiving complementary and integrative health services had lower state plan/acute health care costs than the few (4) who did not receive these services.

Table 1. HCPF-SCI Utilization Data for Complementary and Integrative Health (CIH) Services 2015-2016

CIH Services	Count of Client	Average of Total Months	Average of CIT PMPM	Average of State Plan PMPM	Average of Waiver PMPM
All 2015-2016 Clients					
No	22	9	-	\$1,132.63	\$2,531.01
Yes	65	18	\$175.99	\$2,638.18	\$2,964.99
Total	87	15	\$131.49	\$2,257.47	\$2,855.25
Clients with >= 12 months of waiver services					
No	4	24	-	\$3,591.16	\$2,525.90
Yes	44	23	\$168.06	\$3,106.49	\$2,958.44
Total	48	23	\$154.06	\$3,146.88	\$2,922.39
Clients with >= 24 months of waiver services					
No	4	24	-	\$3,591.16	\$2,525.90
Yes	34	24	\$183.37	\$3,344.31	\$3,570.69
Total	38	24	\$164.07	\$3,370.30	\$3,460.71

Discussion of Evidence on Cost Effectiveness

A health care intervention is cost effective when it achieves the desired health impact and costs less than other treatments. If a therapy costs less but does not achieve the desired end, it is not cost effective. The efficacy of complementary and integrative therapies has not yet been established for the type of pain management needed for persons with SCI, so it is not possible to conclusively state that these therapies are cost effective.

The needs and care utilization for persons with SCI are complex and expensive. It is difficult to identify which intervention is having which impact, and what length or combinations of treatments are ideal to achieve population-level improvements. Integrative therapies seem to have the most potential in improving pain management. Some pain seems to respond better than other types of pain to these therapies – and some therapies work better than others for different types of pain. In addition, the availability and perceptions of complementary and integrative therapies can vary widely among both providers and patients, affecting utilization of these services and limiting the ability to assess outcomes and costs on a large scale.^{33,40,41}

Recommendations

We identified three broad areas in need of further research and evaluation regarding the use of complementary and integrative therapies for SCI. First, lack of reliable comparison between treatments and the irregular use of control groups was a common limitation in the literature. To the extent possible, future analyses should incorporate standardized definitions of treatment, include more comparative analysis between different therapies, and investigate combinations of therapies that may be beneficial for the long-term treatment of SCI. Relatedly, the short versus long-term benefits of these therapies are not well understood for patients with SCI. The American Pain Society recently recommended weekly acupuncture for up to 12 weeks as an option for general pain management, a guideline that does not apply to the unique and long-term physical and psychosocial needs of SCI patients. HCPF may be best served in evaluating the cost impact within the Colorado Medicaid population, in order to ensure that the benefit definitions and combinations of therapies are relevant to the Colorado Medicaid population. An annual analysis on this topic could provide significant insight, not only for Colorado Medicaid but also for state Medicaid agencies across the country.

Additionally, data on long-term follow-up is a gap in the existing literature. Further research on the ongoing benefits (and costs) associated with different therapies will help define critical treatment windows, practice guidelines, and help inform long-term cost projections for SCI patients. HCPF could assess long-term impact within their evaluation framework for complementary and integrative therapies.

Finally, much of the existing information regarding cost effectiveness does not adequately capture either the long-term costs of care or the cost savings beyond reductions in hospitalizations, surgery, or medication. To the extent possible, studies should account for direct and indirect costs specifically associated with SCI patients, such as missed days of work, retraining for reemployment, transportation, caregivers, and legal fees, as well as the duration and frequency of treatments.

Though data is scarce, the potential benefits of complementary integrative health services for this population are promising, especially given little to no adverse effects. As the state reviews the efficacy of this program, it is worth considering how the existing services are perceived and accessed by patients with SCI. Studies of patient perception of complementary and integrative therapies show high satisfaction for these services as a part of whole-patient care, however, barriers may

remain for both access and expectations for these therapies. This information could be captured in a survey of waiver clients receiving these services.

