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The Safety of Chiropractic Care

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Introduction

Chiropractic care has been shown to be effective[1-3] and it is associated with high levels of patient satisfaction.[4] A number of studies have reported that chiropractic care is at least as effective as, if not more effective than, traditional medical management for many spine related injuries.[1 3 5] Chiropractic care also has an enviable safety record compared to most other healthcare interventions.[6-8] That being said, virtually all forms of healthcare are associated with some risk.[9] Chiropractic care may involve a variety of manual therapy procedures, including manipulation, mobilisation, or other instrument or table assisted delivery of specific forces to joints (all referred to as adjustments by many chiropractors), which are known to have a small risk of causing physical harm.[10] Trying to ascertain the true risk associated with any particular intervention is challenging.[9 11 12] Some authors suggest there has been an under-reporting of adverse events associated with interventions such as chiropractic care,[13] while others have pointed out that over-reporting routinely occurs when clinicians are wrongly identified as chiropractors.[11 14] To confound the assessment of the safety of chiropractic care, it has been suggested that a large portion of the adverse events commonly attributed to chiropractors may be due to non-specific effects, or natural history, unrelated to the care that is provided.[15] This review will discuss the published literature that has assessed the safety of chiropractic care and will summarise treatment injury information reported to government agencies such as the Accident Compensation Corporation (ACC).

Systematic Reviews

A number of systematic reviews have been published that have investigated safety aspects of chiropractic care.[10 13 16] In 2009, Gouveia, et al. [10] reviewed the literature to evaluate the tolerability and safety of chiropractic procedures. In this review, the authors identified 46 articles that included data concerning adverse events related to chiropractic care. Most of the adverse events were considered to be benign and transitory, but their review did uncover anecdotal reports of serious complications, such as arterial dissection, myelopathy, vertebral disc extrusion, and epidural hematoma that had a temporal association with chiropractic care (e.g. occurring within 24 hours of a chiropractic consultation). Of course, a temporal relationship does not imply causality, and the extremely rare occurrence of serious events following chiropractic care meant that the authors could not estimate the true risk of injury due to spinal manipulation. They reported speculative ranges of between 1 serious event per 20,000 manipulations to 1.46 serious events per 10 million manipulations. The studies that reported serious complications in this systematic review were retrospective in nature and therefore were susceptible to many forms of bias.[17 18] Interestingly, the 6 prospective studies that were included, reported no serious adverse events from almost 8000 chiropractic consultations. These findings are supported by a large prospective survey performed by Thiel, et al. [19] in 2007 that followed almost 29,000 chiropractic treatment consultations by UK chiropractors, and included over 50,000 cervical manipulations, yet identified no serious adverse events.[19]

In 2015, Hebert, et al.[16] published a systematic review of the literature relating to studies reporting serious adverse events following lumbopelvic spinal manipulation. Their findings were similar to those reported by Gouveia, et al.[10] Although a number of serious adverse events were identified in the literature, important details of most cases were missing or were poorly reported and the design of most of the included studies meant causality could not be assessed. The authors concluded that a detailed understanding of the risk profile of spinal manipulation was difficult to achieve.

Another similar review was published in 2015 that looked at the safety of thrust joint manipulation in the thoracic spine.[20] In this review, the authors identified 10 case reports, over a 65 year period, of serious adverse events following thoracic manipulation. The same issues were present in this study as the previously mentioned studies. The authors acknowledged that there may have been discrepancies between what was reported and what actually occurred, since physicians dealing with the effects of the adverse event, rather than the clinician

performing the manipulation, published the cases. It also wasn't clear if the adverse event was due to the manipulation itself or a pre-existing condition.

