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# **Evaluation of Chiropractic Care as a Minnesota Essential Health Benefit**

Report to the Minnesota Legislature Pursuant to Laws of Minnesota 2023, Chapter 57, Article 2, Section 65

March 31, 2025

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## Report Prepared By

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## Executive Summary

The focus of this retrospective evaluation is the required coverage of chiropractic care as an essential health benefit (EHB) in the Minnesota EHB benchmark plan for the individual and small group health insurance markets. The benchmark plan requires coverage for medically necessary chiropractic services provided by a licensed Doctor of Chiropractic. Chiropractic care may be used by individuals with a broad range of musculoskeletal and neurological conditions, symptoms, and injuries, including low back and neck pain. As shown in the literature and Minnesota claims analysis, chiropractors primarily treat spine-related conditions.

In Minnesota, chiropractic scope of practice includes but is not limited to spinal manipulation, evaluation and management services for new and established patients, acupuncture for pain, and patient education. The Minnesota claims analysis found that spinal manipulation was the most commonly billed chiropractic procedure from 2017 to 2022, which aligns with utilization literature on chiropractic care.

Coverage for chiropractic care is included across many state programs related to commercial and public insurance, and is included in some federal programs. States can implement coverage of chiropractic care in a variety of ways, such as through their state EHB benchmark plan or through state legislation. As of 2014, 45 states, including Minnesota, incorporated chiropractic care in their EHB benchmark plans. Additionally, several states have added commercial and Medicaid coverage for chiropractic care through state legislation.

Public responses to the request for information varied, with conflicting viewpoints on whether chiropractic care should be included in the Minnesota EHB benchmark plan. Some respondents raised safety and efficacy concerns, while others emphasized the importance of chiropractic care in addressing prevalent health conditions. Some respondents noted the potential for downstream savings in cases where chiropractic care can replace the need for emergency and surgical services.

Current standards of care for spine-related conditions, such as low back pain, emphasize nonpharmacological treatments. This may include chiropractic care and spinal manipulation. While leading guidelines incorporate spinal manipulation as a treatment option for spine-related conditions, they also note that the supporting evidence is limited. This was echoed in the evaluation's literature scan, where the quality of literature on the safety, efficacy, and cost-effectiveness of chiropractic care is highly varied, resulting in significant limitations in the conclusions that can be drawn from study findings. Of this literature, some studies highlight that spinal manipulation and chiropractic care may have a positive effect on pain and disability. Some studies suggest that adverse events from chiropractic care are rare, but could include vertebral artery dissection, which can lead to stroke.

An analysis of commercial claims from the Minnesota All Payer Claims Database from 2017 to 2022 revealed that the total amount spent on chiropractic care fluctuated from 2017 to 2022, with a high of \$34 million in 2018, and a low of \$29.3 million in 2022. Additional findings from the analysis include the following:

- 9% of commercial enrollees in the Minnesota All Payer Claims Database used chiropractic care annually from 2017 to 2022, with an average between 5.2 and 5.5 visits per member per year.
- Total spending decreased by 8.82% from 2017 to 2022, driven by reduced utilization and lower allowable costs per procedure, with a shift in cost burden from issuers to enrollees.

- The majority of chiropractic care costs from 2017 to 2022 were for spinal manipulation codes. Costs for other procedures and x-rays decreased during the same period. Spine-related diagnoses, including low back and neck issues, increased from 95.9% in 2017 to 97.6% in 2022 as a percentage of primary diagnoses.

This evaluation focused on the cost and utilization of chiropractic care from 2017 to 2022, rather than the period before and immediately after its inclusion in the Minnesota EHB benchmark plan, due to the nationwide transition to the International Classification of Diseases, Tenth Revision – Clinical Modification in 2015. This and other updates to the coding system for claims data removed the ability to conduct a pre- and post-analysis.

## Introduction

Minn. Stat. § 62J.26 requires the Minnesota Department of Commerce (Commerce)—in coordination with the Minnesota Department of Health (MDH) and Minnesota Management and Budget (MMB)—to evaluate mandated health benefit proposals for potential fiscal, economic, and public health impacts. In 2023, the Minnesota Legislature passed legislation directing Commerce to conduct an evaluation of the economic cost and health benefits of one existing state-required health benefit each year for the next five years.

Commerce is evaluating chiropractic care, an essential health benefit (EHB) in the Minnesota EHB benchmark plan for the individual and small group health insurance markets. The benchmark plan provides coverage for medically necessary chiropractic services provided by a licensed Doctor of Chiropractic.

For evaluation criteria and required evaluation components, please review the Retrospective Evaluation Report Methodology, available at <https://mn.gov/commerce/insurance/industry/policy-data-reports/62j-reports/>.

## Coverage Requirements

This evaluation focuses on chiropractic care as covered in the Minnesota EHB benchmark plan. Starting in 2014, the Patient Protection and Affordable Care Act (ACA) required health plans in the individual and small group markets to cover the EHBs listed in each state’s benchmark plan.<sup>1</sup> Since 2014, the Minnesota EHB benchmark plan has included coverage for chiropractic care.<sup>2</sup> In Minnesota, chiropractic care is defined as “medically necessary therapies that employ manipulation and specific adjustment of body structures provided by a licensed Doctor of Chiropractic.”<sup>3</sup> There are additional mechanisms through which chiropractic care is required for health plans in Minnesota, which include Minnesota statutes and rules applicable to Health Maintenance Organizations (HMOs)<sup>4</sup> and Minnesota Health Care Programs (e.g., Medical Assistance and MinnesotaCare).

The EHB for chiropractic care applies to fully insured small group commercial health plans and individual market plans. This EHB does not apply to non-HMO fully insured large group commercial health plans, self-insured employer plans, grandfathered plans, and Medicare supplemental policies (i.e., Medigap).

## Related Health Conditions and Services

There are no specific health conditions identified within the EHB benchmark plan for chiropractic care. Chiropractic care may be used by individuals with a broad range of musculoskeletal and/or neurological

conditions and injuries, such as low back pain or cervicogenic dizziness.<sup>5</sup> In Minnesota’s Medical Assistance program, neurological and congenital conditions are excluded if not specifically related to subluxation, which refers to the displacement or misalignment of joints within the body (e.g., spinal segments).<sup>6</sup>

In Minnesota, chiropractic services may include but are not limited to manual spinal manipulation, evaluation and management services for new and established patients, acupuncture for pain, soft tissue mobilization, and therapeutic services.<sup>3,7,8,9</sup>

## **Related State and Federal Laws**

This section provides an overview of state and federal laws related to chiropractic care and any external factors that provide context on current policy trends related to this topic.

### **Related Federal Laws**

Medicare Part B covers chiropractic care for manipulation of the spine to treat vertebral subluxation, if medically necessary.<sup>10</sup> After meeting the annual deductible, enrollees are responsible for a 20% coinsurance for approved chiropractic visits. Under CFR § 440.60, chiropractic services must be provided by a chiropractor who is licensed by the state and meets federal regulations for treatment by means of manipulation of the spine.<sup>11</sup> Medicare coverage does not include additional services provided by a chiropractor, such as x-rays, massage therapy, or acupuncture.

In January 2025, the Chiropractic Medicare Coverage Modernization Act of 2023 was reintroduced in the House and Senate.<sup>12</sup> If passed, this bill would expand Medicare coverage to all services a chiropractor is licensed to perform.

### **Related Minnesota Laws**

There are several Minnesota statutes related to chiropractic care. Minn. Stat. § 148.01 defines the scope of chiropractors in the state of Minnesota. These chiropractic services are defined as including the evaluation of relevant bodily function and the use of adjustment, manipulation, mobilization, or other procedures for correction of specific conditions, such as vertebral subluxation.<sup>13</sup> Minn. Stat. § 62M.02, subd. 4 includes chiropractors in the definition of attending health care professional.<sup>14</sup> Minn. Stat. § 62A.15, subd. 2 requires applicable plans to provide coverage for chiropractic services if coverage for physician services are included in plan benefits.<sup>15</sup>

Medical Assistance and MinnesotaCare currently provide coverage for chiropractic care.<sup>16</sup> Under these programs, chiropractic services are only covered for “medically necessary therapies that employ manipulation and specific adjustment of body structures, such as the spinal column, provided by a licensed Doctor of Chiropractic.” Coverage includes spinal manipulation to treat vertebral subluxation, x-rays needed to support a diagnosis, evaluation and management services for new and established patients, and acupuncture for pain and other conditions. Coverage is limited to one evaluation to determine medical necessity or progress per calendar year and up to 24 spinal manipulation treatments per year (no more than six per month) unless prior authorization of a greater number is approved.<sup>17</sup>

## State Comparison

States can implement coverage of chiropractic care in a variety of ways, such as through their state EHB benchmark plan or through state legislation. Each of these coverage policies can impact commercial and Medicaid coverage and have varying levels of cost-sharing and utilization management.

**State EHB Benchmark Plan.** The ACA has required health plans in individual and small group markets to cover the EHBs listed in each state's EHB benchmark plan since 2014.<sup>18,19</sup> At the time this requirement was implemented, 45 states, including Minnesota, included chiropractic care in their EHB benchmark plans.<sup>20</sup>

**State Legislation.** Several states have added commercial and Medicaid coverage for chiropractic care through legislation. Missouri requires coverage for chiropractic care delivered by a licensed chiropractor acting within their scope of practice. This coverage is limited to those within an issuer's current network and issuers are not required to add a chiropractor to their network.<sup>21</sup> Some states (e.g., Connecticut<sup>22</sup>, Kentucky<sup>23</sup>, Maine<sup>24</sup>, New York<sup>25</sup>, and Wisconsin<sup>26</sup>) require coverage for chiropractic care delivered by a licensed chiropractor acting within their scope of practice if the same services are covered when provided by other medical professionals, such as physicians or osteopaths. Wisconsin also prohibits requiring a referral from a physician for chiropractic services to be covered.<sup>26</sup>

**Medicaid.** As of 2018, 24 states, including Minnesota, offer coverage for chiropractic care through their state Medicaid programs.<sup>27</sup> Thirteen of these states require some form of cost-sharing (e.g., deductible, co-insurance, or co-payment) and 18 have limits on services (e.g., utilization review, referral requirement, age requirements, visits per year cap, or prior authorization).

**Cost-Sharing.** Cost-sharing for chiropractic care varies from state to state and across Medicaid and commercial coverage. Some states (e.g., Iowa<sup>28</sup>, New York<sup>25</sup>, and Vermont<sup>29</sup>) require cost-sharing for chiropractic care to be the same as cost-sharing for the same service provided by another type of provider. Other states (e.g., Missouri<sup>21</sup> and New Mexico<sup>30</sup>) require cost-sharing for chiropractic care to be no more than other specific services, such as primary care services or treatment for other physical health conditions.

## Public Comments Summary

Commerce solicited public input on the EHB for chiropractic care through a request for information (RFI) posted to Commerce's website and the Minnesota State Register. The summary below represents only the opinions and input of the individuals and/or organizations who responded to the RFI.

### Key Stakeholder Comment Themes

For this EHB, Commerce received RFI responses from two commercial health issuers, one health care organization, two advocacy organizations, five health care providers, and one member of the public.

Responses to the RFI highlighted conflicting viewpoints on the coverage of chiropractic care, with respondents raising key considerations related to effectiveness and safety, regulations and policy recommendations, and coverage variation and healthcare costs.

