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By courier

November 23, 2016

Mr. Neil Duboff, Chair
Health Professions Advisory Council
c/o 300 Carlton Street
Winnipeg, MB
R3B 3M9

Dear Mr. Duboff;

Re: Reserved Act #15

Thank you for providing our Association with the additional time requested, which has given us the opportunity to provide the thoroughly researched submission attached.

We enclose six copies of our submission in response to your request of September 8, 2016. Should your council require additional information or clarification, please feel free to contact us accordingly.

At your earliest opportunity, we look forward to receiving your advice and direction with respect to your anticipated timeline to complete your review.

Respectfully,

[redacted]
Redacted to protect privacy

Taras Luchak
Executive Director

The mission of the MCA is to foster and ensure the highest standard of chiropractic healthcare for all Manitobans.

Manitoba Chiropractors Association

Submission to the Health Professions Advisory Council

November 17th, 2016

HPAC SUBMISSION

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SUBMISSION of the Manitoba Chiropractors Association

November 17, 2016

In response to the request of The Health Professions Advisory Council dated September 8, 2016

Introduction

By way of your letter dated September 8, 2016, the Manitoba Chiropractors Association has been invited to provide written input on issues related to "the performance of high neck manipulation by regulated health professionals".

We welcome the opportunity to present credible and factual information which will assist your Council in their review. Our submission includes a narrative review, together with attached academic literature, scientific studies and analysis. Our goal is to provide the Council with the necessary evidence to allow the Council to determine, unequivocally the following:

That, when it is determined by a chiropractor to be an appropriate modality of treatment, the administration of a high velocity, low amplitude thrust to move a joint of the spine within its anatomical range of motion, along the full range of the human spine, is a prudent, rationally safe, and scientifically founded procedure.

Manitoba Chiropractors Association

Mission Statement: *The Mission of the MCA is to foster and ensure the highest standard of chiropractic healthcare for all Manitobans.*

As the professional regulatory body that oversees the practice of chiropractic in Manitoba, the primary responsibility of the Manitoba Chiropractors Association (MCA) is to protect the public interest.

What is Chiropractic?

The Scope of Practice of Chiropractic is the range of responsibilities, education, clinical experience/expertise and reserved actions that determine the boundaries within which a chiropractor practices in the province of Manitoba under The Chiropractic Act of Manitoba (to be replaced by the Regulated Health Professions Act).

Chiropractic is a primary contact health care discipline which emphasizes the body's inherent recuperative nature and ability to heal. The practice of chiropractic acknowledges the relationship between structure (primarily the spine, and the extremities) and function (as coordinated by the nervous system) and how that relationship affects the preservation and restoration of health and healing. Chiropractic uses a neuro-musculo-skeletal model to evaluate, diagnose and manage patient care through the use of specific adjustive techniques and

ancillary/adjunctive procedures. Chiropractors are trained to recognize and identify conditions where collaborative care with and/or referral to other health care providers is appropriate. The mainstays of chiropractic care are proper exercise, lifestyle, nutrition and spinal health through healthy living practices.

Regulated Health Professions Act (RHPA)

As part of the transition to the RHPA, the MCA will be outlining Reserved Acts being sought to be performed by licensed chiropractors. The MCA will be submitting a list which is based on the current scope of practice in Manitoba, and includes the Reserved Acts that are all currently being performed by chiropractors in Manitoba. This summary is helpful to delineate the current wide range of modalities and reserved actions that a chiropractor is trained to undertake.

Summary of the pending submission of the MCA related to reserved actions being sought under the RHPA by reference to Reserved Acts as defined (where noted, sections within a reserved act that are not being sought are indicated by ~~strikethrough~~):

Reserved Act #:

1. *Making a diagnosis and communicating it to an individual or his or her personal representative in circumstances in which it is reasonably foreseeable that the individual or representative will rely on the diagnosis to make a decision about the individual's health care.*

2. *Ordering or receiving reports of screening or diagnostic tests.*

3. *Performing a procedure on tissue*
   (a) below the dermis;
   (b) below the surface of a mucous membrane.

4. *Inserting or removing an instrument or a device, hand or finger*
   (a) into the external ear canal;
   (b) beyond the point in the nasal passages where they normally narrow;
   (c) beyond the pharynx;
   (e) beyond the labia majora;
   (f) beyond the anal verge.

5. *Administering a substance*
   (b) by inhalation;
   (d) by irrigation.

10. *Applying or ordering the application of*
    (a) ultrasound for diagnostic or imaging purposes, including any application of ultrasound to a fetus;
    (b) electricity for
    (vii) electromyography,
    (ix) nerve conduction studies,

(c) electromagnetism for magnetic resonance imaging;
(d) other non-ionizing radiation for the purpose of ~~(cutting or destroying tissue)~~ medical imagery;
(e) X-rays or other ionizing radiation for diagnostic imaging ~~(or therapeutic purposes)~~, including computerized axial tomography, ~~positron emission tomography and radiation therapy~~.

12. Setting or casting a fracture of a bone or a dislocation of a joint.

13. Putting into the external ear canal, up to the eardrum, a substance that
(a) is under pressure.

15. Administering a high velocity, low amplitude thrust to move a joint of the spine within its anatomical range of motion.

17. Prescribing, dispensing or verifying a vision appliance.

19. Prescribing, dispensing or fitting a dental appliance.

21. In relation to allergies,
(a) performing challenge testing by any method; or
(b) performing desensitizing treatment by any method.

Notably, Reserved Act 15 (*Administering a high velocity, low amplitude thrust to move a joint of the spine within its anatomical range of motion),* is within the scope of practice of chiropractors in every Canadian jurisdiction, without any limitation as to specific location along the spine.

Chiropractic Competency Profile

Attached to this submission **(appendix 1)** is a Chiropractic Competency Profile. This document summarizes the key competencies of a licensed chiropractor in Manitoba. It includes Clinical Practice Proficiencies. As experts in neuromusculoskeletal function and health, chiropractors integrate all of the aspects of their education, training and clinical experience to enhance the promotion, improvement, and maintenance of the health and well-being of Manitobans.

World Health Organization

The World Health Organization issued a 2005 document entitled *WHO guidelines on basic training and safety in chiropractic* **(appendix 2).** The goal of the document was to "create the conditions for the correct and appropriate use of methods which, if used correctly, can contribute to the protection and enhancement of citizens' health and wellbeing." Part II of the guidelines deals with the safety of spinal manipulative therapy and the contraindications to its use.

- *Please note that all page references which follow refer to our compilation in this submission as opposed to page numbering on the original documents.*

The WHO study (page 69) states:

Incidents and accidents that result from manipulative therapy ***can be prevented*** *by careful appraisal of the patient's history and examination findings. Information must be sought about coexisting diseases and the use of medication, including long-term steroid use and anticoagulant therapy. A detailed and meticulous examination must be carried out. The use of appropriate techniques is essential, and the chiropractor must avoid techniques known to be potentially hazardous.*

The WHO review notes that chiropractic is safe and effective for the prevention and management of a number of health problems. There are known risks and contraindications to manual therapy identified in the review, however the overarching conclusion is that these risks do not outweigh the potential benefits of chiropractic treatment, and in particular, the techniques of adjustment, manipulation and mobilization.

The WHO study (page 43):
Chiropractic is one of the most popularly used forms of manual therapy. It is now practised worldwide and regulated by law in some 40 national jurisdictions.

As a health care service, chiropractic offers a conservative management approach and, although it requires skilled practitioners, it does not always need auxiliary staff and therefore generates minimal add-on costs. Therefore, one of the benefits of chiropractic may be that it offers potential for cost-effective management of neuromusculoskeletal disorders."

More specific reference to this review will be noted in the discussion of Reserved Act #15 to follow.

Reserved Act #15

As part of the conversion to the RHPA, the MCA will be seeking the inclusion (in essence a continuation) of this Reserved Act. Namely:
15. Administering a high velocity, low amplitude thrust to move a joint of the spine within its anatomical range of motion.
This modality is currently performed on a daily basis by chiropractors in Manitoba.

In any interaction with a patient, there are a number of carefully documented steps which include an examination, diagnosis, treatment plan and informed consent.

Chiropractic patients in Manitoba receive care from chiropractors in a manner which is required to be consistent with the *Patient Charter of Rights* **(appendix 3).**

In particular, patients have the right and expectation to:

- Participate in discussions and decisions with their chiropractor regarding their chiropractic care, and;
- Receive clear information from their care provider about:
    a) Their diagnosis, prognosis and the proposed treatment plan

b) Other options for care including referral to other health care providers or other chiropractors if appropriate
c) Any significant risks associated with the proposed treatment.

The MCA has issued Standard of Practice S-05 **(appendix 4)** which contains the following excerpt related to "informed consent":

Part II - Informed Consent
Written informed consent must be obtained from the patient. A patient must be provided an opportunity to ask questions. Consent can be withdrawn by a patient at any time.
□ *Disclosure and discussion of potential risks and benefits, especially material risks based on the patient's situation as well as alternatives to the proposed treatment*
□ *Subjective assessment by the practitioner that the patient in question has the capacity to understand the information provided and form a reasonable judgment as to consent*
□ *The material is presented in such a fashion that the patient is not subjected to external pressure or undue influence*
□ *There must be the opportunity for the patient to ask questions and discuss any concerns that may arise at that time or into the future*

Based on the diagnosis, treatment plan and informed consent, where appropriate, the chiropractor will perform the action contemplated in Reserved Act #15. Chiropractic terminology uses the term "adjustment" for this treatment modality. Other professions will often use the phrase "manipulation". In the assorted studies and materials attached to this submission, these terms will often be used interchangeably, but in most circumstances will be making reference to the treatment described in Reserved Act #15.