Other recent systematic reviews echo the sentiment that, although mild adverse events, meaning transient soreness after an adjustment, may be fairly common, serious adverse events are rare. [2] [21-25] A number of studies have recently been published that have investigated the safety of spinal manipulation. [2] [22-24] One of these was a review of the risks of manual treatment of the spine that was published in 2017. [22] The conclusions of this review were that existing literature indicates that benign adverse events following manual treatments to the spine are common, while serious adverse events are rare. The authors highlighted the point that the incidence and causal relationships with serious adverse events are challenging to establish, with gaps in the literature and inherent methodological limitations of studies. [22] A 'review of reviews' was also published in 2017 [23] that concluded that, due to their rare nature, "*it is currently not possible to provide an overall conclusion about the safety of SMT; however, the types of serious adverse events reported can indeed be significant, sustaining that some risk is present.*"

In the same year, a systematic review in the Journal of the American Medical Association[24] investigated the use of spinal manipulative therapy (SMT) for low back pain and found no randomised controlled trials that reported any serious adverse events. They did however conclude that that minor transient adverse events, such as increased pain, muscle stiffness, and headache were reported 50% to 67% of the time in large case series of patients treated with SMT. [24]

In 2019, Coulter et al [2] published a systematic review of manipulation and mobilisation for treating chronic neck pain. The conclusions from their review of harm were that *"According to the published trials reviewed, manipulation and mobilization appear safe. However, given the low rate of serious adverse events, other types of studies with much larger sample sizes would be required to fully describe the safety of manipulation and/or mobilization for nonspecific chronic neck pain."* [2]

Also in 2019, Rubenstein et al [21] published a similar review in the British Medical Journal that investigated SMT for chronic low back pain. From their extensive search of the literature, they found studies reporting a number of mild to moderate adverse events and 1 serious adverse event that was possibly related to SMT. They identified only 1 good quality study that was designed to assess the risk of adverse events, which reported no increase in risk after manipulation compared to sham.[26]

Edzard Ernst, a vocal critic of chiropractic care and many other forms of complementary care,[27-34] published a systematic review in 2007 that investigated the adverse effects of spinal manipulation.[13] In this review Ernst concluded that spinal manipulation is frequently associated with mild to moderate adverse events and can result in serious complications such as vertebral artery dissections followed by

stroke. Ernst acknowledged that the incidence of such events is unknown but was critical of the chiropractic profession and questioned the safety of spinal manipulation. Tuchin [11] subsequently replicated the study conducted by Ernst[13] and reported numerous errors and omissions that brought into question the validity and conclusions of the study. These errors and omissions included misrepresentation of the long term response of the patient to the adverse event, incorrectly assigning a chiropractor as the treatment provider, and omitting to report the plausible alternative explanations for why an event may have occurred.[11]

The consistent message from these reviews appears to be that minor soreness can occur relatively frequently after chiropractic adjustments, but serious adverse events are rare, so rare that it is impossible to make accurate assumptions about how common they are.

Cause or Association?

One issue that confounds many of the studies included in these systematic reviews is that reported adverse events associated with chiropractic care may not be caused by the care itself. Walker, et al. [15] conducted a randomised controlled trial that investigated the frequency of adverse events from chiropractic care compared to a benign sham treatment. No serious adverse events occurred during this trial, but a number of events that were termed either minor or severe were reported. There was no significant difference in the frequency of adverse events that occurred in the chiropractic vs sham groups and the authors concluded that 'a substantial portion of adverse events after chiropractic treatment may result from natural history variation and nonspecific effects.'[15]

Case-control studies that have investigated a potential link between chiropractic care and vertebral artery dissection have come to the same conclusion.[35] [36] In 2009 Cassidy, et al. [35] published a case-control and case-crossover study that investigated the association between chiropractic visits or primary care physician visits and subsequent vertebrobasilar artery (VBA) stroke. They reported on 818 VBA strokes in a population of more than 100 million person-years. They found that in patients under the age of 45 who had suffered from a VBA stroke there was a positive association with chiropractic visits before the stroke occurred. However, they also found the same association existed with primary contact physician visits prior to the stroke. In patients over the age of 45 there was no association between chiropractic care and VBA stroke. They concluded that the increased risk of VBA artery stroke associated with chiropractic and primary contact physician visits is likely due to patients with headache and neck pain from VBA dissection seeking care before the

stroke occurred, and not as a result of the chiropractic care itself.[35] This conclusion was supported by a similar large scale study conducted by Kosloff, et al. [36] that included 1,829 VBA artery strokes amongst almost 40 million health plan members in the USA over a 3 year period. Kosloff et al reported no significant association between chiropractic care and the risk of VBA stroke, even in those under the age of 45, but they did find a significant association between primary contact physician visits and VBA stroke.[36] Like Cassidy, et al. [35] they concluded that this association was likely due to the patients seeking care for headache and neck pain symptoms that were in fact related to the early stages of arterial dissection.[36]