**Effectiveness and Safety Considerations.** Six respondents stated that chiropractic care is an evidence-based, first-line treatment for back and neck pain. They emphasized that it provides a safe, nonpharmacologic alternative that can help reduce the risk associated with opioid use for pain management. Two of those respondents interpreted the clinical guidelines of several major health organizations (The Joint Commission, World Health Organization, Centers for Disease Control and Prevention, American College of Physicians, American Academy of Family Physicians, Veterans Administration, and North American Spine Society) as endorsing spinal manipulation, a primary intervention of chiropractic care, as an initial treatment option for back pain.

While five of the respondents noted that chiropractic care results in few adverse events, two respondents noted that patients with underlying health conditions may have a higher risk of adverse events, underscoring the need for thorough assessments and clear communication between patients and providers. Another respondent expressed concerns that chiropractic services can lead to negative health outcomes, including disc herniation, cauda equina syndrome, vertebrobasilar occlusion or dissection, and carotid dissection, but noted the frequency of these outcomes has not been thoroughly studied.

Two different respondents expressed opposition to chiropractic care being included in Minnesota's EHB benchmark plan, citing concerns about its scientific validity and safety. One respondent questioned the legitimacy of chiropractic care, characterizing it as pseudoscience and advocating for additional funding for coverage of physical therapy. Another respondent shared personal observations of patients receiving inappropriate diagnoses or treatments from chiropractors. They argued that spinal misalignment as a root cause for various conditions is a fundamental misunderstanding of human anatomy. These respondents recommended reevaluating the effectiveness, safety, and cost implications of chiropractic care, or restricting chiropractic coverage. Another respondent stated that required health benefits limit issuers' ability to adapt and improve their policies based on new evidence.

**Chiropractic Regulation and Policy Recommendations.** One respondent mentioned that chiropractic care in Minnesota is regulated by the Minnesota Board of Chiropractic Examiners, which the respondent stated ensures practitioners meet high ethical and professional standards. Licensing requires completion of accredited education programs and national board examinations. The respondent stated that the curriculum includes competencies such as patient assessment, diagnosis, and treatment planning, aligning with other doctoral-level health science programs.

Two respondents noted that the Minnesota Health Services Advisory Council recommended expanding chiropractic services under Minnesota Health Care Programs (e.g., Medical Assistance) to the governor and legislature. If expanded this would provide coverage for evaluations, therapeutic exercise, manual therapy techniques, treatment for neuromusculoskeletal conditions, and removal of prior authorization requirements for Medical Assistance enrollees under age 12. In contrast, another respondent highlighted the Minnesota Governor's 2025 budget recommendation to eliminate chiropractic benefits in Medical Assistance for enrollees aged 21 and over.

**Coverage and Health Care Costs.** Three respondents highlighted that disparities in chiropractic coverage exist among Medical Assistance, Medicare, and commercial insurance plans. One of these respondents raised concerns about equitable access to chiropractic care, noting that while Medical Assistance enrollees comprise a



larger share of patients who use chiropractic care at their health center, the scope of covered services is less comprehensive than those under most commercial plans. Two of the respondents noted that Medical Assistance covers chiropractic care with low cost-sharing (ranging from \$1-3 per service and an average of \$17.50 per patient per year).<sup>a</sup> However, one of the respondents pointed out that this contrasts with the cost-sharing burden of commercial insurance enrollees, whose out-of-pocket expenses vary depending on their issuer's coverage policy.

Two respondents argued that chiropractic care could contribute to higher overall health expenditures and premiums due to risks such as injuries, dependency on recurring treatments, and costs associated with ongoing care. Another respondent mentioned that since 2020, some commercial health issuers have reported that utilization for chiropractic care has not increased, with an estimated average utilization rate of approximately 620 per 10,000 enrollees.

Another respondent, drawing from their experience in a chiropractic practice, highlighted reimbursement disparities for chiropractors and advocated for parity with physical therapists, while also calling for acupuncture to be recognized as a valid medical practice with equal reimbursement.

Four respondents argued that chiropractic care has been shown to lower health care costs by reducing reliance on expensive medical treatments and emergency services, such as preventing patients from seeking costly emergency room care for treatable conditions like lower back pain. They cited studies indicating that patients who choose chiropractic care as an initial treatment experience fewer surgeries, diagnostic imaging, and opioid prescriptions, leading to overall cost savings. Respondents emphasized that expanding chiropractic coverage could further alleviate financial strain on the health care system and improve patient outcomes by offering a cost-effective, conservative approach to pain management.

**Health Equity.** Three respondents stated chiropractic care improves health equity by addressing rural health care shortages and providing affordable, nonpharmacologic treatment for underserved populations. One of these respondents reported that with over 3,200 licensed chiropractors in Minnesota—many serving rural and underserved communities—chiropractic care plays a crucial role in managing musculoskeletal conditions by reducing disability, enhancing function, and alleviating pain.

## Cost Estimates Provided in Stakeholder Comments

MMB and stakeholders provided the following responses related to cost estimates for this EHB:

- Due to limitations in the available claims data, MMB's health plan administrators are unable to estimate the impact of coverage for chiropractic care on per member per month (PMPM) costs.
- Commercial health issuers in Minnesota offer coverage for chiropractic care services. Respondents estimate the average PMPM cost of chiropractic care over the past one to four years is approximately \$0.44 PMPM. The cost varies between small group plans and individual plans, with small group plans generally incurring higher costs than individual plans.

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<sup>a</sup> Medical Assistance eliminated cost-sharing as of January 1, 2024.

Stakeholders' results may or may not reflect generalizable estimates for the EHB, depending on the methodology, data sources, and assumptions used for analysis.

## Evaluation of Public Health and Economic Impact

### Methodology

The following section includes an overview of the current literature examining the clinical effectiveness of chiropractic care, current standards of care, and the economic and public health impact of chiropractic care. The literature review of key terms (see [Appendix A](#)) includes moderate- to high-quality relevant peer-reviewed literature and/or independently conducted domestic research that was published within the last 10 years and is relevant to chiropractic care. For further information on the literature review methodology, please reference: <https://mn.gov/commerce/insurance/industry/policy-data-reports/62j-reports/>.

### Public Health Impact

**Background.** Chiropractic care is a type of non-medication-based health treatment, also known as a nonpharmacological treatment. It is primarily used for musculoskeletal conditions, particularly those related to the spine.<sup>31</sup> Overall, national survey data indicate that 11% of adults in the United States used chiropractic care in 2022.<sup>32</sup> The most common reasons people seek chiropractic care are for neck and low back pain.<sup>33,34,35</sup> Low back pain may account for roughly half of the total patients seeking chiropractic care. Although chiropractors may treat other conditions, only about 3.1% of individuals seek chiropractic care for non-musculoskeletal issues (e.g., asthma or digestive issues).<sup>33</sup> Based on national statistics, the typical population treated by chiropractors tends to be White individuals, employed, and over the age of 30.<sup>33,35</sup> Pediatric populations, retired individuals, and those living with a disability use chiropractic services less frequently.<sup>33</sup>

**Common Conditions Treated by Chiropractic Care.** Musculoskeletal conditions, particularly those of the spine, are common, and result in a significant percentage of health care expenditures.<sup>36</sup> As of 2013, spine conditions, including neck and low back pain, accounted for one-third of health care costs in the United States. Additionally, low back pain is a common cause of disability and leading reason for health care visits and expenditures<sup>37,38</sup>, including in military populations.<sup>38</sup> Chronic pain, which is pain lasting beyond three to six months<sup>39</sup>, affects over 40% of adults in the United States.<sup>40</sup> While chronic pain, such as chronic low back pain, is not commonly “cured”, it can be managed.<sup>40</sup> Chiropractors are one of many providers who treat chronic pain and spine-related conditions, and offer one of many nonpharmacological treatment options for these conditions.<sup>41</sup> For Minnesota-specific practice patterns observed in commercial claims, see [Analysis of Utilization and Cost for Chiropractic Care](#).

### Standards of Care

**Practice Patterns.** Chiropractors, like other health care providers, use a variety of diagnostic and treatment tools.<sup>42</sup> One scoping review found that chiropractors typically use static (non-moving) evaluation methods, followed by motion palpation, spinal examination, orthopedic tests, and neurological examination.<sup>33</sup> One third of chiropractors reported using x-ray in evaluations in this scoping review, but this does not reflect the percent of evaluations where x-ray is prescribed. Some literature suggests that imaging recommendations in clinical

guidelines for chiropractors may influence imaging trends, such that updated recommendations cautioning against frequent and general use of x-ray may reduce the frequency of use.<sup>43</sup> For Minnesota-specific rates of x-ray utilization in chiropractic care, see [Analysis of Utilization and Cost for Chiropractic Care](#).

Across conditions treated by chiropractors, an estimated four out of five individuals receive spinal manipulation therapy.<sup>33,44</sup> Spinal manipulation is also practiced by physical therapists and osteopaths<sup>44</sup>, but the comparative use by other provider types is unknown. Soft tissue therapy and patient education may be received by roughly a third of patients in chiropractic care.<sup>33</sup> While updates in chiropractic clinical guidelines encourage the use of both active (e.g., therapeutic exercise) and passive therapies (e.g., spinal manipulation therapy)<sup>42</sup>, the impact of these updates on chiropractic practice patterns has not been evaluated. For Minnesota-specific practice patterns observed in commercial claims, see [Analysis of Utilization and Cost for Chiropractic Care](#).

**Clinical Guidelines for Chiropractic Care.** Many clinical guidelines are used by chiropractors and other providers to address musculoskeletal conditions, and several of these guidelines focus on the body of evidence to support spinal manipulation therapy for spine-related conditions. Although the guidelines most commonly used by chiropractors are not clearly defined in the available literature, the American Chiropractic Association recommends using the American College of Physicians (ACP)<sup>45</sup> guidelines<sup>b</sup> and the Compass guidelines<sup>42</sup> to guide chiropractic care in the United States.<sup>46</sup> Additionally, there are other clinical guidelines specific to the treatment of low back pain, including the North American Spine Society’s (NASS) “Evidence-Based Clinical Guidelines for Multidisciplinary Spine Care: Diagnosis and Treatment of Low Back Pain”<sup>41</sup>, the Centers for Disease Control and Prevention’s (CDC) “CDC Clinical Practice Guideline for Prescribing Opioids for Pain”<sup>47</sup>, and the American Academy of Family Physicians’ (AAFP) clinical recommendations for “Imaging for Low Back Pain”<sup>48</sup>.

Table 1 provides a high-level summary of these clinical guidelines and respective recommendations related to chiropractic care.

**Table 1. Overview of Clinical Practice Guidelines**

Guideline Name	Target Audience	Summary of Recommendations
<b>Compass Guidelines</b> <sup>42</sup>	Chiropractors	<ul style="list-style-type: none"><li>• Provides recommendations for diagnosis and chiropractic treatment of many conditions, particularly low back pain, neck pain, and chronic musculoskeletal pain.</li><li>• Highlights specific chiropractic treatment recommendations depending on the patient's condition and symptoms, such as when to perform spinal manipulation and laser therapy.</li><li>• Notes safety considerations, such as who may require referral for highly concerning (also known as “red flag”) symptoms, and/or conditions for which spinal manipulation is not appropriate.</li></ul>

<sup>b</sup> Jointly developed with the American Academy of Family Physicians (AAFP).