Through the review of the studies and research which follows, it is our assertion that the evidence is clear. Chiropractic adjustments are of benefit to patients in the appropriate circumstances, particularly with respect to neck pain. The review of literature attached will show that this form of treatment is more effective for acute and sub-acute neck pain, over both the short and long term, than management with non-steroidal anti-inflammatory drugs.

Neck Adjustments – Evidence Informed Treatment

It is a fundamental tenet of chiropractic that the adjustment of the spine is an efficient and safe modality which facilitates the patient's body to experience optimum health. We attach a series of appendices which outline the value of spinal adjustment, particularly with respect to neck adjustment targeting neck pain and headaches.

(See appendices 5-8)

WHO guidelines on basic training and safety in chiropractic (2005) **(appendix 9)**

There are significant statements made in the WHO review which are relevant to the HPAC review concerning spinal adjustment as contemplated by Reserved Act #15, and in particular, "high neck manipulation" [sic].

The following excerpts from the World Health Organization review are notable:

Contraindications to spinal manipulative therapy (page 62)

Contraindications to spinal manipulative therapy range from a nonindication for such an intervention, where manipulation or mobilization may do no good, but should cause no harm, to an absolute contraindication, where manipulation or mobilization could be life - threatening. In many instances, manipulation or mobilization is contraindicated in one area of the spine, yet beneficial in another region (23). For example, hypermobility may be a relative contraindication to manipulation in one area of the spine, although it may be compensating for movement restriction in another where manipulation is the treatment of choice (24, 25). Of course, the chiropractor's scope in manual therapy extends beyond the use of manipulation or mobilization and includes manual traction, passive stretching, massage, ischaemic compression of trigger points and reflex techniques designed to reduce pain and muscle spasm. Successful spinal mobilization and/or manipulation involves the application of a force to the areas of the spine that are stiff or hypomobile, while avoiding areas of hypermobility or instability (26).

There are a number of contraindications to joint mobilization and/or manipulation, especially spinal joint manipulation, which have been reviewed in practice guidelines developed by the chiropractic profession (27, 28) and in the general chiropractic literature (29, 30, 31). These may be absolute, where any use of joint manipulation or mobilization is inappropriate because it places the patient at undue risk (23, 32:290 - 291), or relative, where the treatment may place the patient at undue risk unless the presence of the relative contraindication is understood and treatment is modified so that the patient is not at undue risk. However, spinal manipulative therapy, particularly low - force and soft - tissue techniques, may be performed on other areas of the spine, depending upon the injury or disease present. ***Clearly, in relative contraindications, low - force and soft - tissue techniques are the treatments of choice, as both may be performed safely in most situations where a relative contraindication is present.***

Spinal manipulative therapy is the primary therapeutic procedure used by chiropractors, and because spinal manipulation involves the forceful passive movement of the joint beyond its active limit of motion, chiropractors must identify the risk factors that contraindicate manipulation or mobilization (19, 20, 21).

Absolute contraindications to spinal manipulative therapy

The review contains a list of twenty-one absolute contraindications to spinal therapy on page 63. A review of contraindications to joint adjustment by category of disorder begins on page 64. Chiropractors are trained to recognize contraindications, and to apply appropriate treatment dependent on the circumstances. They are trained to mitigate risk and maximize benefit to the patient through their choice of care.

Accidents and adverse reactions

The 2005 WHO document states the following (page 67):

*Manipulation is regarded as a **relatively safe, effective and conservative** means of providing pain relief and structural improvement of biomechanical problems of the spine. As with all therapeutic interventions, however, complications can arise. **Serious neurological complications and vascular accidents have been reported, although both are rare (43).***

(page 68)

5.4 Vascular accidents
*Understandably, vascular accidents are responsible for the major criticism of spinal manipulative therapy. **However, it has been pointed out that "critics of manipulative therapy emphasize the possibility of serious injury, especially at the brain stem, due to arterial trauma after cervical manipulation. It has required only the very rare reporting of these accidents to malign a therapeutic procedure that, in experienced hands, gives beneficial results with few adverse side effects" (43).***

*In very rare instances, the manipulative adjustment to the cervical spine of a vulnerable patient becomes the final intrusive act which, **almost by chance,** results in a very serious consequence (54, 55, 56, 57).*

The manipulation becomes the last of a series of events that are leading to an adverse outcome. While the decision to perform or not perform the act bears no effect on an inevitable result. The key statement made by the WHO is the phrase; "almost by chance". More recent studies which will be cited in this submission will show that vascular "incidents" are not **caused by** manipulative therapy, but rather **are already in play** prior to the adjustment taking place. **To use plain language, the latest and best evidence available suggests that there is only a coincidental connection between vascular incidents and manipulative therapy, i.e. the chiropractic adjustment of the spine, and particularly the cervical spine.**

As with any health care procedure undertaken by any regulated health care practitioner, there can be adverse results. Chiropractors are certainly no less vigilant than other health care practitioners in their goal to try to reduce the incidence of such an adverse result.

With respect to "incidence", the report states the following (page 68):

Vertebral artery syndrome attributed to cervical manipulation occurs in younger patients. The average age is under 40, and it occurs more often in women than men. In 1980, ***Jaskoviak estimated that five million treatments had been given at National College of Chiropractic clinics over a 15 - year period, without a single case of vertebral artery syndrome associated with manipulation*** *(58).*

While it is understood that the actual incidence of cerebral vascular injury could be higher than the number of reported incidents, estimates from recognized authorities in research in this area have varied from as little as one fatality in several tens of millions of manipulations (59), one in 10 million (60) and one in one million (61) to the slightly more significant "one important complication in 400,000 cervical manipulations" (62).

Chiropractors are extensively trained to diagnose conditions within their scope of practice and recognize those outside of their scope of practice. In appropriate cases, this will allow the chiropractor to refer a patient to an appropriate health care practitioner. Likewise, chiropractors are highly trained to recognize circumstances where a chiropractic adjustment is contraindicated.

Serious complications are very rare, and it would seem **unlikely that any of the adverse occurences have been solely attributable to the therapeutic intervention.**

As noted, the review speaks of the very rare incident reporting rate, and makes the important statement that it is **unlikely that the therapeutic intervention was the cause of the adverse occurrence.** This reinforces the opinion that what we are dealing with is coincidence, not cause.

It is important to note that the WHO document which we have referenced above was completed in 2005. Both evidence and practice has evolved since then. In particular, the most recent studies (which we will excerpt in the following pages) provide ever more convincing evidence that there is no **causal** connection between "stroke" and cervical adjustment.

What follows is a review of a series of scientific studies and papers on point. They specifically address the issue of chiropractic neck adjustment, dissections and stroke.

In research terminology, the sum of the papers will identify the conclusion, that at worst, there is a "temporal" connection between cervical adjustment and dissection of the cervical arteries that may lead to strokes. It is the assertion of the MCA that it is highly unlikely that there is a cause and effect link between spinal adjustment and strokes.

It is extremely rare for a stroke to occur contemporaneous to cervical adjustment; the evidence does not support a causal relationship between adjustment and cervical dissection and or stroke.

As part of the MCA's preparation for submission in the RHPA process, we conducted an environmental scan of other jurisdictions. We note that cervical adjustments are a regular practice (within scope) in all North American jurisdictions.

Summary of Research Reports & Studies

We invite your Council to review the studies which we have included and will excerpt as follows:

Risk of Vertebrobasilar Stroke and Chiropractic Care: Results of a Population-Based Case-Control and Case-Crossover Study (2008)

(appendix 10)

This study concludes that VBA (vertebrobasilar stroke) is a very rare event in the population. **The increased risks of VBA stroke associated with chiropractic and PCP (primary physician care) visits is likely due to patients with headache and neck pain from VBA dissection seeking care before their stroke.**

They found no evidence of increased risk of VBA stroke associated with chiropractic care compared to primary care.

The authors note the following:

Most cases of extracranial vertebral arterial dissection are thought to occur spontaneously. The true incidence of vertebrobasilar (VTB) dissection is unknown, since many cases are probably asymptomatic, or the dissection produces mild symptoms.

Because patients with VTB dissection commonly present with headache and neck pain, it is probable that patients seek medical or chiropractic care for these symptoms and that the subsequent VBA stroke occurs spontaneously, implying that the association between chiropractic care and VBA stroke **is not causal.**

The study notes that patients with head and neck pain due to vertebral artery dissection seek care for these symptoms, which precedes more than 80% of VBA strokes.

The results suggest that where previous studies may have suggested an **association** between chiropractic care and VBA strokes, that this is likely explained by **presenting symptoms** attributable to vertebral artery dissection. The review notes an **association** between stroke and chiropractic visits in those under 45 years of age, but also an **association** between stroke and the

use of a **primary care physician.** Once again, the point being made is that it was not a chiropractic adjustment that **caused** the stroke to occur.

For those 45 years and older, there was no **association** between chiropractic visits and stroke.

It is also interesting to note that other activities which have been "implicated" in VBA strokes include:

- Motor vehicle collision
- Shoulder checking while driving
- Sports
- Lifting
- Working overhead
- Falls
- Sneezing
- Coughing.

Chiropractic care and the risk of vertebrobasilar stroke: results of a case-control study in U.S. commercial and Medicare Advantage populations **(2015)**

(appendix 11)

The objective of this study was to compare the associations between chiropractic care and VBA stroke with recent primary care physician (PCP) care.

The findings showed no significant association between chiropractic visits and VBA stroke for the sample populations. The findings also showed that in 1/3 of the "stroke" cases, the chiropractic visit **did not include an adjustment.**

The study found no significant association between exposure to chiropractic care and risk of VBA stroke. They conclude that adjustment is an unlikely cause of VBA stroke. The positive **association** between **physician** visits and VBA stroke is most likely due to patient decisions to seek care for the symptoms (headache and neck pain) of the occurrence of VBA stroke. They suggest that using chiropractic visits as a measure of exposure to adjustment may result in unreliable estimates of the strength of association with the occurrence of VBA stroke.