Chiropractic care has also been implicated as a potential cause of internal carotid artery (ICA) dissection.[37] A recent systematic review appraised the literature relating to cervical spine manipulation and ICA dissection.[37] The authors found no epidemiological studies that measured the incidence of ICA dissection following cervical spine manipulation, no studies were found that concluded cervical spine manipulation is linked to ICA dissection, and it is unknown if chiropractic care is any safer or more dangerous than any other healthcare intervention when it comes to ICA dissection.[37]

Treatment Data from ACC and Related Schemes

A review of treatment injury data from the ACC in New Zealand revealed that there were 283 treatment injuries associated with chiropractic care over a 10 year period, or 28.3 injuries per year.[38] Based on the average number of practicing chiropractors over this time period, this equates to one treatment injury every 15 years in practice for a chiropractor in New Zealand.[38] [39] In comparison there were 8175 treatment injuries associated with general practice over this same 10 year period which equates to one treatment injury every 4 years per general practitioner in New Zealand.[12] [38] With the average chiropractor in New Zealand performing approximately 6000 consultations per year these estimates suggest there is roughly one treatment injury for every 90,000 chiropractic consultations in New Zealand.[38] [40] The majority of the treatment injuries attributed to chiropractic care were a strain or sprain (64%), followed by spinal injury (9.5%), bruising (5.3%), nerve injury (4.6%), and a fracture (4.6%).[38] Of the 2374 sentinel or serious events that were reported to the Director General of Health over this same 10 year period only 10 of them were chiropractic events.[41] This extrapolates to approximately one serious or sentinel event for every 2.5 million chiropractic consultations in New Zealand.[40] [41]

Similar treatment injury risks have been made in Scandinavia.[9] Denmark and Norway have central agencies that are similar to the ACC that are responsible for

assessing patient compensation claims associated with care provided by registered health professionals.[9] A recent study reported on the number of claims following consultation with a chiropractor in Denmark and Norway between 2004 and 2012.[9] Three hundred claims were analysed in this report, only 41 of which were approved to receive compensation. The most frequent complaint category was for cases where symptoms worsened following treatment (30%), followed by alleged disc herniation (19%) and delayed referral (15%). The authors of this study reported that many of the claims were filed because of unrealistic expectations of treatment or because the clinician had failed to inform the patient about commonly occurring benign reactions to treatment.[9] This supports the previous research already mentioned that suggests many of the adverse events for which claims were lodged were due to non-specific effects or natural history variation.[9 15] Based on the claims that were analysed the authors calculated that approximately one compensation claim is made for every 100,000 consultations performed by chiropractors in these countries. If only accepted claims are considered, there is approximately one compensable adverse event for every 730,000 chiropractic consultations performed in Denmark and Norway, which is lower than the rates observed for both general practitioners and physiotherapists.[9]

The Safety of Chiropractic Care for Children

Recently, the safety of chiropractic care for children has received a significant amount of international attention.[42 43] One reason for this attention was due to a social media outcry in Australia that followed a video emerging online of a chiropractor adjusting a 2-week-old baby. Interestingly, the mother of the baby reported benefit from the chiropractic care, however a number of online commentators claimed that what the chiropractor did was unsafe and was not evidence based. The Victorian Minister of Health then announced that she was calling for a review[42] into chiropractic care for children and that '*we won't rest until babies are protected from practices we know to be harmful, and that we can be sure children under 12 are not being exposed to harm.*' This was a somewhat unusual statement to make before the review had taken place and suggested that the review may be biased and would potentially be based on a political agenda.

The Safer Care Victoria 'review of harm' reported that an extensive search was undertaken to identify evidence of harm sustained by children who had received spinal manipulation. This included a literature review performed by Cochrane Australia, as well as a public campaign that sought to capture patient complaints and

practitioner notification data from Australian complaints and regulatory agencies, as well as insurance claim data for registered chiropractors, and stakeholder feedback.