Guideline Name	Target Audience	Summary of Recommendations
<b>2017 American College of Physicians (ACP) and American Academy of Family Physicians (AAFP) Guidelines<sup>45,48</sup></b>	“The primary spine practitioner”, which includes all health care providers treating back pain	<ul style="list-style-type: none"> <li>• Provides recommendations for managing acute (less than 1 month), subacute (1-3 months), and chronic (more than 3 months) pain.</li> <li>• Highlights nonpharmacological therapies as first-line treatments for low back pain.</li> <li>• Recommends several different interventions for low back pain and notes the quality of evidence for each specific intervention.</li> <li>• Includes spinal manipulation therapy among potential interventions for low back pain, which is performed most frequently by chiropractors, but notes that the level of evidence supporting spinal manipulation is low.</li> </ul>
<b>Centers for Disease Control and Prevention (CDC) Guidelines<sup>47</sup></b>	Health care providers treating pain, particularly those with medication prescription and referral privileges	<ul style="list-style-type: none"> <li>• Provides both pharmacological and nonpharmacological recommendations for managing acute, subacute, and chronic pain.</li> <li>• Similarly emphasizes nonpharmacological treatments as first-line therapies for pain management.</li> <li>• Includes spinal manipulation among an expansive list of other treatments that could be considered for acute, subacute, and chronic pain, particularly low back pain.</li> </ul>
<b>North American Spine Society (NASS) Guidelines<sup>41</sup></b>	Health care providers treating low back pain	<ul style="list-style-type: none"> <li>• Provides recommendations and evidence ratings for treatment of low back pain.</li> <li>• Recommends several different interventions that can be used for low back pain, and notes the quality of evidence for those interventions.</li> <li>• Highlights the limited and conflicting evidence supporting spinal manipulation therapy, categorizing it as a lower-tier recommendation compared to other interventions for back pain.</li> <li>• Acknowledges that while the evidence favoring spinal manipulation over other nonpharmaceutical approaches for low back pain (e.g., exercise, massage) is low, spinal manipulation therapy has short-term improvements in health outcomes from spinal manipulation.</li> </ul>
<b>American Academy of Family Physicians (AAFP) Guidelines<sup>48</sup></b>	Health care providers treating low back pain	<ul style="list-style-type: none"> <li>• Recommends against imaging (e.g., x-ray, MRI) within the first six weeks of low back pain unless “red flag” symptoms are present.</li> </ul>

**Effectiveness of Chiropractic Care.** The effectiveness of chiropractic care in treating pain, improving function, and reducing disability is difficult to assess from the available literature because studies vary in focus. Whereas some studies evaluate the effectiveness of chiropractic care generally<sup>38,49,50</sup>, other studies evaluate specific interventions used by multiple clinicians, but most prominently by chiropractors.<sup>51,52,53</sup> Some studies have found that spinal manipulation therapy may improve ratings of pain, disability, and/or satisfaction with care<sup>51,52,53</sup>, and reduce the use of opioids.<sup>49</sup> One systematic review of 26 randomized controlled trials found that spinal manipulation therapy was associated with a statistically significant improvement in pain and function for

individuals with acute low back pain.<sup>51</sup> Several studies support the addition of chiropractic care to the management of spine-related conditions in addition to care provided by other health care providers.<sup>38,49,50</sup> Of these studies, one comparative effectiveness trial found that adding chiropractic care to usual care resulted in statistically significant increases in patient's perception of improvement and reduced the use of prescribed medications compared with usual care alone.<sup>38</sup> However, the effectiveness of chiropractic care on health outcomes may depend on factors such as the frequency of care, the specific outcomes assessed, concurrent medications and/or other health care services used, and the specific interventions employed.<sup>54</sup>

Due to the significant variations in the diagnostic tools and treatments used by different providers for musculoskeletal conditions<sup>55</sup>, it is difficult to assess the comparative effectiveness of chiropractic care versus other care for similar conditions. According to the limitations provided by most studies included in this review, available studies are unable to account for potentially confounding factors, such as the range of interventions across provider types, patient populations, comorbidities, severity of diagnoses, patient preferences, coverage, and outcome measures.

**Safety of Chiropractic Care.** There are a limited number of studies published within the last 10 years addressing the safety of chiropractic care. Overall, many of the studies available for evaluation conclude a low risk of adverse events from chiropractic care, with varying rates of frequency.<sup>56,57,58</sup> One scoping review found that the incidence of chiropractic-related adverse events is approximately 13 out of 10,000 patients, or 1 out of 2 million manipulations.<sup>57</sup> Many studies on chiropractic-related adverse events focus on vertebral artery dissection (VAD) which is a rare cause of stroke but the leading form of stroke in populations aged 45 and under.<sup>58</sup> VAD can result from various factors, such as excessive movement or trauma to the neck, motor vehicle accidents, falls, yoga, and blunt trauma. Spinal manipulation therapy of the neck may be an independent risk factor for VAD.<sup>56,58</sup> One study estimated the incidence of chiropractic-related VAD to be 1 in 20,000 cervical spine manipulations.<sup>58</sup> Another study found that when VAD statistics were narrowed to individuals aged 45 and under, the odds ratio of VAD from chiropractic care was found to be higher.<sup>59</sup> Some studies argued that methodological challenges of studies for chiropractic-related adverse events should limit confidence in findings, given the multifactorial nature of risk for VAD.<sup>56,60</sup>

Amongst the commercially-insured enrollee population captured in the Minnesota All Payer Claims Database (MN APCD),<sup>c</sup> between 2017 and 2022, there were a total of 423 unique patients (between 56 and 90 each year) with a diagnosis of VAD.<sup>61</sup> Of those, 45 patients between 2017 and 2022 (12% of unique patients) had seen a chiropractor within 30 days prior to their VAD event, with 33% requiring inpatient treatment with a primary diagnosis of stroke. 41 of those patients received spinal manipulation, defined by procedure codes 98940 - "Chiropractic manipulative treatment for 1-3 spinal regions" or 98941 - "Chiropractic manipulative treatment for 3-4 spinal regions". 22 patients had a primary diagnosis of M9901 - "Segmental & Somatic Dysfunction of Cervical [neck] Region". The mean number of days between treatment for VAD and chiropractic care was 18 days, with a median of 7 days. Given the small sample size for VAD following chiropractic care, the association between chiropractic care and VAD cannot be determined from the available data. For more information on the

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<sup>c</sup> All figures only represent claims for commercial enrollees in the MN APCD who had 12 months of continuous coverage in a given year.

methodology and population considered for this statistic, see [Analysis of Utilization and Cost for Chiropractic Care](#).

## Economic Impact

### *Analysis of Utilization and Cost for Chiropractic Care*

**Objective.** This analysis examines trends in the utilization and cost of chiropractic care in Minnesota between 2017 and 2022, to better understand the economic impact of required coverage of chiropractic care as a Minnesota EHB.

**Methodology.** For this evaluation, MDH provided cost and utilization data for chiropractic care in Minnesota from the MN APCD.<sup>61</sup> Data included the cost and utilization of the most common chiropractic procedures, as well as the total cost and utilization of chiropractic care for commercially-insured enrollees.

This evaluation focused on data from the MN APCD for 2017 through 2022 to assess trends in utilization, cost, and practice patterns for chiropractic care during this period. Although chiropractic care was included in Minnesota's EHB benchmark plan in 2014, a pre- and post-analysis was not possible due to significant updates to the International Classification of Diseases, Tenth Revision – Clinical Modification (ICD-10-CM) in 2015. Claims included commercially-insured enrollees in the MN APCD of all ages and genders with 12 months of continuous enrollment who received care from a chiropractor (defined by Taxonomy Code 111N00000X). It should be noted that variation in billing and coding across health care providers may account for some variation in the procedure and diagnosis codes used to describe the clinical encounter.<sup>62</sup> As multiple services may be provided in a single visit for multiple diagnoses, this analysis reports on primary diagnoses for claims, and on a per procedure/service basis. A trend analysis was conducted to identify changes in utilization and cost between 2017 and 2022, a period when the coverage of chiropractic care was included in the Minnesota EHB benchmark plan. For this analysis, diagnosis and procedure/service codes were grouped based on similar characteristics, and subgrouping was performed where additional specificity was required. For a complete list of codes used in this analysis, see [Appendix B](#).

Data were requested for all non-public claims from the MN APCD, which includes approximately 40% of the total commercially-insured population in Minnesota (See Table 2). Commercial plans in the MN APCD include fully insured employer-based plans, individual and small group plans, and self-insured plans not covered by the Employee Retirement Income Security Act (ERISA) (e.g., State Employee Group Insurance Program). ERISA-covered plans are not required to submit data to the MN APCD, but some do voluntarily and therefore may be included. While the MN APCD includes data for Minnesota Health Care Programs (e.g., Medical Assistance and MinnesotaCare), these were not included in the analyses for this evaluation.

Data were requested to evaluate the safety and cost of adverse events related to chiropractic care, and to compare the incidence of VAD associated with chiropractic care in the MN APCD with the incidence reported in the literature.<sup>56,57,58</sup> Corresponding to study designs observed in the literature<sup>59</sup>, MDH provided total claims and costs of care for VAD occurring within 30 days following a chiropractor visit to identify any associated downstream costs. For the analysis of VAD, the data included claims for all enrollees who received a principal diagnosis code for VAD (ICD-10-CM code of I77.74) or stroke (ICD-10-CM code of I63.XXX) as a primary or

secondary diagnosis within 30 days of a chiropractic care visit (defined as Taxonomy Code 111N00000X). The analysis included claims from all commercially-insured enrollees with 12 months of continuous coverage who received care from a chiropractor (defined as Taxonomy Code 111N00000X) between 2017 and 2022. The results of this query are discussed in the [Public Health Impact](#) section of this report under *Safety of Chiropractic Care*. A robust analysis of this data was not possible given the limited number of claims for VAD occurring within 30 days of a chiropractic care visit.

**Findings.** Key findings from the following analysis include:

- Between 2017 and 2022, an average of 9% of commercially-insured enrollees in the MN APCD used chiropractic care annually. During this time period, the average number of chiropractic care visits per member per year ranged from 5.2 to 5.5.
- Total spending on chiropractic care decreased by 8.82% from 2017 to 2022, driven by reduced utilization and lower allowable costs per procedure. However, during this same time period, the cost burden shifted from issuers to patients with an increase in patient-sharing.
- Spinal manipulation-related codes consistently accounted for the majority of chiropractic care costs, while costs for other procedures and x-rays decreased from 2017 to 2022. Spine-related diagnoses dominated, including low back and neck-related codes, increasing from 95.9% to 97.6% of total diagnoses over the same period.

**Utilization.**<sup>d</sup> There was a net decrease in the total number of commercially-insured enrollees receiving chiropractic care from 102,004 in 2017 to 96,771 in 2022. The number of commercially-insured enrollees in the MN APCD follows the same trend (See Table 2).

**Table 2. Number of Commercially-Insured Enrollees Included in the MN APCD and Receiving Chiropractic Care between 2017 and 2022**

Year	Number of Enrollees	Number of Enrollees Receiving Chiropractic Care
2017	1,185,243	102,004
2018	1,222,346	106,487
2019	1,129,880	106,254
2020	1,118,227	98,433
2021	1,069,881	99,207
2022	1,054,811	96,771

**Source:** MDH analysis of MN APCD, extract 26.<sup>61</sup>

**Notes:** This analysis is restricted to commercially-insured enrollees in the MN APCD with 12 months of coverage for a given year.