Cervical Arterial Dissections and Association With Cervical Manipulative Therapy
A Statement for Healthcare Professionals From the American Heart Association/American Stroke Association **(2014)**

(appendix 12)

The study notes the following:

Patients with CD (cervical artery dissections) may present with unilateral headaches, posterior cervical pain, or cerebral or retinal ischemia (transient ischemic or strokes) attributable mainly to artery-artery embolism, CD cranial nerve palsies, oculosympathetic palsy, or pulsatile tinnitus.

Case-control and other articles have suggested an ***epidemiologic association*** *between CD, particularly vertebral artery dissection and cervical manipulative therapy.* ***It is unclear*** *whether this is due to lack of recognition of pre-existing CD in these patients or due to trauma caused by cervical manipulative therapy.*

The study, endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons repeats the theme of a possible "association" but no clear delineation of "cause". As previously stated the relationship is suggestive of concurrence not cause and effect.

Systematic Review and Meta-analysis of Chiropractic Care and Cervical Artery Dissection: No Evidence for Causation **(2016)**

(appendix 13)

The systematic review notes that case reports and case control studies have suggested an **association** between chiropractic neck adjustment and cervical artery dissection (CAD), but that a **causal relationship** has **not** been established.

The quality of the published literature on the relationship between chiropractic adjustment and CAD is very low. Their analysis shows a small **association** between chiropractic neck adjustment and cervical artery dissection. This relationship may be explained by the high risk of bias and confounding in the available studies, and in particular by the known association of neck pain with CAD and with chiropractic adjustment . **There is no convincing evidence to support a causal link between chiropractic adjustment and CAD. Belief** in a causal link may have significant negative consequences such as numerous episodes of litigation.

Internal Carotid Artery Strains During High-Speed, Low-Amplitude Spinal Manipulations of the Neck (Herzog, 2012)

(appendix 14)

The primary objective of this study was to quantify the strains applied to the internal carotid artery (ICA) during neck spinal manipulative treatments and range of motion. This study showed that the maximal ICA strains imparted by cervical spinal manipulative treatments were well within the normal range of motion. Chiropractic adjustment of the neck did not cause strains to the ICA in excess of those **experienced during normal everyday movements.** Therefore, cervical spinal manipulative therapy as performed by the trained clinicians in this study, did not appear to place undue strain on the internal carotid artery and thus **does not seem to be a factor in ICA injuries.**

Changes in vertebral artery blood flow following various head positions and cervical spine manipulation (2013)

(appendix 15)

The objective of this study was to investigate the cerebrovascular hemodynamic response of cervical spine positions including rotation and cervical spine manipulation in living patients using magnetic resonance imaging technology on the vertebral artery (VA).

The study concluded that there were **no significant changes in blood flow or velocity in the vertebral arteries** of healthy young male adults after various head positions and cervical spine adjustments.

Beliefs and Practice Patterns in Spinal Manipulation and Spinal Motion Palpation Reported by Canadian Manipulative Physiotherapists (2013)

(appendix 16)

This article is published by Physiotherapy Canada. It is interesting for a number of reasons. Firstly, it deals with "perception". i.e. what physiotherapists perceived on an anecdotal basis in a survey. The point to be garnered from this follows on the previous study above. Namely, that it is a **"belief"** (which research maintains is a mistaken belief) and **not a fact** that there is a causal link between manipulation/adjustment and stroke which has influenced their opinion.

It is human nature to be influenced by "perceptions", howsoever founded. This study by Physiotherapy Canada is instructive as to how powerful these perceptions can be. We acknowledge the existence of these points of view, and respectfully submit the best possible scientific reviews and evidence that is currently available on this topic.

The article concludes that the use of spinal manipulation/mobilization is prevalent by physiotherapists, but is less commonly used in the neck because of a **perceived association** with adverse events and a **lack of experience** associated with the physiotherapists surveyed.

From page 346 of the article:
*Spinal manipulation and mobilization are used to decrease pain and improve joint mobility and overall function. However, **media coverage** of the **association** between neck manipulation and adverse events has drawn public attention in Canada.*

What emerges from the article is a clear separation between perception and reality. The perception is that neck adjustment is dangerous. The reality is that there is no evidence of causal relationship between adjustment and stroke or other serious adverse event. Any connection is by "association" i.e. coincidence or concurrence.

Page 353 of the article highlights this dichotomy:

*"... international surveys of orthopaedic, manipulative physiotherapists show continued use of, and **confidence in**, manual assessment techniques to guide manual treatment interventions, including **spinal manipulation**. Cervical spinal manipulation has a low usage rate among international orthopaedic manipulative physiotherapists and is associated with a **fear** of adverse events."*

We recognize and encourage the need for caution in the exercise of separating fact from innuendo. In reviewing this study of perception by physiotherapists, it is critical to note the significant difference in training and expertise between physiotherapists and chiropractors with respect to spinal manipulation, and in particular, cervical spine adjustment.

As presented in the WHO document (which will be repeated in a following section dealing with chiropractic training), the recommended target for chiropractic training is not less than 4200 student/teacher contact hours. This is the equivalent of four years of full-time education, including not less than 1000 hours of supervised training. Three to four year pre-requiste requirements preclude this training.

International Journal of Stroke (2016)
Beauty parlor stroke revisited: An 11-year single-centre consecutive series

(appendix 17)

Fear of stroke is not limited to the modality of neck adjustment. One interesting example of anecdotal hypothesis is reviewed in this journal article.

The paper looks at a stroke during or shortly after a hairdresser visit. The paper notes that 12 of 500 consecutive "posterior circulation strokes" were likely related to a hairdresser visit. The presumed culprit being an impingement of the vertebral artery during neck rotation and hyperextension while shampooing as a mechanism.

Page 364:
*These strokes may be due to **chance** occurrence in some patients .... A lower rate of ... risk factors suggest possible mechanisms that are **causally** related to the hairdresser visit."*

"Our data are insufficient to suggest specific preventive recommendations to persons visiting the hairdresser."

Even with a possible causal connection, related to the rotation of the neck and head upon shampooing by a hairdresser, the authors in the International Journal of Stroke **do not suggest any remedial or preventative action**.

Journal of Electromyography and Kinesiology (2012)
Epidemiology: Spinal manipulation utilization

(appendix 18)

Page: 370
"Spinal manipulation is used around the world for mostly musculoskeletal conditions, primarily back and neck pain. Chiropractors, osteopaths, and physical therapists deliver the vast majority of spinal manipulation, which is often combined with other manual therapies, physical modalities, or exercise... Patients are generally very satisfied with care that includes spinal manipulation."

Case Report: Vertebral artery dissection in evolution found during chiropractic examination (2015)

(appendix 19)

This case illustrates the importance for all healthcare providers who see patients with neck pain and headache to be attentive to the symptomatic presentation of possible vertebral arterial dissection (VAD).

The studies and papers which we cite in this submission specifically reference the safety of neck adjustments when performed by chiropractors.

This concludes the section of excerpts related to research review and studies.

Performance of "high neck manipulation" [sic]

The HPAC letter of September 8th seeks commentary on the "the performance of high neck manipulation". This is not a phrase that the chiropractic community uses, nor are we comfortable with its use. We understand that the source of this phrase is from outside our profession, presented in a context with a negative connotation. As a result, we are hesitant to give this phrase any legitimacy by propagating its usage.

Reserved Act #15 adequately, and appropriately, addresses the act which is performed effectively and safely by the chiropractic profession. We choose not to engage in a "justification" exercise for "high neck manipulation" as the best available evidence to date suggests that there is no causal connection between the chiropractic adjustment and stroke, irrespective of the location in the cervical, thoracic or lumbar region. There is no rational distinction to delineate "low neck", "middle neck" or "high neck". The evidence presented verifies the safety and effectiveness of cervical adjustment.

Chiropractic Education and Competency Assessment

A typical doctor of chiropractic program includes an undergraduate University education as well as specific Doctor of Chiropractic training totally seven - eight years of intense study. This education includes classroom training, clinical skills development and evaluation.

Doctor of Chiropractic programs involve an intensive four -year academic program in anatomy, physiology, biomechanics, pathology, orthopedics, neurology, radiology (x-ray), chiropractic technique, philosophy, public health, nutrition, disease prevention, rehabilitation and more. Chiropractic students undergo hundreds of hours of **specialized training in spinal adjustments**. This extensive education and training prepares chiropractors to be skilled primary care providers.

In a 2009 survey of licensed chiropractors in Manitoba, 99% responded that this reserved act (#15) is performed as part of their practice on a daily basis.

The "adjustment" is regularly performed in every Canadian jurisdiction on a daily basis as governed by provincial regulatory frameworks and standards of practice.

Although spinal adjustments/manipulations are used by other health professions, no other health profession meets the same standard of education and training for the performance of a spinal adjustment. In addition, no other profession performs spinal adjustments as regularly as chiropractors. As with any clinical skill, the ongoing utilization builds the clinician's skills and abilities.

Referring once more to the World Health Organization publication (2005), the document outlines what the WHO has determined to be an acceptable level of education and training for someone to undertake the practice of chiropractic.

Page 51:

4.3 Basic training
Irrespective of the model of education utilized, for those without relevant prior health care education or experience, not less than 4200 student/teacher contact hours are required, or the equivalent, in four years of full-time education. This includes not less than 1000 hours of supervised clinical training.