References

1. Nas K. Rehabilitation of spinal cord injuries. *World J Orthop.* 2015;6(1):8. doi:10.5312/wjo.v6.i1.8.
2. Sezer N. Chronic complications of spinal cord injury. *World J Orthop.* 2015;6(1):24. doi:10.5312/wjo.v6.i1.24.
3. Martin B, Gerkovich M, Deyo R. The Association of Complementary and Alternative Medicine Use and Health Care Expenditures for Back and Neck Problems. *Med Care.* 2012;50(12):1029-1036. doi:10.1097/MLR.0b013e318269e0b2.The.
4. Rosner AL. *Cost-Effectiveness of Chiropractic Healthcare.*; 2013. [http://www.cochiro.org/resources/Documents/Anthony Rosner Meta Analysis Effectiveness of Chiropractic Healthcare~1-23-2014.pdf](http://www.cochiro.org/resources/Documents/Anthony%20Rosner%20Meta%20Analysis%20Effectiveness%20of%20Chiropractic%20Healthcare~1-23-2014.pdf).
5. Bailit Health. *State Spinal Cord Injury Programs: A Best Practices Report for the Colorado Department of Health Care Policy and Financing.*; 2016. [https://www.colorado.gov/pacific/sites/default/files/Spinal Cord Injury Best Practices Report-November 2016.pdf](https://www.colorado.gov/pacific/sites/default/files/Spinal%20Cord%20Injury%20Best%20Practices%20Report-November%202016.pdf).
6. Bailit Health. *State Spinal Cord Injury Programs: A Research Report for the Colorado Department of Health Care Policy and Financing.*; 2016. [https://www.colorado.gov/pacific/sites/default/files/Spinal Cord Injury Research Report-November 2016.pdf](https://www.colorado.gov/pacific/sites/default/files/Spinal%20Cord%20Injury%20Research%20Report-November%202016.pdf).
7. Taylor P, Pezzullo L, Grant SL, Bensoussan A. Cost-effectiveness of Acupuncture for Chronic Nonspecific Low Back Pain. *Pain Pract.* 2014;14:599-606. doi:10.1111/papr.12116.
8. Kumar S, Beaton K, Hughes T. The effectiveness of massage therapy for the treatment of nonspecific low back pain: a systematic review of systematic reviews. *Int J Gen Med.* 2013;733-741. [http://ww.healingartsce.com/Effectiveness of massage in LBP.pdf](http://ww.healingartsce.com/Effectiveness%20of%20massage%20in%20LBP.pdf).
9. Furlan AD, Yazdi F, Tsertsvadze A, et al. 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 Complement Altern Med.* 2012;2012. doi:10.1155/2012/953139.
10. Whedon JM, Goertz CM, Lurie JD, Stason WB. Beyond spinal manipulation: Should Medicare expand coverage for chiropractic services? A review and commentary on the challenges for policy makers. *J Chiropr Humanit.* 2013;20(1):9-18. doi:10.1016/j.echu.2013.07.001.

11. Wang J, Zhai Y, Wu J, Zhao S, Zhou J, Liu Z. Acupuncture for Chronic Urinary Retention due to Spinal Cord Injury: A Systematic Review. *Evid Based Complement Altern Med*. 2016;2016:9. doi:10.1155/2016/9245186.
12. Dorsher PT, McIntosh PM. Acupuncture's effects in treating the sequelae of acute and chronic spinal cord injuries: A review of allopathic and traditional Chinese medicine literature. *Evidence-based Complement Altern Med*. 2011;2011. doi:10.1093/ecam/nep010.
13. Heo I, Shin B-C, Kim Y-D, Hwang E-H, Han CW, Heo K-H. Acupuncture for spinal cord injury and its complications: a systematic review and meta-analysis of randomized controlled trials. *Evid Based Complement Alternat Med*. 2013;2013:364216. doi:10.1155/2013/364216.
14. Nayak S, Shiflett SC, Schoenberger NE, et al. Is acupuncture effective in treating chronic pain after spinal cord injury? *Arch Phys Med Rehabil*. 2001;82(11):1578-1586. doi:10.1053/apmr.2001.26624.
15. Norrbrink C, Lundeberg T. Acupuncture and massage therapy for neuropathic pain following spinal cord injury: an exploratory study. *Acupunct Med*. 2011;29(2):108-115. doi:10.1136/aim.2010.003269.
16. Liu Z, Wang W, Wu J, Zhou K, Liu B. Electroacupuncture improves bladder and bowel function in patients with traumatic spinal cord injury: results from a prospective observational study. *Evid Based Complement Alternat Med*. 2013;2013:543174. doi:10.1155/2013/543174.
17. Qaseem A, Wilt TJ, McLean RM, Forciea MA. Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. *Ann Intern Med*. 2017;(May 2016). doi:10.7326/M16-2367.
18. Ambrósio EMM, Bloor K, MacPherson H. Costs and consequences of acupuncture as a treatment for chronic pain: A systematic review of economic evaluations conducted alongside randomised controlled trials. *Complement Ther Med*. 2012;20(5):364-374. doi:10.1016/j.ctim.2012.05.002.
19. Chou R, Qaseem A, Snow V, Casey D, Cross T, Shekelle P. Clinical Guidelines Diagnosis and Treatment of Low Back Pain : A Joint Clinical Practice Guideline from the American College of Physicians and the American. *Ann Intern Med*. 2007;147(7):478-491. doi:10.7326/0003-4819-147-7-200710020-00006.
20. Chou R, Deyo R, Friedly J, et al. Nonpharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline. *Ann Intern Med*. 2017;166(7). doi:10.7326/M16-2459.