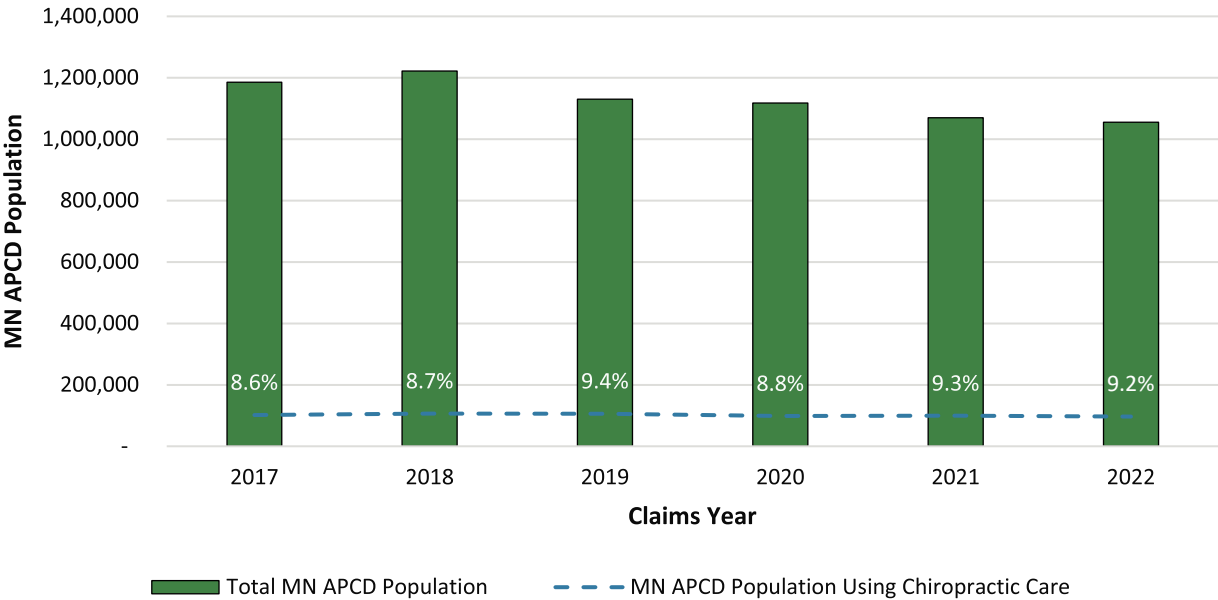
While the total number of enrollees utilizing chiropractic care and the number of commercially-insured enrollees in the MN APCD decreased, the percentage of commercially-insured enrollees in the MN APCD using chiropractic care increased by 0.06% from 2017 to 2022. Between 2017 and 2022, an average of 9% of

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<sup>d</sup> All figures only represent claims for commercial enrollees in the MN APCD who had 12 months of continuous coverage in a given year.

commercially-insured enrollees in the MN APCD received chiropractic care annually (see Figure 1). The percentage of enrollees utilizing chiropractic services between 2017 and 2019 increased from 8.6% to 9.4%, decreased to 8.8% in 2020 during the first year of the COVID-19 pandemic, and rose to 9.2% of enrollees by 2022.

**Figure 1. Total MN APCD Population and Percent Utilizing Chiropractic Care (2017-2022)**



**Source:** MDH analysis of MN APCD, extract 26.<sup>61</sup>

**Notes:** This analysis is restricted to commercially-insured enrollees in the MN APCD with 12 months of coverage for a given year.

During the six-year analysis period, the average number of chiropractic care visits per member per year ranged between 5.2 and 5.5. Meanwhile, the median number of visits per member per year remained stable at 3.0, indicating that the overall averages were influenced by high utilizers of chiropractic care. For instance, in 2022 the mean number of chiropractic care visits per member per year was 5.4, but for the 11 highest utilizers the mean was 80.9 chiropractic care visits per member per year.

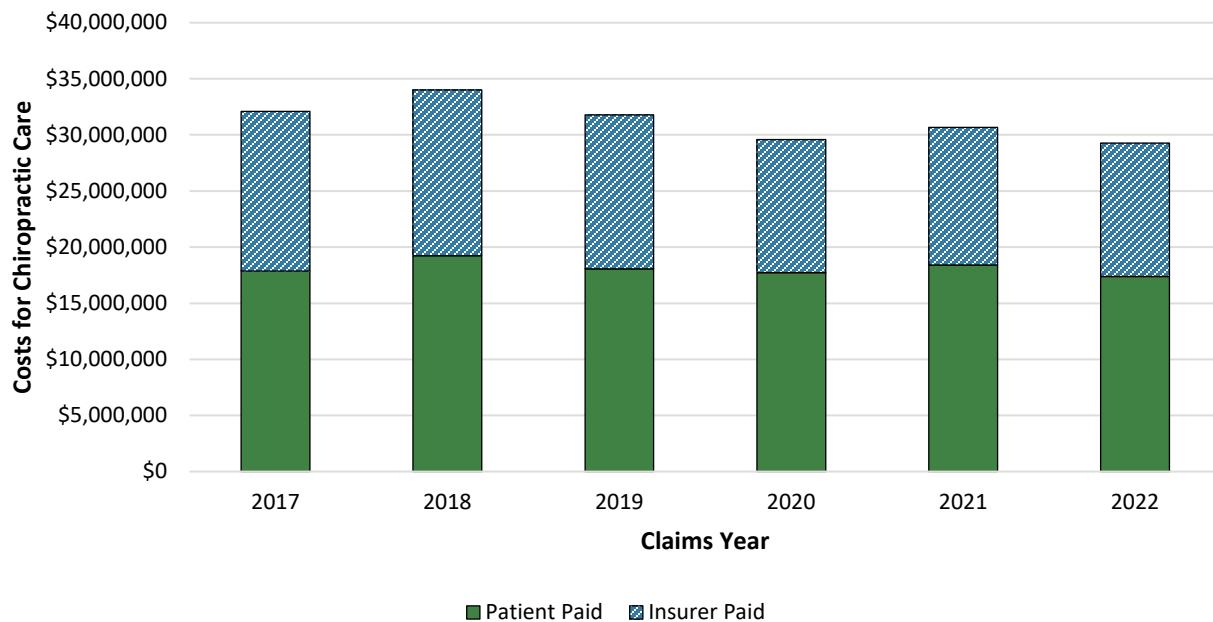
**Total Costs.<sup>e</sup>** Overall, there was an 8.82% decrease in spending on chiropractic care from 2017 to 2022, corresponding to factors such as changes in the number of commercially-insured enrollees represented in the MN APCD and allowable per unit costs. The total cost of chiropractic care fluctuated from 2017 to 2022, with a high of \$34.0 million in 2018, and a low of \$29.3 million in 2022 (Figure 2). Total issuer costs were \$14.2 million in 2017 and decreased to \$11.9 million in 2022. Patient-paid costs varied slightly, representing \$17.9 million in 2017 and \$17.4 million in 2022. When analyzing the trends of proportion of total costs paid by issuers and patients over years, issuer-paid amounts decreased between 2017 and 2022 (44.4% to 40.6%) while patient-paid costs increased to accommodate this change (55.7% to 59.4%). Enrollees may face higher costs for maintaining access to chiropractic care, depending on the extent to which premiums have increased over the analysis period due to chiropractic care requirements (see [Cost Estimates Provided in Stakeholder Comments](#)) in addition to the

<sup>e</sup> All figures only represent claims for commercial enrollees in the MN APCD who had 12 months of continuous coverage in a given year.



observable shift in the cost burden to enrollees through cost-sharing. Many of the allowable per unit costs<sup>f</sup> for the most common procedures decreased over the six-year period. The decrease in total cost for chiropractic care (including issuer and patient paid) from 2017 to 2022 may be driven by the decrease in allowable cost per procedure and/or fewer enrollees utilizing chiropractic care.

**Figure 2. Plan Paid and Patient Cost-Sharing for Total Cost of Chiropractic Care (2017-2022)**



**Source:** MDH analysis of MN APCD, extract 26.<sup>61</sup>

**Notes:** This analysis is restricted to commercially-insured enrollees in the MN APCD with 12 months of coverage for a given year.

**Practice Patterns.**<sup>g</sup> Between 2017 to 2022, procedure/treatment codes constituted the majority of chiropractic care costs, accounting for an average of 90.1% of total allowable chiropractic care costs for the six-year period. New patient evaluation codes (e.g., 99202 – Office Outpatient New 20 minutes) across all diagnoses and x-ray codes (e.g., 72050 – Radex spine Cervical 4 or 5 views) accounted for an average of 5.0% and 1.0% of total allowable costs, respectively.<sup>h</sup> The distribution of costs by visit type (returning patient visit versus new evaluation) remained stable over this period, with changes of less than 1% in any service category.

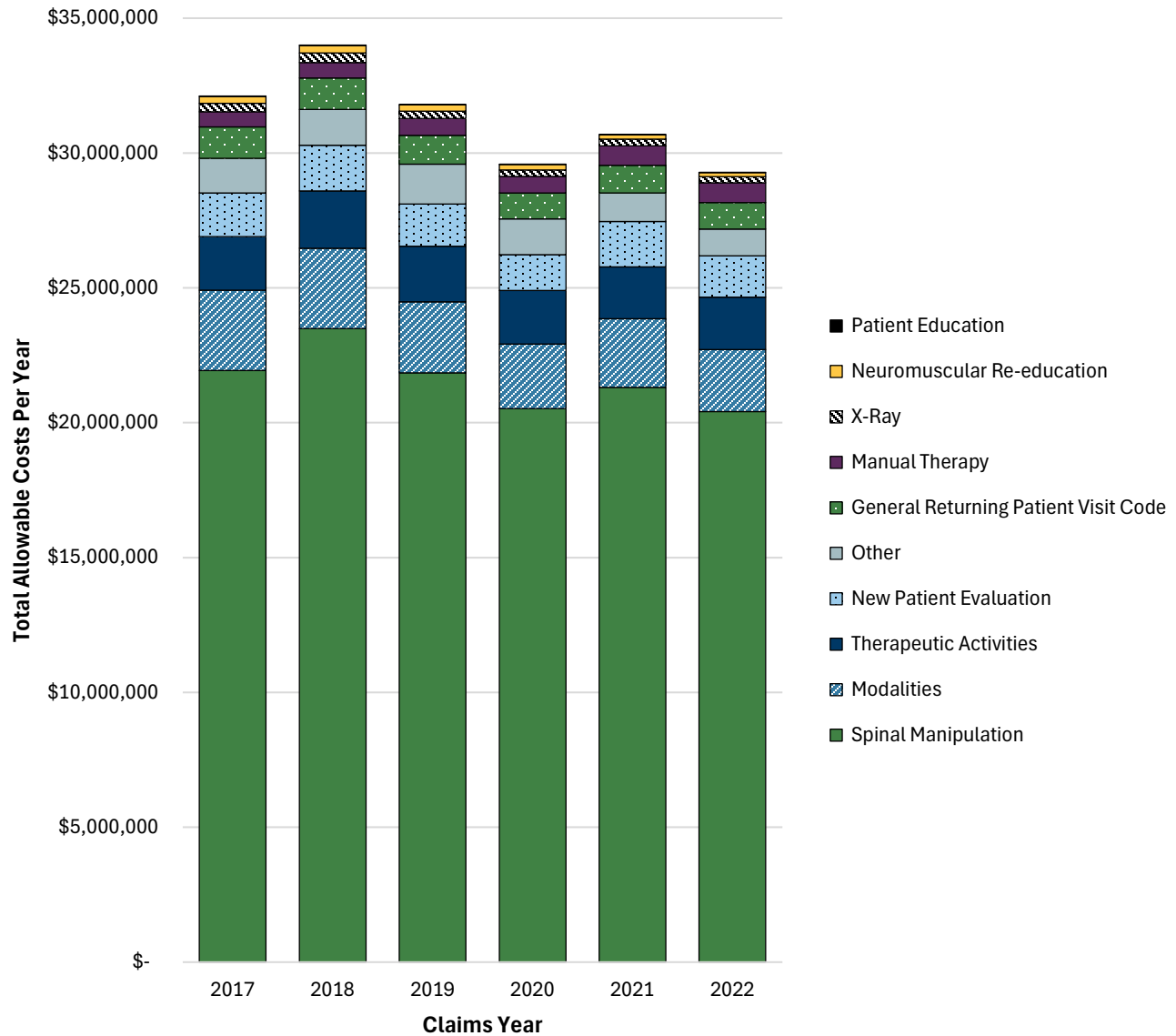
Spinal manipulation codes (e.g., CPT code 98941- chiropractic manipulative treatment spinal 3-4 regions) were the most frequently observed procedure in the claims data amongst codes for new or returning patient visits (e.g., 92214 – Office Outpatient Visit 25 minutes), representing 68.3% to 69.8% of total chiropractic care costs between 2017 and 2022, and increasing by 1.5% over the six-year period (See Figure 3).