Page 52:

5. Full chiropractic education – category I(B)
5.3 Basic training
The duration of the training depends upon the credits received from previous education and experience, but should not be less than 2200 hours over a two - or three year full - time or part - time programme, including not less than 1000 hours of supervised clinical experience.

Page 56:

6. Limited chiropractic education – category II(A)
6.3 Basic training
Although dependent upon the human resources available for health care, the entrance

requirement would normally be completion of university - level training as a health care practitioner.

The duration of training would be not less than 1800 hours over a two - or three - year full - time or part - time programme, including not less than 1000 hours of supervised clinical experience.

Page 57:

7. Limited chiropractic education – category II(B)

This refers to the programmes necessary for persons with limited training, who identify themselves as "chiropractors", to obtain minimum requirements for safe practice. In many countries, no formal requirements exist for minimum chiropractic education. This leads to the unqualified practice of chiropractic, which is undesirable for patient safety. These programmes prepare graduates to attain the minimal acceptable requirements for the safe practice of chiropractic.

7.3 Basic training

The duration of training is not less than 2500 hours in a full - time or part - time programme, including not less than 1000 hours of supervised clinical experience. For an example, see Annex 5.

The WHO has indicated that it is undesirable for patient safety that individuals be allowed to practice chiropractic (i.e. in particular spinal adjustment/manipulation) **without a minimum level of training**. They have identified a threshold of 2500 hours with not less than 1000 hours of supervised clinical experience. In addition, once completing this extensive curriculum, chiropractors are further assessed for competency by the CCEB prior to licensure in all Canadian Provinces and Territories.

The Canadian Chiropractic Examining Board (CCEB) assesses the competencies of chiropractors prior to licensure in all Canadian jurisdictions. These pan-Canadian exams ensure that successful examination candidates have met accepted levels of competencies to practice chiropractic in Canada. This psychometrically validated competency assessment evaluates an individual's skills in providing chiropractic care including but not limited to the performance of adjustments to the spine and extremities.

Contrary Opinion

[redacted]

We take very seriously the review that is being undertaken by your council. The administration of reserved act #15 (including cervical adjustment) is a key component of the practice of chiropractic in Manitoba, and throughout the world. Any notion that performance of this reserved act be challenged, requires us to provide this response, which by nature must be frank, pointed and factual. As such, our submission includes extensive research that clearly demonstrates that cervical adjustments are both safe and effective.

Redacted to protect privacy

This submission cites numerous articles, studies and research articles which contain evidence based conclusions. We anticipate that you may be in receipt of material from other sources. Should your committee be inclined to rely on any other alleged studies or research which purports contrary analysis to what we have presented, the MCA respectfully requests the opportunity to provide our own critique and rebuttal of any such material. We would fully expect that any of our research material may be assessed in a similar fashion. In this internet age, there are volumes of publications which are unreliable.

Summary

The MCA, its leadership and members take very seriously, our responsibility to protect the public interest. Should the MCA receive credible evidence that a procedure is not warranted, as the degree of potential risk outweighs its value, then the MCA, as a responsible regulatory body, would seek to discontinue the practice of that procedure in question.

Millions of neck adjustments are performed in Canada each year, safely and without incident all while providing significant benefit to the patient.

There have been studies which suggest a coincidental (not causal) relationship between cervical spinal adjustment and stroke. **There are no studies establishing a causal relationship.** Older studies (including the 2005 WHO review) reached the same conclusion but were **less definitive** than the most recent materials we have presented herein.

Manitoba standards require each and every chiropractor to undertake a diagnosis, treatment plan and informed consent with a patient. In appropriate cases, a spinal adjustment is then performed. A chiropractor is trained to identify when a spinal adjustment is contra-indicated.

With respect to relative safety, other forms of health care interventions carry a far higher level of risk as compared to a spinal adjustment. The long term use of over the counter pain relievers, as well as opioids, have far greater adverse consequences.

Chiropractic is a safe and effective way to treat a variety of ailments. Neck adjustment, in particular, is an effective treatment for headache, neck and back pain.

Manitoba chiropractors have extensive training and education which enable them to perform reserved act #15. Without question, chiropractors are the health professional with the most extensive training and education with regards to the performance of spinal adjustments.

We welcome the opportunity to address any questions that may arise from our submission. Likewise, we respectfully request the opportunity to refute any material, which allegedly contradicts the facts presented in this submission.

Appendix 1

Introduction

The practice of chiropractic in Manitoba is both diverse and developing. Changes in the nature of practice opportunities, advances in evidence -informed practice as well as changes in healthcare landscape/legislation have allowed for an ongoing evolution of the practice of chiropractic in Manitoba.

This document provides valuable insight to stakeholders and the general public as to the roles, expertise and background of chiropractors in Manitoba.

Chiropractic in Manitoba

This document describes the essential core competencies, (i.e., the knowledge, skills, attitudes etc.) required by chiropractors in Manitoba at the beginning of and throughout their career. It also provides guidance for stakeholders to better understand the depth of knowledge and reach of the practice of chiropractic in Manitoba. This document clearly lays out the scope of practice, competencies, role, and entry requirements for chiropractors in Manitoba.

What is Chiropractic?

Scope of Practice.

The practice of chiropractic is a primary care health profession in which a chiropractor provides health care to promote, maintain and restore health and well-being by means of:

(a) Assessment of the spine and nervous system, and other joints of the body, extremities and associated tissues (the neuromusculoskeletal system) as they relate to the general health of an individual.

(b) Diagnosis and treatment of neuromusculoskeletal system disorders, diseases and conditions through chiropractic adjustment of the spine or the joints of the body, extremities, and the associated tissues by hand or by device and the use of additional supportive procedures.

(c) Advice and counselling on matters related to the condition of the neuromusculoskeletal system or other joints of the body, extremities and their associated tissues, and the general health of the individual.

The Practice of Chiropractic.

(1) Chiropractors are primary health care providers who consult and collaborate and provide quality patient-centred services. Chiropractors maximize human function and improve the quality of life by keeping people productive throughout their lives. Chiropractors prevent, assess, and treat the impact that injury, pain, disease and/or disorders have on clients' movement, function and health status.

(2) Chiropractors work within a variety of diverse contexts of practice including consideration of the types of patients, areas of-practices, types and goals of chiropractic care, practice settings and funding models. The contexts of practice are interrelated and also influence the roles and competencies that individual chiropractors require to practice safely and effectively. Chiropractors practice both independently and as part of inter-professional teams throughout the health system.

(3) Basic tenets exist that apply to the practice of chiropractic regardless of the role of the chiropractor:

a. Chiropractic care is patient centered care.

b. Informed consent is of paramount importance.

c. Patient care is evidence -informed

d. Patient safety is at the forefront

What is a Chiropractor ?

1. Expert: As experts in neuromusculoskeletal function and mobility, chiropractors integrate all of the aspects of their education, training and clinical experience to enhance the promotion, improvement, and maintenance of the health and well-being of Canadians.

2. Teacher: Chiropractors use effective communication to develop professional relationships with patients, families, care providers, and other stakeholders.

3. Collaborator: Chiropractors work collaboratively and effectively to achieve optimal patient care.

4. Administrator: Chiropractors manage time, resources, and priorities both on a patient care level as well as a business level.

5. Advocate: Chiropractors use their knowledge and expertise to promote the health and wellbeing of individual patients as well as communities and populations.

6. Academic: Chiropractors are committed to ongoing learning for the purpose of improving patient outcomes.

7. Professional: Chiropractors are committed to the best interests of patients and the general public through ethical standards of practice, self regulation, and high personal standards of behaviour.

Key Competencies

1. Expert

As experts in neuromusculoskeletal function and mobility, chiropractors integrate all of the aspects of their education, training and clinical experience to enhance the promotion, improvement, and maintenance of the health and well-being of Canadians.

Key Competency		Enabling Competencies	
1.1	Consults with the patient to obtain information about his/her health, associated history, previous health interventions, and associated outcomes.	1.1.1	Collects and reviews background information relevant to the patient's health.
		1.1.2	Determines the patient's expectations related to Chiropractic care and adjunctive therapy.
		1.1.3	Collects and reviews health information about the paitent from other sources where applicable. (e.g., other sources may include previous health records, other health care practitioners, professional colleagues, or family).
		1.1.4	Collects and reviews information related to the patient's prior functional abilities, physical performance, and participation.
		1.1.5	Identifies the patient's personal and environmental factors affecting his/her functional abilities, physical performance, and participation.
1.2	Collects physical examination and history data relevant to the patient's needs and standards of Chiropractic practice.	1.2.1	Selects quantitative and qualitative methods and treatment measures based on evidence-informed practice.
		1.2.2	Informs the patient of the nature and purpose of examination as well as any associated risk.
		1.2.3	Safely performs a chiropractic examination, taking into account patient consent, known indications, limitations and risk-benefit considerations.

	1.2.4	Monitors the patient's health status for significant changes during the course of examination and takes appropriate actions as required.
1.3	Analyzes physical examination and history findings.	1.3.1 Identifies the nature and extent of the patient's impairments, activity limitations, and participation restrictions within the context of the patient's needs.
		1.3.2 Identifies environmental and personal supports and barriers relevant to the patient.
		1.3.3 Assesses the correlation or lack there of, of the physical examination and personal history findings.