21. Lin CWC, Haas M, Maher CG, MacHado LAC, Van Tulder MW. Cost-effectiveness of guideline-endorsed treatments for low back pain: A systematic review. *Eur Spine J*. 2011;20(7):1024-1038. doi:10.1007/s00586-010-1676-3.
22. Boyuan Z, Yang C, Ke C, Xueyong S, Sheng L. Efficacy of Acupuncture for Psychological Symptoms Associated with Opioid Addiction: A Systematic Review and Meta-Analysis. *Evidence-Based Complement Altern Med*. 2014;2014:1-13. doi:10.1155/2014/313549.
23. Wu M-S, Chen K-H, Chen I-F, et al. The Efficacy of Acupuncture in Post-Operative Pain Management: A Systematic Review and Meta-Analysis. *PLoS One*. 2016;11(3):e0150367. doi:10.1371/journal.pone.0150367.
24. Dorr H, Townley C. Chronic Pain Management Therapies in Medicaid: Policy Considerations for Non- Pharmacological Alternatives to Opioids. *Natl Acad State Heal Policy*. 2016;(August):1-11.
25. Tan G, Craine MH, Bair MJ, et al. Efficacy of selected complementary and alternative medicine interventions for chronic pain. *J Rehabil Res Dev*. 2007;44(2):195. doi:10.1682/JRRD.2006.06.0063.
26. Lovas J, Tran Y, Middleton J, Bartrop R, Moore N, Craig A. Managing pain and fatigue in people with spinal cord injury: a randomized controlled trial feasibility study examining the efficacy of massage therapy. *Spinal Cord*. 2017;55:162-166. doi:10.1038/sc.2016.156.
27. Herman P, Craig B, Caspi O. Is complementary and alternative medicine (CAM) cost-effective? a systematic review. *BMC Complement Altern Med*. 2005;5(11):1-15. doi:10.1186/1472-Received.
28. Haas M, Sharma R, Stano M. Cost-Effectiveness of Medical and Chiropractic Care for Acute and Chronic Low Back Pain. *J Manipulative Physiol Ther*. 2005;28(8):555-563. doi:10.1016/j.jmpt.2005.08.006.
29. Dagenais S, Brady O, Haldeman S, Manga P. A systematic review comparing the costs of chiropractic care to other interventions for spine pain in the United States. *BMC Health Serv Res*. 2015;15(1):474. doi:10.1186/s12913-015-1140-5.
30. Arienti C, Daccò S, Piccolo I, Redaelli T. Osteopathic manipulative treatment is effective on pain control associated to spinal cord injury. *Spinal Cord*. 2011;49(4):515-519. doi:10.1038/sc.2010.170.
31. Paige N, Miake-Lye I. Association of spinal manipulative therapy with clinical benefit and harm for acute low back pain: systematic review and meta-analysis. *JAMA*. 2017;317(14):1451-1460. doi:10.1001/jama.2017.3086.