<sup>f</sup> This represents the maximum amount an issuer will pay for a unit of a service or product.

<sup>g</sup> All figures only represent claims for commercial enrollees in the MN APCD who had 12 months of continuous coverage in a given year.

<sup>h</sup> Codes with an insufficiently small cell size were not collected. As a result, percentages of cost by procedure code do not add up to 100%.

**Figure 3. Total Chiropractic Care Costs per Year by Procedure/ Service (2017-2022)**



**Source:** MDH analysis of MN APCD, extract 26.<sup>61</sup>

**Notes:** This analysis is restricted to commercially-insured enrollees in the MN APCD with 12 months of coverage for a given year.

In 2017, spinal manipulation codes accounted for \$21.9 million, or 68.3% of total allowable chiropractic care costs, and in 2022, accounted for \$20.4 million and 69.8% of total allowable costs. In 2017, total allowable costs for modalities (i.e., any code related to electrical simulation, ultrasound, and laser treatments) accounted for 9.3% of total costs (\$3 million) decreasing to 7.8% (\$2.3 million) in 2022. In 2017, therapeutic activities, including all codes related to therapeutic exercises, accounted for 6.2%, or \$2.0 million, increasing to 6.6% of costs, or \$1.9 million, in costs in 2022. On average, 7.0% of commercially-insured enrollees receiving chiropractic care

were provided an x-ray,<sup>i</sup> resulting in total allowable costs of \$311,446 in 2017 and \$225,668 in 2022. This reduction between 2017 and 2022 was likely driven by some combination of decreased utilization and per-unit allowable costs for certain x-ray codes. For instance, the total allowable per unit cost for a 4-5 view x-ray of the cervical spine (CPT code 72050) decreased from \$68.27 in 2017 to \$56.48 in 2022.

Spine-related diagnoses (e.g., M546 – Pain in Thoracic Spine), which include all diagnosis codes related to the neck, midback, low back, pelvis, and ribs, accounted for 95.9 and 97.6% of total diagnoses in 2017 and 2022, respectively, as calculated by a percent of total enrollees per diagnosis code per year. Other musculoskeletal diagnoses (e.g., M76.61 – Achilles Tendonitis Right Leg) accounted for 2.5 and 1.5% of total diagnoses in 2017 and 2022, respectively, followed by other diagnosis codes (e.g., R51 - Headache) which accounted for 1.6 and 0.9% of total diagnosis codes in 2017 and 2022, respectively. From 2017 to 2022, the top three primary diagnosis codes for commercially-insured enrollees receiving chiropractic care were segmental and somatic dysfunction of the cervical region (M9901), lumbar region (M9903), and thoracic region (M9902). These diagnoses may refer to a broad range of symptoms and clinical presentations but are broadly related to pain or dysfunction in the neck, low back, or mid-back respectively. These diagnoses have increased as a percentage of the overall proportion of chiropractic care diagnoses each year, starting at 60.0% in 2017 and rising to 68.6% in 2022. Amongst these codes, primary diagnosis codes related to the neck (e.g., M542 – Cervicalgia) and lumbosacral region (e.g., M5441 - Lumbago with Sciatica Right Side) were the top diagnoses across 2017 to 2022 to be linked to x-ray codes, accounting for 52.2 and 54.6% and 42.0 and 40.7% of total x-ray codes provided by chiropractors, respectively. It is unclear from the data the specific stage of treatment that most x-rays were provided, and the degree to which these diagnosis codes align with the recommendations for imaging in the clinical guidelines. Diagnoses related to nerve pathology (e.g., M5412 – Radiculopathy), which are most supported by guidelines for x-ray provision, accounted for 4.7% of primary diagnoses linked to x-ray claims in 2017 and 2.3% in 2022.

## **Literature Review**

A more comprehensive analysis and modeling of all costs associated with chiropractic care, including downstream effects, and a full picture of current coverage and expenditures for Minnesota was not feasible within the scope of this evaluation and data limitations (see [Evaluation Limitations](#)). A literature review was conducted to assess the broader environment of coverage, utilization, and costs related to chiropractic care.

**Utilization.** Total utilization and frequency of utilization for chiropractic care may depend on several factors including diagnosis and insurance coverage, provider experience, and clinic-specific factors. One study based on national data found the mean number of visits per person using chiropractic care was 8.3 visits per year<sup>35</sup>, which is higher than what was observed in the Minnesota claims analysis. Another observational study found an average of 2.3 visits per month for individuals with chronic neck and low back pain using chiropractic care.<sup>44</sup> This study found that the frequency of visits may vary by clinic and provider, where clinics seeing more individuals per day may have higher visit frequency and providers with more experience were associated with lower treatment frequency. Similar to other health services, coverage of chiropractic care and condition severity

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<sup>i</sup> With per service/procedure presentation in claims, unique enrollees may be accounted for with multiple x-ray lines. As result, this may overstate the percentage of enrollees receiving an x-ray if multiple x-ray procedure codes are applied for the same enrollee.

rather than specific conditions are associated with variations in utilization and frequency.<sup>40,44</sup> While one study found that the total utilization of chiropractic care increased between 2007-2016 on a national level<sup>44</sup>, the MN APCD claims analysis did not demonstrate a clear increase in utilization of chiropractic services.

**Cost of Chiropractic Care.** The average cost of chiropractic care varies across the literature. The mean expenditure per visit for chiropractic care, according to one study, was \$86.94 per visit and total annual expenditure per enrollee was \$721.43.<sup>35</sup> When adjusted for inflation, the year-to-year trend in cost for services do not appear to have trended upwards despite a nationwide increase in the utilization of chiropractic services.<sup>35</sup> These findings align with the MN APCD claims analysis (see [Analysis of Utilization and Cost for Chiropractic Care](#)), where prices specifically for chiropractic care have remained relatively stable compared to rates of health care inflation<sup>63</sup>, and align with patterns of utilization as opposed to rising health care prices.

One systematic review found that the costs of care for a treatment episode of spine pain, which may include multiple visits to achieve a desired outcome, ranged from \$264 to \$6,171.<sup>50</sup> Among studies focused on the cost of chiropractic care, costs varied by study-specific factors, including the scope of care, specific type of spine pain, and codes used to bill for treatment of spine pain. In many cases, costs of chiropractic care were lower than costs for other types of providers (e.g., primary care), but given that populations and conditions varied across studies, it may be challenging to draw conclusions from the relative costs of treatment.

**Cost-Effectiveness.** The literature is inconclusive as to the cost-effectiveness of chiropractic care. For example, the Office of the Inspector General has scrutinized the costs of chiropractic care within the Medicare program and reported that it remains uncertain whether these additional expenses are offset by downstream savings.<sup>64</sup> Another study found that chiropractic care may help reduce health care expenditures and mitigate the economic impacts of the opioid use epidemic.<sup>49</sup> One study suggested that the cost-effectiveness of chiropractic care extends beyond avoiding opioid use for spine pain, potentially reducing hospitalizations and emergency room visits when chiropractic care is the initial treatment for spine pain.<sup>65</sup> Additionally, the cost of chiropractic care may be comparable to other nonpharmacological interventions<sup>50</sup>, such as physical therapy, which is considered cost-effective for many conditions.<sup>66</sup> However, many studies evaluating the cost-effectiveness of chiropractic care do not control for factors such as condition severity in study populations or assess long-term health care outcomes and utilization, which are critical for evaluating the cost-effectiveness for this required service.

## Evaluation Limitations

**Data Limitations.** A comprehensive analysis of chiropractic care, utilization, and safety using Minnesota claims was not feasible due to several key limitations. Firstly, comparing the cost and utilization of chiropractic care before and after its inclusion in the Minnesota EHB benchmark plan was hindered by the transition from ICD-9-CM to ICD-10-CM for claims in 2015. This transition restricted the analysis of trends in utilization and costs to the last six years of available data in the MN APCD (2017-2022). Additionally, the analysis period coincided with the height of the COVID-19 pandemic, which significantly altered healthcare utilization patterns, including those for chiropractic care. Furthermore, there was insufficient data to conduct a reliable cost-effectiveness analysis for this EHB. Such an analysis would require linking longitudinal medical records and claims data to evaluate the impact of chiropractic care on outcomes for various diagnoses. Lastly, due to the rarity of VAD cases, the sample size of VAD claims was insufficient to analyze yearly trends related to adverse events and/or the associated costs.

**Literature Review Limitations.** There are several key limitations in the available literature regarding the public health and economic impact of chiropractic care. These limitations are reflected in clinical guidelines, particularly those evaluating the effectiveness of interventions commonly used by chiropractors. Many studies included in systematic reviews have low statistical power and research quality, making it difficult to draw definitive conclusions.<sup>51,53,67</sup> Studies comparing chiropractic care to other forms of care often fail to control for factors such as condition severity, comorbidities, insurance coverage, concurrent care, and types of interventions used. Additionally, many studies evaluating the cost, utilization, and potential cost-effectiveness of chiropractic care rely on older health care expenditure data, which may not reflect current cost considerations. Furthermore, as chiropractic care encompasses various health care interventions, as opposed to a specific type of treatment, the effectiveness of chiropractic care likely depends on the conditions treated, interventions used, and specific outcome measurements.<sup>51</sup> Since practice patterns and patient populations differ by state and provider, the literature cannot fully address the impact of chiropractic coverage for Minnesota.