Key Competency		Enabling Competencies	
1.4	Establishes a diagnosis and prognosis.	1.4.1	Formulates a diagnosis based on the analysis of patient history and exam findings.
		1.4.2	Identifies the need for and potential value of intervention by a Chiropractor.
		1.4.3	Discusses diagnosis and prognosis with the patient (and other health professionals where warranted).
1.5	Develops and recommends a treatment strategy.	1.5.1	Establishes and prioritizes, with the patient, expected outcomes based on the history and exam findings.
		1.5.2	Recommends a service approach consistent with the patient's needs, goals and all available resources.
		1.5.3	Identifies when chiropractic services are not required or indicated and refers for other care as appropriate.
		1.5.4	Establishes patient specific treatment goals.
		1.5.5	Selects treatment that are evidence-informed and consistent with the patient's goals, general health status and functional needs.
1.6	Implements care.	1.6.1	Orients the patient to the practice setting and provides information about relevant service/policies (e.g., location, duration, frequency, cost; introduce patient to all staff involved in their care; expected completion of service).
		1.6.2	Performs chiropractic treatment in accordance with patient informed consent in a safe and effective manner.
		1.6.3	Determines the patient's need for supervision and implements appropriate monitoring during certain interventions.
		1.6.4	Educates the patient about health promotion, self-management, and relevant services with respect to his/her unique condition.
		1.6.5	Maintains continuity in care, where resources permit (e.g., communicates with Chiropractors and other health professionals who share responsibility for service delivery; arranges for substitute service, as appropriate).

Key Competency		Enabling Competencies	
1.7	Evaluates the effectiveness of interventions.	1.7.1	Discusses with the patient, the nature, purpose and results of ongoing assessment.
		1.7.2	Monitors patient responses and changes in status during the interventions and modifies treatment accordingly.
		1.7.3	Evaluates the effectiveness of the treatment strategy on an ongoing basis.
		1.7.4	Consults with the patient to redefine goals and modifies or discontinues treatment as necessary.

2. Teacher

Chiropractors use effective communication to develop professional relationships with patients, families, care providers, and other stakeholders.

Key Competency		Enabling Competencies	
2.1	Develops, builds, and maintains rapport, trust, and ethical professional relationships through effective communication.	2.1.1	Demonstrates sensitivity to the uniqueness of others.
		2.1.2	Listens effectively and facilitates discussion to ensure reciprocal exchange of information.
		2.1.3	Demonstrates an awareness of self-behaviours and the responses of others and adapts communications appropriately.
		2.1.4	Respects confidentiality, privacy and autonomy.
2.2	Elicits, analyzes, records, applies, conveys and shares information.	2.2.1	Seeks out and gathers information from patients and others to assist in shared and informed decision-making.
		2.2.2	Encourages and asks clarifying questions.
		2.2.3	Provides information and responds to questions in a truthful, objective, sensitive, empathic, and respectful manner.
2.3	Employs effective and appropriate verbal, non-verbal, written, and electronic communications.	2.3.1	Produces and maintains legible, accurate, and appropriate records, in keeping with regulatory requirements (e.g., may be written or electronic and relate to patients or equipment).
		2.3.2	Effectively presents information about patient care and Chiropractic treatment.

3. Collaborator

Chiropractors work collaboratively and effectively to achieve optimal patient care.

Key Competency		Enabling Competencies	
3.1	Establishes and maintains inter professional relationships, which foster effective patient-centered collaboration.	3.1.1	Demonstrates an understanding of and respects the roles, responsibilities and differing perspectives of team members.
		3.1.2	Integrates knowledge and understanding of the Chiropractor role and the roles of others in providing patient-centred care.
		3.1.3	Consults and shares relevant information with patients, other health professionals, and all relevant individuals or groups in a timely manner.
		3.1.4	Promotes active and informed shared decision making.
		3.1.5	Fosters collaboration with relevant others.
3.2	Collaborates with others to prevent, manage and resolve conflict.	3.2.1	Identifies the issues that may contribute to the development of conflict between the Chiropractor and patient or between team members (e.g., recognizes that one's own beliefs, perceptions, and values may contribute to inter professional tension).
		3.2.2	Addresses conflicts in a timely manner.
		3.2.3	Demonstrates a respectful attitude towards other colleagues and members of an inter professional team.
		3.2.4	Employs collaborative techniques to resolve conflicts.

4. Administrator

Chiropractors manage time, resources, and priorities both on a patient care level as well as a business level.

Key Competency		Enabling Competencies	
4.1	Manages individual practice effectively.	4.1.1	Understands the structure, funding and function of the health system as it relates to Chiropractic practice.
		4.1.2	Provides services considering patient needs and allocation of available human, physical and financial resources.
		4.1.3	Sets priorities and manages time for provision of patient services and general Chiropractic practice delivery.
		4.1.4	Balances time for work, professional activities, and personal responsibilities.
4.2	Manages and supervises personnel involved in the delivery of Chiropractic care.	4.2.1	Assesses, orients, and provides ongoing feedback and continuing education to personnel involved in the delivery of Chiropractic care.
		4.2.2	Assigns tasks to, and monitors, personnel acting within established regulatory guidelines.
		4.2.3	Accepts responsibility for actions and decisions of those for whom the Chiropractor is accountable.
4.3	Participates in activities that contribute to safe and effective Chiropractic practice.	4.3.1	Anticipates, recognizes, and prevents hazards in the physical environment (e.g., infection prevention and control; hazardous waste; electrical safety; equipment).
		4.3.2	Delivers Chiropractic care in a safe physical environment for self, other team members, and staff.
		4.3.3	Promotes patient safety in the selection and application of assessment, intervention and evaluation measures.
		4.3.4	Participates in quality improvement and patient safety initiatives.

5. Advocate

Chiropractors responsibly use their knowledge and expertise to promote the health and well-being of individual patients as well as communities and populations.

Key Competency		Enabling Competencies	
5.1	Works collaboratively to identify, respond to and promote the health needs and concerns of individual patients, populations, and communities.	5.1.1	Collaborates with patient and other care providers to understand, identify and promote the health and Chiropractic needs and concerns of patients/ patient populations.
		5.1.2	Speaks out on health issues identified by patients and, together with other health care providers/team members, empowers patients to speak on their own behalf.
		5.1.3	Understands the limits and opportunities within the practice setting to address health issues, and works collaboratively to develop strategies to optimize patient care (e.g., Supports patients to access timely and affordable service; assists patients to navigate and coordinate the health care system).
		5.1.4	Identifies the determinants of health of patients/patient populations and understands factors that act as barriers to accessing services and resources.
		5.1.5	Describes the role of the Chiropractic profession in advocating for health and safety.
		5.1.6	Uses opportunities to communicate the role and benefits of Chiropractic to enhance individual and community health including health promotion and disease prevention.

6. Academic

Chiropractors are committed to ongoing learning for the purpose of improving patient outcomes through translating knowledge to practical Chiropractic practice.

Key Competency		Enabling Competencies	
6.1	Uses a reflective approach to practice.	6.1.1	Utilizes self-evaluation and feedback from patients and other providers to reflect upon actions and decisions to continuously improve knowledge and skills.
		6.1.2	Uses a problem-solving approach to make decisions and take action.
		6.1.3	Recognizes and takes into account how own background, education, experiences, perspectives, values and beliefs impact on decision-making.
6.2	Incorporates lifelong learning and experiences into best practice.	6.2.1	Engages in professional development and lifelong learning activities (e.g., actively participates in the acquisition of new knowledge and skills; integrates new knowledge, skills and behaviours into practice).
		6.2.2	Incorporates own experiences, education, research, and best available resources to plan and deliver Chiropractic care.
6.3	Engages in scholarly inquiry.	6.3.1	Uses the principles of research, research ethics, and research methods to advance practice (e.g., critically appraises literature; conducts a systematic search for evidence).
		6.3.2	Engages in activities that support clinical research (e.g., collecting and/or analysing data; integrating and/or disseminating research results).

7. Professional

Chiropractors are committed to the best interests of patients and the general public through ethical standards of practice, self profession-led regulation, and high personal standards of behaviour.

Key Competency		Enabling Competencies
7.1	Conducts self within legal/ethical requirements.	7.1.1 Provides services within Chiropractic scope of practice and personal competence. 7.1.2 Maintains a professional relationship with patients (e.g., maintains professional boundaries, integrity and acts in the best interest of the patient). 7.1.3 Provides services upholding professional ethical values (e.g., adheres to professional codes of ethics and standards of practice when making decisions with patients). 7.1.4 Informs the patient regarding all uses of collected personal and health data and obtains patient consent. 7.1.5 Maintains patient confidentiality/privacy as required by applicable legislation. 7.1.6 Accepts responsibility and is accountable for own actions and decisions.
7.2	Respects the individuality and autonomy of the patient.	7.2.1 Demonstrates sensitivity to and respect for each patient's rights, dignity, and uniqueness. 7.2.2 Treats the patient with respect and empowers the patient in expressing individual needs.
7.3	Contributes to the development of the Chiropractic profession.	7.3.1 Contributes to the learning of others (e.g., supports student clinical education; supports colleagues through feedback, mentorship, and knowledge transfer). 7.3.2 Engages in activities that support the development of the profession of Chiropractic (e.g., participates in in-service presentations, local and national conferences, professional committees, and public education of other health care professionals).

Entry to Practice Requirements in Manitoba

1. Graduation from a CCE accredited Doctor of Chiropractic Program

2. Completion of CCEB (Canadian Chiropractic Examining Board) entry to practice National competency examinations.

3. Obtain and shown proof of payment of professional liability coverage at a level as determined by the Board of the MCA to be acceptable for all members.

4. Obtain a letter of standing from previous jurisdiction of practice if applicable.

5. Must be of the active register of the MCA to practice chiropractic in the Province of Manitoba.

6. Must have passed the MCA (Manitoba Chiropractors Association) jurisprudence examination.

7. Must be able to communicate in English

8. Must be of good character and mentally/physically competent.

Clinical Practice Proficiencies

1. Graduation from a CCE accredited Doctor of Chiropractic Program

http://www.cce-usa.org/uploads/2013_CCE_ACCREDITATION_STANDARDS.pdf

Program Learning Outcomes (PLO): Students graduating with a Doctor of Chiropractic degree will demonstrate proficiency in the following:

1. ASSESSMENT AND DIAGNOSIS: An assessment and diagnosis requires developed clinical reasoning skills. Clinical reasoning consists of data gathering and interpretation, hypothesis generation and testing, and critical evaluation of diagnostic strategies. It is a dynamic process that occurs before, during, and after the collection of data through history, physical examination, imaging, and laboratory tests.