Following this comprehensive review of harm, the panel concluded that "*This extensive search identified very little evidence of patient harm occurring in Australia. In particular, there were no patient complaints or practitioner notifications that arose from significant harm to a child following spinal manipulation.*" The only harm they identified was 3 individual case reports related to spinal manipulative techniques performed outside of Australia and not limited to chiropractors. The panel also stated that practices described in these reports were not reflective of Australian chiropractic techniques. In their report, they did include the caveat that this doesn't mean spinal manipulation in children is not associated with any risk of any adverse effects. They pointed out that their review did identify transient or minor adverse events, such as crying or soreness after chiropractic care, but even for these minor adverse events, the prevalence was very low.

One interesting aspect of this Safer Care Victoria review was the panel also conducted a survey of parents and guardians of children who had accessed chiropractic spinal care, to explore their experiences, both positive and negative. They received 21,824 responses from members of the public who had accessed chiropractic care for a child under 12 years. Of these parent responses, 99.7% reported a positive experience with the chiropractic care of their children. A very small minority of respondents – 0.3% (74) – reported a negative experience. These experiences mostly related to concerns about the cost of treatment with no improvement in the condition, excessive use of X-rays, or perceived pressure to avoid medications or advice previously provided by other practitioners, including medical practitioners.

The results of this review support the conclusions from a number of studies published over recent years that have investigated the safety of chiropractic care for children and infants. [43-48] These studies overwhelmingly suggest that chiropractic care can be safely provided to even the youngest members of our society.[6 12 33 44-46]

In 2009 a study was published by Alcantara, et al. [44] that reported the results of a survey conducted through a chiropractic practice based research network. This survey included almost 5,500 chiropractic office visits for children up to the age of 18. From these visits there were only 3 reported adverse events which were described as muscle or spine stiffness or soreness following chiropractic care. All cases were self-limiting and the patients continued under care.[44]

In 2011, Doyle [46] published a review on the safety of paediatric chiropractic care. In this review Doyle searched the literature up until 2010 for articles that reported on the safety or adverse events associated with paediatric chiropractic care. The results of this literature review suggested about one in every 100 or 200 children who see a

chiropractor will experience a mild adverse event. With a mild adverse event meaning irritability or soreness lasting less than a day that requires no additional treatment to resolve.[46] The review identified a small number of serious adverse events that have been reported in the literature. The most recent of these reported events had occurred more than 30 years prior to the publication of the review, so details regarding identified cases were difficult to corroborate. The cases tended to involve children with significant pre-existing conditions and treatment options that don't conform to usual chiropractic care.[46 49]

In 2014, Todd, et al. [45] published a literature review of adverse events due to chiropractic care and other manual therapies for infants and children. In their review, Todd, et al. discussed seven serious adverse events in children or infants that were reported to be associated with chiropractic care. These were the same adverse events that Doyle [46] included in his review. The conclusion that Todd, et al. came to was that chiropractors should modify their techniques to suit the age, anatomy, and unique physiology of their young patients.[45]

In 2019, Driehuis et al[47] published a systematic review of spinal manual therapy in infants, children and adolescents. With respect to harm, the conclusions of this review were that "*severe harms were relatively scarce, poorly described and likely to be associated with underlying missed pathology. Gentle, low-velocity spinal mobilizations seem to be a safe treatment technique in infants, children and adolescents.*" Also in 2019, Parnell Prevost et al [48] published a comprehensive review of manual therapy for the paediatric population. They reported that "*no lasting or significant adverse events were reported for children receiving any form of manual therapy.*" In 2020, Corso et al [43] conducted a review of the safety of spinal manipulative therapy in children under 10 on behalf of the College of Chiropractors of British Colombia. They reported that "*the risk of moderate and severe adverse events is unknown in children treated with SMT.*" They came to this conclusion because they could find so little evidence of serious harm that they couldn't make any accurate assessment of what that risk may be.

Summary

The key finding from this review of the safety of chiropractic care is that chiropractic care is associated with a very low risk of serious adverse events.[10 16] The risks are so rare that they cannot be accurately estimated. [10 16] Of the risk estimates that have been made, most suggest that a serious adverse event associated with chiropractic care may occur perhaps every several hundred thousand chiropractic visits.[9 10] Like any healthcare intervention, some adverse events do occur that are associated with chiropractic care.[9] These adverse events are generally benign and transitory[10] and

don’t detract from the high levels of patient satisfaction associated with chiropractic care.[4 44]

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