## Summary and Future Considerations

As identified by this evaluation, coverage for chiropractic care in Minnesota includes medically necessary chiropractic services provided by a licensed Doctor of Chiropractic, such as spinal manipulation, evaluation and management services for new and established patients, and patient education. While coverage for chiropractic care varies across states, 45 states, including Minnesota, have included chiropractic care in their EHB benchmark plans since 2014. The public comments received through the RFI had contradictory perspectives, with some respondents raising safety and efficacy concerns while others highlighted how chiropractic care can lead to downstream savings and reduced surgical or emergency services. This discordance continued in the literature review. While some studies stated that chiropractic care may have a positive impact on reducing back pain and disability, other studies suggested that adverse events (e.g., VAD), while rare, may result from chiropractic care. Literature and clinical guidelines suggest that the effectiveness and safety of chiropractic care depends on the specific interventions used and the patient populations treated, which may evolve as clinical guidelines change. The comparative benefit of chiropractic care versus other types of care remains unclear, given the diverse patient populations seeking chiropractic services. An analysis of commercial claims from the MN APCD and cost-related literature suggest that utilization, price per service, and coverage of chiropractic care are the primary source of fluctuations in total spending for chiropractic care. For Minnesota, the burden of costs have shifted to enrollees in the form of increased patient cost-sharing for chiropractic services. The degree to which chiropractic care is cost-effective is not well established in the available literature.

Evaluating the comprehensive public health and economic impact of chiropractic care in the Minnesota EHB benchmark plan was limited by several factors, including the current body of evidence in the available literature and inability to link Minnesota-specific claims data to enrollee medical records. Future research may more thoroughly assess the impact of chiropractic care by analyzing claims and corresponding medical records, which would better capture the complexities of clinical care and health outcomes.

## Appendix A. Key Terms

Adverse events

Back pain

Chiropractic

Chiropractic adjustment

Chiropractor

Comparative effectiveness

Cost effectiveness

Evidence based

Exercise therapy

Herniated disk

Lumbago

Manual therapy

Musculoskeletal

Neck pain

Orthopedics

Outcomes

Pain management

Quality of life

Radiculopathy

Sciatica

Spinal manipulation

Spinal manipulative therapy

Therapeutic

## Appendix B. Associated Codes

### Cost and Utilization Analysis: Taxonomy Codes

Code	Grouping	Classification
111N00000X	Chiropractic Providers	Chiropractor

### Cost and Utilization Analysis: Taxonomy Codes

CPT Code	Description
72020	RADEX SPINE 1 VIEW SPECIFY LEVEL
72040	RADEX SPINE CERVICAL 2 OR 3 VIEWS
72050	RADEX SPINE CERVICAL 4 OR 5 VIEWS
72070	RADEX SPINE THORACIC 2 VIEWS
72072	RADEX SPINE THORACIC 3 VIEWS
72074	RADEX SPINE THORACIC MINIMUM 4 VIEWS
72081	RADEX ENTIR THRC LMBR CRV SAC SPI W/SKULL 1 VW
72083	RADEX ENTIR THRC LMBR CRV SAC SPI W/SKULL 4/5 VW
72100	RADEX SPINE LUMBOSACRAL 2/3 VIEWS
72114	RADEX SPINE LUMBSACL COMPL W/BENDING VIEWS MIN 6
72170	RADIOLOGIC EXAMINATION PELVIS 1/2 VIEWS
72190	RADIOLOGIC EXAM PELVIS COMPL MINIMUM 3 VIEWS
72200	RADIOLOGIC EXAMINATION SACROILIAC JNTS <3 VIEWS
72220	RADEX SACRUM & COCCYX MINIMUM 2 VIEWS
97010	APPLICATION MODALITY 1/> AREAS HOT/COLD PACKS
97012	APPL MODALITY 1/> AREAS TRACTION MECHANICAL
97014	APPL MODALITY 1/> AREAS ELEC STIMJ UNATTENDED
97018	APPL MODALITY 1/> AREAS PARAFFIN BATH
97022	APPLICATION MODALITY 1/> AREAS WHIRLPOOL
97026	APPLICATION MODALITY 1/> AREAS INFRARED
97032	APPL MODALITY 1/> AREAS ELEC STIMJ EA 15 MIN
97033	APPL MODALITY 1/> AREAS IONTOPHORESIS EA 15 MIN
97035	APPL MODALITY 1/> AREAS ULTRASOUND EA 15 MIN
97039	UNLIST MODALITY SPEC TYPE&TIME CONSTANT ATTEND
97110	THERAPEUTIC PX 1/> AREAS EACH 15 MIN EXERCISES
97112	THER PX 1/> AREAS EACH 15 MIN NEUROMUSC REEDUCA
97113	THER PX 1/> AREAS EACH 15 MIN AQUA THER W/XERSS
97116	THER PX 1/> AREAS EA 15 MIN GAIT TRAING W/STAIR

CPT Code	Description
97124	THER PX 1/> AREAS EACH 15 MINUTES MASSAGE
97140	MANUAL THERAPY TQS 1/> REGIONS EACH 15 MINUTES
97161	PHYSICAL THERAPY EVALUATION LOW COMPLEX 20 MINS
97162	PHYSICAL THERAPY EVALUATION MOD COMPLEX 30 MINS
97530	THERAPEUT ACTIVITY DIRECT PT CONTACT EACH 15 MIN
97535	SELF-CARE/HOME MGMT TRAINING EACH 15 MINUTES
97750	PHYSICAL PERFORMANCE TEST/MEAS W/REPRT EA 15 MIN
98940	CHIROPRACTIC MANIPULATIVE TX SPINAL 1-2 REGIONS
98941	CHIROPRACTIC MANIPULATIVE TX SPINAL 3-4 REGIONS
98942	CHIROPRACTIC MANIPULATIVE TX SPINAL 5 REGIONS
98943	CHIROPRACTIC MANIPLTV TX EXTRASPINAL 1/> REGION
99202	OFFICE OUTPATIENT NEW 20 MINUTES
99203	OFFICE OUTPATIENT NEW 30 MINUTES
99204	OFFICE OUTPATIENT NEW 45 MINUTES
99205	OFFICE OUTPATIENT NEW 60 MINUTES
99211	OFFICE OUTPATIENT VISIT 5 MINUTES
99212	OFFICE OUTPATIENT VISIT 10 MINUTES
99213	OFFICE OUTPATIENT VISIT 15 MINUTES
99214	OFFICE OUTPATIENT VISIT 25 MINUTES
99215	OFFICE OUTPATIENT VISIT 40 MINUTES

#### Adverse Events: Taxonomy Codes

Code	Grouping	Classification
111N00000X	Chiropractic Providers	Chiropractor
204D00000X	Allopathic & Osteopathic Physicians	Neuromusculoskeletal Medicine & OMM
207X00000X	Allopathic & Osteopathic Physicians	Orthopaedic Surgery
225100000X	Respiratory, Developmental, Rehabilitative and Restorative Service Providers	Physical Therapist

#### Adverse Events: Diagnosis Codes

ICD-10 Code	Description
I63	CEREBRAL INFARCTION
I630	CEREBRAL INFARCT D/T THROMB PRECEREBRAL ARTERIES
I6300	CEREBRAL INFARCT D/T THROMB UNS PRECEREBRAL ART
I6301	CEREBRAL INFARCT D/T THROMBOSIS VERTEBRAL ARTERY
I63011	CEREBRAL INFARCT D/T THROMB RT VERTEBRAL ARTERY



ICD-10 Code	Description
I63012	CEREBRAL INFARCT D/T THROMB LT VERTEBRAL ARTERY
I63013	CEREBRAL INFARCTION THROMBOSIS BIL VERTEBRAL ART
I63019	CEREBRAL INFARCT D/T THROMB UNS VERTEBRAL ARTERY
I6302	CEREBRAL INFARCT D/T THROMBOSIS BASILAR ARTERY
I6303	CEREBRAL INFARCT D/T THROMBOSIS CAROTID ARTERY
I63031	CEREBRAL INFARCT D/T THROMB RIGHT CAROTID ARTERY
I63032	CEREBRAL INFARCT D/T THROMB LEFT CAROTID ARTERY
I63033	CEREBRAL INFARCTION THROMB BIL CAROTID ARTERIES
I63039	CEREBRAL INFARCT D/T THROMB UNS CAROTID ARTERY
I6309	CEREBRAL INFARCT D/T THROMB OTH PRECEREBRAL ART
I631	CEREBRAL INFARCT D/T EMBOLISM PRECEREBRAL ARTERY
I6310	CEREBRAL INFARCT D/T EMBOLISM UNS PRECEREBRL ART
I6311	CEREBRAL INFARCT D/T EMBOLISM VERTEBRAL ARTERY
I63111	CEREBRAL INFARCTION D/T EMBOLISM RT VERT ARTERY
I63112	CEREBRAL INFARCTION D/T EMBOLISM LT VERT ARTERY
I63113	CEREBRAL INFARCTION EMBOLISM BIL VERTEBRAL ART
I63119	CEREBRAL INFARCTION D/T EMBOLISM UNS VERT ARTERY
I6312	CEREBRAL INFARCTION D/T EMBOLISM BASILAR ARTERY
I6313	CEREBRAL INFARCTION D/T EMBOLISM CAROTID ARTERY
I63131	CEREBRAL INFARCT D/T EMBOLISM RT CAROTID ARTERY
I63132	CEREBRAL INFARCT D/T EMBOLISM LT CAROTID ARTERY
I63133	CEREBRAL INFARCTION EMBOLISM BIL CAROTID ARTERY
I63139	CEREBRAL INFARCT D/T EMBOLISM UNS CAROTID ARTERY
I6319	CEREBRAL INFARCT D/T EMBOLISM OTH PRECEREBRL ART
I632	CEREBRAL INFARCT D/T UNS OCCL/STEN PRECEREB ART
I6320	CEREB INFARCT D/T UNS OCCL/STEN UNS PRECEREB ART
I6321	CEREBRAL INFARCT D/T UNS OCCL/STENOSIS VERT ART
I63211	CEREBRL INFARCT DT UNS OCCL/STENOSIS RT VERT ART
I63212	CEREBRL INFARCT DT UNS OCCL/STENOSIS LT VERT ART
I63213	CEREBRAL INFARCT UNS OCCL/STENOSIS BIL VERT ART
I63219	CEREBRAL INFARCT D/T UNS OCCL/STEN UNS VERT ART
I6322	CEREBRAL INFARCT DT UNS OCCL/STENOSIS BASILR ART
I6323	CEREBRAL INFARCT D/T UNS OCCL/STEN CAROTID ART
I63231	CEREBRAL INFARCT D/T UNS OCC/STEN RT CAROTID ART
I63232	CEREBRAL INFARCT D/T UNS OCC/STEN LT CAROTID ART
I63233	CEREBRL INFARCTION UNS OCC/STENOS BIL CAROTID ART
I63239	CEREBRAL INFARCT D/T UNS OCC/STEN UNS CAROTD ART
I6329	CEREB INFARCT D/T UNS OCCL/STEN OTH PRECEREB ART
I633	CEREBRAL INFARCT D/T THROMB CEREBRAL ARTERIES
I6330	CEREBRAL INFARCT D/T THROMB UNS CEREBRAL ARTERY
I6331	CEREBRAL INFARCT D/T THROMB MID CEREBRAL ARTERY
I63311	CEREBRAL INFARCT D/T THROMB RT MID CEREBRAL ART
I63312	CEREBRAL INFARCT D/T THROMB LT MID CEREBRAL ART