32. Bronfort G, Haas M, Evans R, Bouter L. Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis. *Spine J*. 2004;4(3):335-356.
33. Weeks WB, Leininger B, Whedon JM, Lurie JD, Tosteson TD. The association between use of chiropractic care and costs of care among older Medicare patients with chronic low back pain and multiple comorbidities. *J Manipulative Physiol Ther*. 2016;39(2):63-75. doi:10.1016/j.jmpt.2016.01.006.
34. Kaiser Family Foundation. Medicaid Benefits: Chiropractor Services. <http://www.kff.org/medicaid/state-indicator/chiropractor-services/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D>. Published 2012. Accessed May 15, 2017.
35. Boldt I, Eriks-Hoogland I, Brinkhof MW, de BR, Joggi D, von EE. Non-pharmacological interventions for chronic pain in people with spinal cord injury. *Cochrane Databasem Syst Rev*. 2014;11(1469-493X (Electronic)):CD009177. doi:10.1002/14651858.CD009177.pub2.www.cochranelibrary.com.
36. Geneen L, Smith B, Clarke C, Martin D, Colvin LA, Moore RA. Physical activity and exercise for chronic pain in adults: an overview of Cochrane reviews. *Cochrane Libr*. 2017;(4). doi:10.1002/14651858.CD011279.pub3.www.cochranelibrary.com.
37. Standaert CJ, Friedly J, Erwin MW, et al. Comparative Effectiveness of Exercise, Acupuncture, and Spinal Manipulation for Low Back Pain. *Spine (Phila Pa 1976)*. 2011;36(21):S120-S130. doi:10.1097/BRS.0b013e31822ef878.
38. Donovan E, Ranney M, Ried M, Baird J, Green T. Chronic pain in the emergency department. *R I Med J*. 2017;(February):25-29. doi:10.1007/s12630-014-0239-1.
39. Oregon Health Plan. Back Policy Changes Fact Sheet. <http://www.oregon.gov/oha/herc/FactSheet/Back-policy-changes-fact-sheet.pdf>. Published 2016. Accessed June 15, 2017.
40. Penney LS, Ritenbaugh C, DeBar LL, Elder C, Deyo RA. Provider and patient perspectives on opioids and alternative treatments for managing chronic pain: a qualitative study. *BMC Fam Pract*. 2016;17(1):164. doi:10.1186/s12875-016-0566-0.
41. Lawrence DJ, Meeker WC. Chiropractic and CAM utilization: a descriptive review. *Chiropr Osteopat*. 2007;15:2. doi:10.1186/1746-1340-15-2.
42. Burhenn P, Olausson J, Villegas G, Kravits K. Guided Imagery for Pain Control. *Clin J Oncol Nurs*. 2014;18(5):501-502.

Appendix A: Literature Search Strategy

Databases

Pubmed, Cochrane

Study Types

Systematic Review/Meta-Analysis

Comparative Cost Analyses (Cost effectiveness, cost utilization...)

RTC

Case-Control

Case Study

Limitations

Published between 2001-2017, English language

Intervention Search Terms

Complementary and Integrative Therapies

Integrative Therap^{*}

Integrative Health^{*}

Alternative therap^{*}

Holistic therap^{*}

Complementary and alternative therap^{*}

Acupuncture

Acupuncture

Acupuncture therap^{*}

electro-acupuncture

Massage

Massage

Massage therap^{*}

Therapeutic massage

Chiropractic

Chiropractic care

Osteo-/Chiro-/Spinal manipulation or manipulative therapy

Other holistic therapies

Yoga

Pilates
Tai Chi
Equine Therap*
Animal Therap*
Aqua Therap*
Movement-based therap*
Qigon

Outcome Terms

SCI

Spinal cord injury
Spinal injury

SCI Complications

respiratory complications
cardiovascular complications
urinary and bowel complications
spasticity
pain
pressure ulcers
osteoporosis
bone fractures

Pain management

Opioid use
Alternatives to opioids
Opioid alternatives
Chronic pain management

Cost effectiveness

Cost effectiveness
Cost-efficient
Cost efficacy
Cost benefit