2. MANAGEMENT PLAN: Management involves the development, implementation and documentation of a patient care plan for positively impacting a patient's health and well-being, including specific therapeutic goals and prognoses. It may include case follow-up, referral, and/or collaborative care.

3. HEALTH PROMOTION AND DISEASE PREVENTION: Health promotion and disease prevention requires an understanding and application of epidemiological principles regarding the nature and identification of health issues in diverse populations and recognizes the impact of biological, chemical, behavioural, structural, psychosocial and environmental factors on general health.

4. COMMUNICATION AND RECORD KEEPING: Effective communication includes oral, written and nonverbal skills with appropriate sensitivity, clarity and control for a wide range of healthcare related activities, to include patient care, professional communication, health education, and record keeping and reporting.

5. PROFESSIONAL ETHICS AND JURISPRUDENCE: Professionals comply with the law and exhibit ethical behaviour.

6. INFORMATION AND TECHNOLOGY LITERACY: Information and technology literacy are manifested in an ability to locate, evaluate and integrate research and other types of evidence, including clinical experience, to explain and manage health-related issues and use emerging technologies appropriately.

7. INTELLECTUAL AND PROFESSIONAL DEVELOPMENT: Intellectual and professional development is characterized by maturing values and skills in clinical practice; the seeking and application of new knowledge; and the ability to adapt to change.

8. BUSINESS: Assessing personal skills and attributes, developing leadership skills, leveraging talents and strengths that provide an achievable expectation for graduate success. Adopting a systems-based approach to business operations. Networking with practitioners in associated fields with chiropractic, alternative medicine and allopathic medicine. Experiencing and acquiring the hard business skills required to open and operate an on-going business concern. Participating in practical, real time events that promote business building and quantifiable marketing research outcomes.

9. PHILOSOPHY: Demonstrates an ability to incorporate a philosophically based Chiropractic paradigm in approach to patient care. Demonstrates an understanding of both traditional and contemporary Chiropractic philosophic concepts and principles. Demonstrates an understanding of the concepts of philosophy, science, and art in chiropractic principles and their importance to chiropractic practice.

2. Canadian Chiropractic Examining Board - CCEB

A CCEB Certificate is required by the Provincial Licensing Bodies for chiropractors who wish to apply for provincial licensure. Recertification is available upon the request of a province for those practitioners who have previously received a CCEB Certificate in circumstances such as in an extended lapse in practice or a disciplinary matter. The CCEB certification process is the same for all candidates whether they are graduates of Canadian, American, or International schools.

The Canadian Chiropractic Examining Board (CCEB) conducts clinical competency exams for individuals seeking licensure to practice chiropractic in Canada. The CCEB is responsible for the development, delivery, and administration of three exams:

Component A – Chiropractic Knowledge*

Component B – Clinical Decision Making and Diagnostic Imaging**

Component C – Clinical Skills Evaluation***

***Component A**
Component A tests the foundational knowledge of chiropractic, i.e. anatomy, biomechanics, physiology, etc. that is required to identify the underlying causes of pain and disease to make appropriate clinical decisions. Exam items are written as patient presentations. Candidates that struggle on Component A may not have the foundational knowledge required to progress to the clinical decision-making level.

Component B
Component B tests the application of knowledge in the areas of patient history, physical exams, diagnosis, etc. It tests Candidates' ability to interpret data in a clinical context and arrive at a diagnosis or appropriate plan of management. All items are presented as clinical vignettes requiring the candidate to integrate and process information related to a patient presentation. Those who struggle on Component B may not be able to demonstrate the comprehension and application necessary for effective clinical decision-making and patient management.

***Component C**
Component C is an Objective Structured Clinical Exam (OSCE) requiring a demonstration of skills in ten doctor-patient interactive stations. It allows candidates to show their decision-making processes and their approach to patient management. Candidates are required to select and demonstrate appropriate differentiating physical exams based on a patient history and complaint to communicate a diagnosis, rationale and plan of management. Candidates that struggle on Component C tend to show an inability to "do" chiropractic.

Exam Content Basis

The current exam content is based on the Blueprint Validation Study (BVS) conducted in 2008-2009. This study included the following:
- Job Analysis Survey
- Rating of Conditions and Core Competency Survey
- Curriculum Study
- Blueprint Survey

3. Manitoba Chiropractic Association Jurisprudence Examination

Each chiropractor upon entry to Manitoba must have read, understood and acknowledged the provisions of *The Chiropractic Act*, Regulations, MCA Bylaws and the Code of Ethics of the Manitoba Chiropractors Association. Subsequently they must have passed an MCA (Manitoba Chiropractors Association) jurisprudence examination related to the above items.

4. Clinical Proficiency in Relation to the Practice of Chiropractic (Examples)

CMCC (CCE accredited) or equivalent

Two six month clinical internships in a teaching clinic under the supervision of clinical faculty where the basic sciences from Years I and II are integrated into the clinical and diagnostic

sciences, laboratory diagnosis, pathology, and clinical nutrition curriculum of Years III and IV. A comprehensive approach to diagnostic imaging ensures students hone their skills in the taking of radiographic images as well as imaging interpretation and diagnosis.

LCCW (Life Chiropractic College West)- CCE Accredited or equivalent

Six quarter internship with two quarters (six months) preparing the clinician for actual supervised patient interaction. Must Complete Clinic 1 and Clinic 2 and a clinic entrance exam prior to moving on to Clinic I II, III, and IV. Testing during this phase includes Mid - Proficiency Examination as well as a final Clinic Competency Examination.

References:

1. Canadian Memorial Chiropractic College - *DCP Course Syllabus 2015-2016*
2. Life University - *DCP Course Syllabus 2015-2016*
3. Life Chiropractic College West - *DCP Course Syllabus 2015-2016*
4. Manitoba Chiropractors Association - *Scope of Practice Review 2009*
5. Manitoba Chiropractors Association - RHPA Working Group - *Competency Profile for Chiropractors in Manitoba - 2015*
6. Council of Chiropractic Education - Canada - *Standards for Accreditation of Doctor of Chiropractic Programmes - 2011*
7. Canadian Chiropractic Examining Board - Competency Examination Blueprint 2008-2009
8. Alberta College & Association of Chiropractors - Scope of practice adapted 05/2012, revised and effective 01/2014
9. College of Chiropractors of Ontario - Scope of practice, 1991
10. College of Chiropractors of British Columbia - Scope of practice, 20/08/2015

Appendix 2

Appendix 2 –

Redacted – Subject to Copyright

Can be found at:

WHO Guidelines on basic Training and Safety in Chiropractic (2005)

Or

http://apps.who.int/medicinedocs/documents/s14076e/s14076e.pdf

Appendix 3

Patient Charter of Rights

The Manitoba Chiropractors Association and its members stand by the pledge that chiropractic patients have the following rights and expectations from their Doctor of Chiropractic. The Manitoba Chiropractors Association and its members endorse patient centered practice that emphasizes collaboration between the patient and the chiropractor.

Chiropractic Patients in Manitoba have the right and expectation to:

1. Be treated with courtesy, dignity and respect.

2. Receive chiropractic care;
    a) Without discrimination, and based solely on their health condition;
    b) With options that are presented to the patient based on their personal goals. Care options may include treatment plans of varying duration;
    c) With individualized treatment plans that evolve and change with the patient's progress based on ongoing assessments;
    d) And have their care and how it will contribute to their health goals explained to them in terms they can understand;
    e) With respectful and honest communication; and without any additional conditions such as attendance at educational workshops, or participation of other family members.

3. Have financial terms clearly explained to them prior to any service being provided. In particular:

    a) Patients have the right to pay for individual treatments at the time of service.
    b) Patients have the right to accept, reject or discontinue care at any time without penalty or conditions.
    c) Patients may request and must receive in a timely manner an itemized, detailed statement which explains the charges and services rendered.

4. Participate in discussions and decisions with their chiropractor regarding their chiropractic care.

5. Receive clear information from their care provider about:
    a) Their diagnosis, prognosis and the proposed treatment plan
    b) Other options for care including referral to other health care providers or other chiropractors if appropriate
    c) Any significant risks associated with the proposed treatment.

6. Know the identity and professional status of any individual providing care to them.

7. Consult with, or seek care from, any other health care practitioner, including another chiropractor.

8. Reasonable access to their treatment records.

9. Have their personal and health information protected from disclosure, and know with assurance that their chiropractor and the office staff will comply with all provincial and federal privacy and health information legislation.

10. Be informed of research projects, clinical training programs or data gathering process under the direction of the chiropractor and be given the choice to consent or decline participation. Generic data collection devoid of personal identifiers does not require individual patient consent.

Your chiropractor can answer any questions you have about your rights and expectations as a patient. You may also contact the Manitoba Chiropractors Association.

Manitoba Chiropractors.....Making Life Better!

Adopted: February 29, 2016

Appendix 4

Record Keeping, Collection, Custodianship, Transfer, Retention and Destruction of Patient Information

Standard of Practice S-05

Note to Members: In the event of any inconsistency between this document and the legislation that affects chiropractic practice, the legislation governs.

Intent of Standard S-05

To provide a framework as to the standard for Record Keeping, Informed Consent, Collection, Retention, Transfer and Destruction of Patient Information. As a primary health care provider, a Doctor of Chiropractic has both a legal and ethical responsibility to adequately diagnose, treat and/or refer the patient, and maintain proper records to document relevant notes, findings and recommendations.