ICD-10 Code	Description
I63313	CEREBRAL INFARCTION THROMB BIL MID CEREBRAL ART
I63319	CEREBRAL INFARCT D/T THROMB UNS MID CERBRAL ART
I6332	CEREBRAL INFARCT D/T THROMB ANT CEREBRAL ARTERY
I63321	CEREBRAL INFARCT D/T THROMB RT ANT CEREBRAL ART
I63322	CEREBRAL INFARCT D/T THROMB LT ANT CEREBRAL ART
I63323	CEREBRAL INFARCT DT THROMB BIL ANT CEREBRAL ART
I63329	CEREBRAL INFARCT D/T THROMB UNS ANT CEREBRAL ART
I6333	CEREBRAL INFARCT D/T THROMB POST CEREBRAL ARTERY
I63331	CEREBRAL INFARCT D/T THROMB RT POST CERBRAL ART
I63332	CEREBRAL INFARCT D/T THROMB LT POST CERBRAL ART
I63333	CEREBRAL INFARCT D/T THROMB BIL PST CEREBRAL ART
I63339	CEREBRAL INFARCT D/T THROMB UNS POST CERBRAL ART
I6334	CEREBRAL INFARCT D/T THROMB CEREBELLAR ARTERY
I63341	CEREBRAL INFARCT D/T THROMB RT CEREBELLAR ARTERY
I63342	CEREBRAL INFARCT D/T THROMB LT CEREBELLAR ARTERY
I63343	CEREBRL INFARCTION THROMBOSIS BIL CEREBELLAR ART
I63349	CEREBRAL INFARCT D/T THROMB UNS CEREBELLAR ART
I6339	CEREBRAL INFARCT D/T THROMB OTH CEREBRAL ARTERY
I634	CEREBRAL INFARCT D/T EMBOLISM CEREBRAL ARTERIES
I6340	CEREBRAL INFARCT D/T EMBOLISM UNS CEREBRAL ART
I6341	CEREBRAL INFARCT D/T EMBOLISM MID CEREBRAL ART
I63411	CEREBRAL INFARCT D/T EMBOLISM RT MID CEREBRL ART
I63412	CEREBRAL INFARCT D/T EMBOLISM LT MID CEREBRL ART
I63413	CEREBRAL INFARCTION EMBOLISM BIL MID CEREBRL ART
I63419	CEREBRAL INFARCT D/T EMBOLISM UNS MID CEREB ART
I6342	CEREBRAL INFARCT D/T EMBOLISM ANT CEREBRAL ART
I63421	CEREBRAL INFARCT D/T EMBOLISM RT ANT CEREB ART
I63422	CEREBRAL INFARCT D/T EMBOLISM LT ANT CEREB ART
I63423	CEREBRAL INFARCTION EMBOLISM BIL ANT CEREBRL ART
I63429	CEREBRAL INFARCT D/T EMBOLISM UNS ANT CEREB ART
I6343	CEREBRAL INFARCT D/T EMBOLISM POST CEREBRAL ART
I63431	CEREBRAL INFARCT D/T EMBOLISM RT POST CERBRL ART
I63432	CEREBRAL INFARCT D/T EMBOLISM LT POST CERBRL ART
I63433	CEREBRAL INFARCT EMBOLISM BIL POST CEREBRAL ART
I63439	CEREBRAL INFARCT D/T EMBOLISM UNS POST CERB ART
I6344	CEREBRAL INFARCT D/T EMBOLISM CEREBELLAR ARTERY
I63441	CEREBRAL INFARCT D/T EMBOLISM RT CEREBELLAR ART
I63442	CEREBRAL INFARCT D/T EMBOLISM LT CEREBELLAR ART
I63443	CEREBRAL INFARCTION EMBOLISM BIL CEREBELLAR ART
I63449	CEREBRAL INFARCT D/T EMBOLISM UNS CEREBELLAR ART
I6349	CEREBRAL INFARCT D/T EMBOLISM OTH CEREBRAL ART
I635	CEREBRAL INFARCT D/T UNS OCCL/STEN CEREBRAL ART
I6350	CEREBRAL INFARCT D/T UNS OCCL/STEN UNS CEREB ART

ICD-10 Code	Description
I6351	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS MCA
I63511	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS RT MCA
I63512	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS LT MCA
I63513	CEREBRAL INFARCTION DT UNS OCCL/STENOSIS BIL MCA
I63519	CEREBRAL INFARCTION D/T UNS OCCL/STEN UNS MCA
I6352	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS ACA
I63521	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS RT ACA
I63522	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS LT ACA
I63523	CEREBRAL INFARCTION DT UNS OCCL/STENOSIS BIL ACA
I63529	CEREBRAL INFARCTION D/T UNS OCC/STENOSIS UNS ACA
I6353	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS PCA
I63531	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS RT PCA
I63532	CEREBRAL INFARCTION D/T UNS OCCL/STENOSIS LT PCA
I63533	CEREBRAL INFARCTION DT UNS OCCL/STENOSIS BIL PCA
I63539	CEREBRAL INFARCTION D/T UNS OCCL/STEN UNS PCA
I6354	CEREBRAL INFARCT D/T UNS OCCL/STEN CEREBELLR ART
I63541	CEREBRAL INFARCT UNS OCCL/STEN RT CEREBELLAR ART
I63542	CEREBRAL INFARCT UNS OCCL/STEN LT CEREBELLAR ART
I63543	CEREBRAL INFARCTION UNS OCCL/STEN BIL CERBRL ART
I63549	CEREBRAL INFARCT UNS OCCL/STEN UNS CEREBELLR ART
I6359	CEREBRAL INFARCT UNS OCCL/STEN OTH CEREBRAL ART
I636	CEREBRAL INFARCT D/T CEREB VN THROMB NONPYOGENIC
I638	OTHER CEREBRAL INFARCTION
I6381	OTH CEREB INFARCT DT OCCLS OR STENOSIS OF SM ART
I6389	OTHER CEREBRAL INFARCTION
I639	CEREBRAL INFARCTION UNSPECIFIED
I7774	DISSECTION OF VERTEBRAL ARTERY

## Works Cited

1. What are Essential Health Benefits. Minnesota Department of Commerce. Accessed November 5, 2024. <https://mn.gov/commerce/insurance/health/consumer-protections/rates/health-ins-reform/essential-health-benefits/what-are-ehb.jsp>
2. Minnesota Essential Health Benefit Benchmark Plan (2025-2027). Accessed November 15, 2024. <https://www.cms.gov/files/document/mn-bmp-summary-py2025-2027.pdf>
3. Minnesota Department of Human Services. Chiropractic Services. March 3, 2022. Accessed November 5, 2024. [https://www.dhs.state.mn.us/main/idcplg?IdcService=GET\\_DYNAMIC\\_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=ID\\_008952](https://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=ID_008952)
4. MN Rules 4685.0700 and 4685.1010. Accessed December 3, 2024. <https://www.revisor.mn.gov/rules/4685.0700/> and <https://www.revisor.mn.gov/rules/pdf/4685.1010/2014-01-18%2005:37:47+00:00>
5. Lefebvre R, Peterson D, Haas M. Evidence-Based Practice and Chiropractic Care. J Evid Based Complementary Altern Med. 2012;18(1):75-79. doi:10.1177/2156587212458435
6. MN Admin Rules Part 9505.0245. January 14, 2010. Accessed November 5, 2024. <https://www.revisor.mn.gov/rules/9505.0245/>
7. MN Statutes Sec 148.01. Mn.gov. Published 2024. Accessed November 21, 2024. <https://www.revisor.mn.gov/statutes/cite/148.01>
8. MN Statutes Ch. 147B. Accessed November 5, 2024. <https://www.revisor.mn.gov/statutes/cite/147B/full>
9. Sec. 62A.15 MN Statutes. Mn.gov. Published 2024. Accessed November 21, 2024. <https://www.revisor.mn.gov/statutes/cite/62A.15>
10. Coverage For Chiropractic Services. Accessed January 17, 2025. <https://www.medicare.gov/coverage/chiropractic-services>
11. Code of Federal Regulations, title 42, section 440.60(b). Accessed November 5, 2024. <https://www.ecfr.gov/current/title-42/chapter-IV/subchapter-C/part-440/subpart-A/section-440.60>
12. Library of Congress. HR1610 - 118th Congress (2023-2024): Chiropractic Medicare Coverage Modernization Act of 2023. Accessed January 21, 2025. <https://www.congress.gov/bill/118th-congress/house-bill/1610/text>
13. Sec. 148.01 MN Statutes. Accessed November 21, 2024. <https://www.revisor.mn.gov/statutes/cite/148.01>
14. Sec. 62M.02 MN Statutes. Accessed January 23, 2025. <https://www.revisor.mn.gov/statutes/2023/cite/62M.02>

15. Sec. 62A.15 MN Statutes. Accessed November 21, 2024. <https://www.revisor.mn.gov/statutes/cite/62A.15>
16. Minnesota Department of Human Services. Chiropractic Services. March 3, 2022. Accessed November 5, 2024. [https://www.dhs.state.mn.us/main/idcplg/pna108?IdcService=GET\\_DYNAMIC\\_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=id\\_008952](https://www.dhs.state.mn.us/main/idcplg/pna108?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=id_008952)
17. MN Statutes Sec. 256B.0625. Accessed November 5, 2024. <https://www.revisor.mn.gov/statutes/cite/256B.0625>
18. What are Essential Health Benefits. Minnesota Department of Commerce. Accessed November 5, 2024. <https://mn.gov/commerce/insurance/health/consumer-protections/rates/health-ins-reform/essential-health-benefits/what-are-ehb.jsp>
19. 45 CFR 156.115 -- Provision of EHB. Accessed January 29, 2025. <https://www.ecfr.gov/current/title-45/part-156/section-156.115>
20. Weiner J, Colameco C. *Essential Health Benefits: 50-State Variations on a Theme*. Leonard Davis Institute of Health Economics; Robert Wood Johnson Foundation; 2014. Accessed November 5, 2024. [https://nationaldisabilitynavigator.org/wp-content/uploads/resources-links/RWJF\\_EHB-State-Variations.pdf](https://nationaldisabilitynavigator.org/wp-content/uploads/resources-links/RWJF_EHB-State-Variations.pdf)
21. Missouri General Assembly. Title XXIV BUSINESS AND FINANCIAL INSTITUTIONS, Chapter 376.1230. Accessed January 21, 2025. <https://revisor.mo.gov/main/OneSection.aspx?section=376.1230&bid=20945>
22. Connecticut General Assembly. Chapter 700c - Health Insurance. Accessed January 21, 2025. [https://www.cga.ct.gov/current/pub/chap\\_700c.htm#sec\\_38a-507](https://www.cga.ct.gov/current/pub/chap_700c.htm#sec_38a-507)
23. Kentucky Administrative Regulations Title 907 Chapter 3 Regulation 125 Legislative Research Commission. Accessed January 21, 2025. <https://apps.legislature.ky.gov/law/kar/titles/907/003/125/>
24. Maine Legislature. Title 24-A, §2840-A: Coverage for chiropractic services. Accessed January 21, 2025. <https://legislature.maine.gov/statutes/24-A/title24-Asec2840-A.html>
25. The New York State Senate. Insurance Law § 3221(k)(11). Accessed January 21, 2025. <https://www.nysenate.gov/legislation/laws/ISC/3221>
26. Wisconsin Office of the Commissioner of Insurance. Mandated Benefits in Health Insurance Policies. October 2024. Accessed January 17, 2025. <https://oci.wi.gov/Documents/Consumers/PI-019.pdf>
27. Medicaid Benefits: Chiropractor Services. KFF. Accessed January 17, 2025. <https://www.kff.org/medicaid/state-indicator/chiropractor-services/>
28. Iowa Legislature. Chapter 514C Special Health and Accident Insurance Coverages. Accessed January 21, 2025. <https://www.legis.iowa.gov/docs/code/514C.pdf>