Description of Standard S-05:

Clinical records shall contain the following information **in written detail**:

Part I - Collection of Patient Information

A. Patient History

a) chief complaint*
b) area of concern*
c) duration of complaint*
d) previous similar complaints*
e) probable cause; onset*
f) nature of complaint[1]*
g) related or associated symptoms
h) aggravating factors *
i) relieving factors *
j) previous care *
k) secondary illness or complaint[2] **
l) systems review **
m) past history*
n) family history **

[1] Example: character, intensity, frequency and duration
[2] Unrelated
* Minimum Requirement
** Performed When Appropriate

B. Physical Examination, Spinal and Neuromusculoskeletal Examination

a) observation*
b) palpation*
c) percussion **
d) auscultation **
e) inspection **
f) range of motion **
g) muscular testing ** - myotome testing, strength, joint integrity, muscle innervation
h) neurological/orthopedic status ** - reflexes, dermatomes, specific tests and/or signs

* Minimum Requirement
** Performed When Appropriate

C. Laboratory Examination (where indicated)

Physiological tests (blood, urine, or results of same)

D. Diagnostic Imaging (where required)

Results of all diagnostic imaging procedures

E. Diagnosis

A logical conclusion of the sum of the results of the above history and various examinations performed. Any diagnosis must be specific and unique to the presenting condition of the patient.

F. Treatment / Recommendations (as performed)

a) spinal adjustments
b) nutritional counseling
c) patient education
d) consultation
e) manipulations and/or mobilization
f) supportive modalities or procedures
g) first aid and emergency procedures
h) referral

Part II - Informed Consent

Written informed consent must be obtained from the patient. A patient must be provided an opportunity to ask questions. Consent can be withdrawn by a patient at any time.

- Disclosure and discussion of potential risks and benefits, especially material risks based on the patient's situation as well as alternatives to the proposed treatment
- Subjective assessment by the practitioner that the patient in question has the capacity to understand the information provided and form a reasonable judgment as to consent
- The material is presented in such a fashion that the patient is not subjected to external pressure or undue influence
- There must be the opportunity for the patient to ask questions and discuss any concerns that may arise at that time or into the future

Part III - Custodianship of Patient Information

In all cases, the owner of the original patient clinic where the patient was examined and/or treated remains the custodian of the original patient file/record/x-ray.

Part IV – Transfer of Confidential Patient Information and Records

Information regarding the number of visits billed to MHSC during a calendar year will be communicated to the office of a new treating chiropractor when the query is made.

Photocopies of records will be made available to the requesting clinic or agency promptly upon receipt of written permission by the patient and upon receipt of the customary and reasonable fee for file review / retrieval / photocopying.

Part V - Retention of Records

Records must be maintained for a minimum of six years following the last date of the clinical encounter.

Part VI – Destruction of Records

Records must be destroyed in such a manner as to remove any possibility for a breach of confidentiality. The Trustee must keep a record of all personal health information that is destroyed, the time period of the information, the method of destruction, and the name of the person who is responsible for supervising the destruction.

Approved August 2015
Review next: 2020

Enforceability

Any member identified to the Office of the Registrar as non-compliant in regard to the Standard of Practice related to record keeping, collection, custodianship, transfer, retention, and destruction of patient information may be subject to the complaints process and/or investigation. Identification of non-compliance may occur as a result of office inspections, patient complaint or any other reason by which this information may be brought to the attention of the Office of the Registrar.

Appendix 5

Appendix 5 –

Redacted – Subject to Copyright

Can be found at:

Maiers, Michele et al. Spinal manipulative therapy and exercise for seniors with chronic neck pain. The Spine Journal, Volume 14, Issue 9, 1879 - 1889

Appendix 6

Appendix 6 –

Redacted – Subject to Copyright

Can be found at:

Haavik-Taylor, Heidi et al. Cervical spine manipulation alters sensorimotor integration: A somatosensory evoked potential study. Clinical Neurophysiology, Volume 118, Issue 2, 391 - 402

Appendix 7

Appendix 7 –

Redacted – Subject to Copyright

Can be found at:

Haas, Mitchell et al. Dose Response for Chiropractic Care of Chronic Cervicogenic Headache and Associated Neck Pain: A Randomized Pilot Study. Journal of Manipulative & Physiological Therapeutics, Volume 27, Issue 9, 547 - 553

Appendix 8

Appendix 8 –

Redacted – Subject to Copyright

Can be found at:

Haas, Mitchell et al. Dose response and efficacy of spinal manipulation for chronic cervicogenic headache: a pilot randomized controlled trial. The Spine Journal, Volume 10, Issue 2, 117 - 128

Appendix 9

Appendix 9 –

Redacted – Subject to Copyright

Can be found at:

WHO Guidelines on basic Training and Safety in Chiropractic (2005)

Or

http://apps.who.int/medicinedocs/documents/s14076e/s14076e.pdf

Appendix 10

Appendix 10 –

Redacted – Subject to Copyright

First Document

Can be found at:

https://pdfs.semanticscholar.org/716c/c923d4410849aed44fec0876c0dfb468fe86.pdf

Second Document

Can be found at:

Cassidy, J David DC, PhD, DrMedSc; Boyle, Eleanor PhD; Côté, Pierre DC, PhD; He, Yaohua MD, PhD; Hogg-Johnson, Sheilah ; Silver, Frank L. MD, FRCPC; Bondy, Susan J. PhD. Risk of Vertebrobasilar Stroke and Chiropractic Care: Results of a Population-Based Case-Control and Case-Crossover Study. Spine. 33(4S):S176-S183, FEB 2008

Or

https://pdfs.semanticscholar.org/c538/293c0a65f42d7d4ceaca3c871fc10e73f9f1.pdf

Appendix 11

Kosloff et al. Chiropractic & Manual Therapies (2015) 23:19
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CHIROPRACTIC & MANUAL THERAPIES

RESEARCH Open Access

Chiropractic care and the risk of vertebrobasilar stroke: results of a case–control study in U.S. commercial and Medicare Advantage populations

Thomas M Kosloff[1*†], David Elton[1†], Jiang Tao[2†] and Wade M Bannister[2†]

Abstract

Background: There is controversy surrounding the risk of manipulation, which is often used by chiropractors, with respect to its association with vertebrobasilar artery system (VBA) stroke. The objective of this study was to compare the associations between chiropractic care and VBA stroke with recent primary care physician (PCP) care and VBA stroke.

Methods: The study design was a case–control study of commercially insured and Medicare Advantage (MA) health plan members in the U.S. population between January 1, 2011 and December 31, 2013. Administrative data were used to identify exposures to chiropractic and PCP care. Separate analyses using conditional logistic regression were conducted for the commercially insured and the MA populations. The analysis of the commercial population was further stratified by age (<45 years; ≥45 years). Odds ratios were calculated to measure associations for different hazard periods. A secondary descriptive analysis was conducted to determine the relevance of using chiropractic visits as a proxy for exposure to manipulative treatment.

Results: There were a total of 1,829 VBA stroke cases (1,159 – commercial; 670 – MA). The findings showed no significant association between chiropractic visits and VBA stroke for either population or for samples stratified by age. In both commercial and MA populations, there was a significant association between PCP visits and VBA stroke incidence regardless of length of hazard period. The results were similar for age-stratified samples. The findings of the secondary analysis showed that chiropractic visits did not report the inclusion of manipulation in almost one third of stroke cases in the commercial population and in only 1 of 2 cases of the MA cohort.

Conclusions: We found no significant association between exposure to chiropractic care and the risk of VBA stroke. We conclude that manipulation is an unlikely cause of VBA stroke. The positive association between PCP visits and VBA stroke is most likely due to patient decisions to seek care for the symptoms (headache and neck pain) of arterial dissection. We further conclude that using chiropractic visits as a measure of exposure to manipulation may result in unreliable estimates of the strength of association with the occurrence of VBA stroke.

Keywords: Chiropractic, Primary care, Cervical manipulation, Vertebrobasilar stroke, Adverse events

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Background

The burden of neck pain and headache or migraine among adults in the United States is significant. Survey data indicate 13% of adults reported neck pain in the past 3 months [1]. In any given year, neck pain affects 30% to 50% of adults in the general population [2]. Prevalence rates were reportedly greater in more economically advantaged countries, such as the USA, with a higher incidence of neck pain noted in office and computer workers [3]. Similar to neck pain, the prevalence of headache is substantial. During any 3-month timeframe, severe headaches or migraines reportedly affect one in eight adults [1].

Neck pain is a very common reason for seeking health care services. "In 2004, 16.4 million patient visits or 1.5% of all health care visits to hospitals and physician offices, were for neck pain" [4]. Eighty percent (80%) of visits occurred as outpatient care in a physician's office [4]. The utilization of health care resources for the treatment of headache is also significant. "In 2006, adults made nearly 11 million physician visits with a headache diagnosis, over 1 million outpatient hospital visits, 3.3 million emergency department visits, and 445 thousand inpatient hospitalizations" [1].

In the United States, chiropractic care is frequently utilized by individuals with neck and/or headache complaints. A national survey of chiropractors in 2003 reported that neck conditions and headache/facial pain accounted respectively for 18.7% and 12% of the patient chief complaints [5]. Chiropractors routinely employ spinal manipulative treatment (SMT) in the management of patients presenting with neck and/or headache [6], either alone or combined with other treatment approaches [7-10].