29. Vermont General Assembly. 8 V.S.A. § 4088a. Accessed December 21, 2025.  
<https://legislature.vermont.gov/statutes/section/08/107/04088a>
30. New Mexico Legislature. HB 0075 - Chiropractic Services Insurance Coverage. Accessed January 17, 2025.  
<https://www.nmlegis.gov/Legislation/Legislation?Chamber=H&LegType=B&LegNo=75&year=23>
31. Trager, R. J., Bejarano, G., Perfecto, R. T., Blackwood, E. R., & Goertz, C. M. (2024). Chiropractic and Spinal Manipulation: A Review of Research Trends, Evidence Gaps, and Guideline Recommendations. *Journal of clinical medicine*, 13(19), 5668. <https://doi.org/10.3390/jcm13195668>
32. Chiropractic: In Depth. NCCIH. Published 2022. Accessed January 16, 2025.  
<https://www.nccih.nih.gov/health/chiropractic-in-depth#:~:text=Chiropractic%20is%20a%20licensed%20health,chiropactic%20care%20during%20that%20year>
33. Beliveau, P.J.H., Wong, J.J., Sutton, D.A. *et al.* The chiropractic profession: a scoping review of utilization rates, reasons for seeking care, patient profiles, and care provided. *Chiropr Man Therap* 25, 35 (2017).  
<https://doi.org/10.1186/s12998-017-0165-8>
34. Adams, Jon PhD\*; Peng, Wenbo PhD\*; Cramer, Holger PhD\*<sup>†</sup>; Sundberg, Tobias PhD\*<sup>‡</sup>; Moore, Craig Masters of Clinical Trials Research\*; Amorin-Woods, Lyndon MPH<sup>§</sup>; Sibbritt, David PhD\*; Lauche, Romy PhD\*. The Prevalence, Patterns, and Predictors of Chiropractic Use Among US Adults: Results From the 2012 National Health Interview Survey. *SPINE* 42(23):p 1810-1816, December 1, 2017. | DOI: 10.1097/BRS.0000000000002218
35. Chen B, Brown HS, Douphrate D, Janak J, Gabriel KP, Peng T. National Trends in the Utilization and Expenditure of Chiropractic Care in U.S. Adults: Analysis of the 2007-2016 Medical Expenditure Panel Survey. *Journal of Manipulative and Physiological Therapeutics*. Published online September 1, 2024. doi:<https://doi.org/10.1016/j.jmpt.2024.08.005>
36. Chang, D., Lui, A., Matsoyan, A., Safaee, M. M., Aryan, H., & Ames, C. (2024). Comparative Review of the Socioeconomic Burden of Lower Back Pain in the United States and Globally. *Neurospine*, 21(2), 487–501.  
<https://doi.org/10.14245/ns.2448372.186>
37. Keeney, B. J., Fulton-Kehoe, D., Turner, J. A., Wickizer, T. M., Chan, K. C., & Franklin, G. M. (2013). Early predictors of lumbar spine surgery after occupational back injury: results from a prospective study of workers in Washington State. *Spine*, 38(11), 953–964. <https://doi.org/10.1097/BRS.0b013e3182814ed5>
38. Goertz CM, Long CR, Vining RD, Pohlman KA, Walter J, Coulter I. Effect of Usual Medical Care Plus Chiropractic Care vs Usual Medical Care Alone on Pain and Disability Among US Service Members With Low Back Pain: A Comparative Effectiveness Clinical Trial. *JAMA Netw Open*. 2018;1(1):e180105. doi:10.1001/jamanetworkopen.2018.0105
39. Dydyk AM, Conermann T. Chronic Pain. [Updated 2024 May 6]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK553030/>

40. Herman, P.M., Edgington, S.E., Hurwitz, E.L. *et al.* Predictors of visit frequency for patients using ongoing chiropractic care for chronic low back and chronic neck pain; analysis of observational data. *BMC Musculoskeletal Disord* 21, 298 (2020). <https://doi.org/10.1186/s12891-020-03330-1>
41. North American Spine Society. *Evidence-Based Clinical Guidelines for Multidisciplinary Spine Care: Diagnosis & Treatment of Low Back Pain.*; 2020.  
<https://www.spine.org/Portals/0/assets/downloads/ResearchClinicalCare/Guidelines/LowBackPain.pdf>
42. Whalen WM, Hawk C, Farabaugh RJ, et al. Best Practices for Chiropractic Management of Adult Patients With Mechanical Low Back Pain: A Clinical Practice Guideline for Chiropractors in the United States. *Journal of Manipulative and Physiological Therapeutics*. 2022;45(8):551-565. doi:  
<https://doi.org/10.1016/j.jmpt.2023.04.010>
43. Bussi res AE, Sales AE, Ramsay T, Hilles SM, Grimshaw JM. Impact of imaging guidelines on X-ray use among American provider network chiropractors: interrupted time series analysis. *Spine J*. 2014;14(8):1501-1509. doi:10.1016/j.spinee.2013.08.051
44. Herman, P. M., Edgington, S. E., Sorbero, M. E., Hurwitz, E. L., Goertz, C. M., & Coulter, I. D. (2021). Visit Frequency and Outcomes for Patients Using Ongoing Chiropractic Care for Chronic Low-Back and Neck Pain: An Observational Longitudinal Study. *Pain physician*, 24(1), E61–E74.
45. ACP Guidelines: 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. *Annals of Internal Medicine*. 2017;166(7):514. doi:<https://doi.org/10.7326/m16-2367>
46. Guidelines. ACA Today. Published February 2024. Accessed December 16, 2025.  
<https://www.acatoday.org/practice-resources/guidelines/>
47. Dowell D, Ragan KR, Jones CM, Baldwin GT, Chou R. CDC Clinical Practice Guideline for Prescribing Opioids for Pain — United States, 2022. *MMWR Recomm Rep* 2022;71(No. RR-3):1–95.  
DOI: <http://dx.doi.org/10.15585/mmwr.rr7103a1>
48. Musculoskeletal (MSK). Aafp.org. Published 2025. Accessed January 15, 2025. Imaging for Low Back Pain.  
<https://www.aafp.org/family-physician/patient-care/clinical-recommendations/all-clinical-recommendations/cw-back-pain.html>
49. Acharya, M., Chopra, D., Smith, A. M., Fritz, J. M., & Martin, B. C. (2022). Associations Between Early Chiropractic Care and Physical Therapy on Subsequent Opioid Use Among Persons With Low Back Pain in Arkansas. *Journal of chiropractic medicine*, 21(2), 67–76. <https://doi.org/10.1016/j.jcm.2022.02.007>
50. Dagenais, S., Brady, O., Haldeman, S., & Manga, P. (2015). A systematic review comparing the costs of chiropractic care to other interventions for spine pain in the United States. *BMC health services research*, 15, 474. <https://doi.org/10.1186/s12913-015-1140-5>

51. Paige NM, Miake-Lye IM, Booth MS, et al. 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
52. Schulz C, Evans R, Maiers M, Schulz K, Leininger B, Gert Bronfort. Spinal manipulative therapy and exercise for older adults with chronic low back pain: a randomized clinical trial. *Chiropractic & Manual Therapies*. 2019;27(1). doi:<https://doi.org/10.1186/s12998-019-0243-1>
53. Schroeder, J., Kaplan, L., Fischer, D. J., & Skelly, A. C. (2013). The outcomes of manipulation or mobilization therapy compared with physical therapy or exercise for neck pain: a systematic review. *Evidence-based spine-care journal*, 4(1), 30–41. <https://doi.org/10.1055/s-0033-1341605>
54. Friedly J, Bauer Z, Comstock B, et al. Challenges conducting comparative effectiveness research: the Clinical and Health Outcomes Initiative in Comparative Effectiveness (CHOICE) experience. *Comparative Effectiveness Research*. Published online May 1, 2014:1-1. doi:<https://doi.org/10.2147/cer.s59136>
55. Khodakarami N. (2020). Treatment of Patients with Low Back Pain: A Comparison of Physical Therapy and Chiropractic Manipulation. *Healthcare (Basel, Switzerland)*, 8(1), 44. <https://doi.org/10.3390/healthcare8010044>
56. Mitra A, Azad HA, Prasad N, et al. Chiropractic associated vertebral artery dissection: An analysis of 34 patients amongst a cohort of 310. *Clin Neurol Neurosurg*. 2021;206:106665. doi:10.1016/j.clineuro.2021.106665
57. Swait G, Finch R. What are the risks of manual treatment of the spine? A scoping review for clinicians. *Chiropractic & Manual Therapies*. 2017;25(1). doi:<https://doi.org/10.1186/s12998-017-0168-5>
58. Britt TB, Agarwal S. Vertebral Artery Dissection. [Updated 2023 Mar 20]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK441827/>
59. Cai, X., Razmara, A., Paulus, J. K., Switkowski, K., Fariborz, P. J., Goryachev, S. D., D'Avolio, L., Feldmann, E., & Thaler, D. E. (2014). Case misclassification in studies of spinal manipulation and arterial dissection. *Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association*, 23(8), 2031–2035. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2014.03.007>
60. Kosloff, T. M., Elton, D., Tao, J., & Bannister, W. M. (2015). Chiropractic care and the risk of vertebrobasilar stroke: results of a case-control study in U.S. commercial and Medicare Advantage populations. *Chiropractic & manual therapies*, 23, 19. <https://doi.org/10.1186/s12998-015-0063-x>
61. Minnesota Department of Health. Minnesota All Payer Claims Database, Extract 26. Accessed November 1, 2024. <https://www.health.state.mn.us/data/apcd/index.html>
62. Burks, K., Shields, J., Evans, J., Plumley, J., Gerlach, J., & Flesher, S. (2022). A systematic review of outpatient billing practices. *SAGE open medicine*, 10, 20503121221099021. <https://doi.org/10.1177/20503121221099021>



63. Rakshit S, Wager E, Hughes-Cromwick P, Cox C, Amin K. How does medical inflation compare to inflation in the rest of the economy? *Peterson-KFF Health System Tracker*. Published Online August 2, 2024. <https://www.healthsystemtracker.org/brief/how-does-medical-inflation-compare-to-inflation-in-the-rest-of-the-economy/>
64. Hundreds of millions in Medicare payments for chiropractic services did not comply with Medicare requirements. HHS Office of Inspector General website. Published 2016. Accessed November 15, 2024. <https://oig.hhs.gov/oas/reports/region9/91402033.pdf>
65. Farabaugh, R., Hawk, C., Taylor, D. *et al*. Cost of chiropractic versus medical management of adults with spine-related musculoskeletal pain: a systematic review. *Chiropr Man Therap* 32, 8 (2024). <https://doi.org/10.1186/s12998-024-00533-4>
66. Hon S, Ritter R, Allen DD. Cost-Effectiveness and Outcomes of Direct Access to Physical Therapy for Musculoskeletal Disorders Compared to Physician-First Access in the United States: Systematic Review and Meta-Analysis. *Phys Ther*. 2021;101(1):pzaa201. doi:10.1093/ptj/pzaa201
67. Grabowska, W., Burton, W., Kowalski, M.H. *et al*. A systematic review of chiropractic care for fall prevention: rationale, state of the evidence, and recommendations for future research. *BMC Musculoskelet Disord* 23, 844 (2022). <https://doi.org/10.1186/s12891-022-05783-y>