While evidence syntheses suggest the benefits of SMT for neck pain [7-9,11-13] and various types of headaches [10,12,14-16], the potential for rare but serious adverse events (AE) following cervical SMT is a concern for researchers [17,18], practitioners [19,20], professional organizations [21-23], policymakers [24,25] and the public [26,27]. In particular, the occurrence of stroke affecting the vertebrobasilar artery system (VBA stroke) has been associated with cervical manipulation. A recent publication [28] assessing the safety of chiropractic care reported, "...the frequency of serious adverse events varied between 5 strokes/100,000 manipulations to 1.46 serious adverse events/10,000,000 manipulations and 2.68 deaths/10,000,000 manipulations". These estimates were, however, derived from retrospective anecdotal reports and liability claims data, and do not permit confident conclusions about the actual frequency of neurological complications following spinal manipulation.

Several systematic reviews investigating the association between stroke and chiropractic cervical manipulation have reported the data are insufficient to produce definitive conclusions about its safety [28-31]. Two case–control studies [32,33] used visits to a chiropractor as a proxy for SMT in their analyses of standardized health system databases for the population of Ontario (Canada). The more recent of these studies [32] also included a case-crossover methodology, which reduced the risk of bias from confounding variables. Both case–control studies reported an increased risk of VBA stroke in association with chiropractic visits for the population under age 45 years old. Cassidy, et al. [32] found, however, the association was similar to visits to a primary care physician (PCP). Consequently, the results of this study suggested the association between chiropractic care and stroke was noncausal. In contrast to these studies, which found a significant association between chiropractic visits and VBA stroke in younger patients (<45 yrs.), the analysis of a population-based case-series suggested that VBA stroke patients who consulted a chiropractor the year before their stroke were older (mean age 57.6 yrs.) than previously documented [34].

The work by Cassidy, et al. [32] has been qualitatively appraised as one of the most robustly designed investigations of the association between chiropractic manipulative treatment and VBA stroke [31]. To the best of our knowledge, this work has not been reproduced in the U.S. population. Thus, the main purpose of this study is to replicate the case–control epidemiological design published by Cassidy, et al. [32] to investigate the association between chiropractic care and VBA stroke; and compare it to the association between recent PCP care and VBA stroke in samples of the U.S. commercial and Medicare Advantage (MA) populations. A secondary aim of this study is to assess the utility of employing chiropractic visits as a proxy measure for exposure to spinal manipulation.

Methods

Study design and population

We developed a case–control study based on the experience of commercially insured and MA health plan members between January 1, 2011 and December 31, 2013. General criteria for membership in a commercial or MA health plan included either residing or working in a region where health care coverage was offered by the insurer. Individuals must have Medicare Part A and Part B to join a MA plan. The data set included health plan members located in 49 of 50 states. North Dakota was the only State not represented.

Both case and control data were extracted from the same source population, which encompassed national health plan data for 35,726,224 unique commercial and 3,188,825 unique MA members. Since members might be enrolled for more than one year, the average

annual commercial membership was 14.7 million members and the average annual MA membership was 1.4 million members over the three year study period, which is comparable to ~5% of the total US population based on the data available from US Census Bureau [35]. Administrative claims data were used to identify cases, as well as patient characteristics and health service utilization.

The stroke cases included all patients admitted to an acute care hospital with vertebrobasilar (VBA) occlusion and stenosis strokes as defined by ICD-9 codes of 433.0, 433.01, 433.20, and 433.21 during the study period. Patients with more than one admission for a VBA stroke were excluded from the study. For each stroke case, four age and gender matched controls were randomly selected from sampled qualified members. Both cases and controls were randomly sorted prior to the matching using a greedy matching algorithm [36].

Exposures

The index date was defined as the date of admission for the VBA stroke. Any encounters with a chiropractor or a primary care physician (PCP) prior to the index date were considered as exposures. To evaluate the impact of chiropractic and PCP treatment, the designated hazard period in this study was zero to 30 days prior to the index date. For the PCP analysis, the index date was excluded from the hazard period since patients might consult PCPs after having a stroke. The standard health plan coverage included a limit of 20 chiropractic visits. In rare circumstances a small employer may have selected a 12-visit limit. An internal analysis (data not shown) revealed that 5% of the combined (commercial and MA) populations reached their chiropractic visit limits. Instances of an employer not covering chiropractic care were estimated to be so rare that it would have had no measureable impact on the analysis. There were no limits on the number of reimbursed PCP visits per year.

Analyses

Two sets of similar analyses were performed, one for the commercially insured population and one for the MA population. In each set of analyses, conditional logistic regression models were used to examine the association between the exposures and VBA strokes. To measure the association, we estimated the odds ratio of having the VBA stroke and the effect of total number of chiropractic visits and PCP visits within the hazard period. The analyses were applied to different hazard periods, including one day, three days, seven days, 14 days and 30 days for both chiropractic and PCP visits. The results of the chiropractic and PCP visit analyses were then compared to find evidence of excess risk of having stroke for patients with chiropractic visits during the hazard period. Previous research has indicated that most patients who experience a vertebral artery dissection are under the age of 45. Therefore, in order to investigate the impact of exposure on the population at different ages, separate analyses were performed on patients stratified by age (under 45 years and 45 years and up) for the study of the commercial population. The number of visits within the hazard period was entered as a continuous variable in the logistic model. The chi square test was used to analyze the proportion of co-morbidities in cases as compared to controls.

A secondary analysis was performed to evaluate the relevance of using chiropractic visits as a proxy for spinal manipulation. The commercial and MA databases were queried to identify the proportions of cases of VBA stroke and matched controls for which at least one chiropractic spinal manipulative treatment procedural code (CPT 98940 – 98942) was or was not recorded. The analysis also calculated the use of another manual therapy code (CPT 97140), which may be employed by chiropractors as an alternative means of reporting spinal manipulation.

Ethics

The New England Institutional Review Board (NEIRB) determined that this study was exempt from ethics review.

Results

The commercial study sample included 1,159 VBA stroke cases over the three year period and 4,633 age and gender matched controls. The average age of the patients was 65.1 years and 64.8% of the patients were male (Table 1). The prevalence rate of VBA stroke in the commercial population was 0.0032%.

There were a total of 670 stroke cases and 2,680 matched controls included in the MA study. The average patient age was 76.1 years and 58.6% of the patients were male (Table 2). For the MA population, the prevalence rate of VBA stroke was 0.021%.

Claims during a one year period prior to the index date were extracted to identify comorbid disorders. Both the commercial and MA cases had a high percentage of comorbidities, with 71.5% of cases in the commercial study and 88.5% of the cases in the MA study reporting at least one of the comorbid conditions (Table 3). Six comorbid conditions of particular interest were identified, including hypertensive disease (ICD-9 401–404), ischemic

Table 1 Age and gender of cases and controls (Commercial)

Variable	Cases (n = 1159)	Controls (n = 4633)
Age: mean (median)	65.1 (64.7)	65.1 (64.7)
Males: n (%)	751 (64.8)	3001 (64.8)

Table 2 Age and gender of cases and controls (Medicare)

Variable	Cases (n = 670)	Controls (n = 2680)
Age: mean (median)	76.1 (76.2)	76.1 (76.2)
Males: n (%)	393 (58.6)	1572 (58.6)

heart disease (ICD-9 410–414), disease of pulmonary circulation (ICD-9 415–417), other forms of heart disease (ICD-9 420–429), pure hypercholesterolemia (ICD-9 272.0) and diseases of other endocrine glands (ICD-9 249–250). There were statistically significant differences (p = <0.05) between groups for most comorbidities. Greater proportions of comorbid disorders (p = <0.0001) were reported in the commercial and MA cases for hypertensive disease, heart disease and endocrine disorders (Table 3). The commercial cases also showed a larger proportion of diseases of pulmonary circulation, which was statistically significant (p = 0.0008). There were no significance differences in pure hypercholesterolemia for either the commercial or MA populations. Overall, cases in both the commercial and MA populations were more likely (p = <0.0001) to have at least one comorbid condition.

Among the commercially insured, 1.6% of stroke cases had visited chiropractors within 30 days of being admitted to the hospital, as compared to 1.3% of controls visiting chiropractors within 30 days prior to their index date. Of the stroke cases, 18.9% had visited a PCP within 30 days prior to their index date, while only 6.8% of controls had visited a PCP (Table 4). The proportion of exposures for chiropractic visits was lower in the MA sample within the 30-day hazard period (cases = 0.3%; controls = 0.9%). However, the proportion of exposures for PCP visits was higher, with 21.3% of cases having PCP visits as compared to12.9% for controls (Table 5).

The results from the analyses of both the commercial population and the MA population were similar (Tables 6, 7 and 8). There was no association between chiropractic visits and VBA stroke found for the overall sample, or for samples stratified by age. No estimated odds ratio was significant at the 95% confidence level. MA data were insufficient to calculate statistical measures of association for hazard periods less than 0–14 days for chiropractic visits. When stratified by age, the data were too sparse to calculate measures of association for hazard periods less than 0–30 days in the commercial population. The data were too few to analyze associative risk by headache and/or neck pain diagnoses (data not shown).

These results showed there is an association existing between PCP visits and VBA stroke incidence regardless of age or length of hazard period. A strong association was found for those visits close to the index date (OR 11.56; 95% CI 6.32-21.21) for all patients with a PCP visit within 0–1 day hazard period in the commercial sample. There was an increased risk of VBA stroke associated with each PCP visit within 30-days prior to the index date for MA patients (OR 1.51; 95% CI 1.32-1.73) and commercial patients (OR 2.01; 95% CI 1.77-2.29).

The findings of the secondary analysis showed – that of 1159 stroke cases from commercial population – there were a total of 19 stroke cases associated with chiropractic visits for which 13 (68%) had claims documentation indicating chiropractic SMT was performed. For the control group of the commercial cohort, 62 of 4633 controls had claims of any kind of chiropractic visits and 47 of 4633 controls had claims of SMT. In the commercial control group, 47 of 62 DC visits (76%) included SMT in the claims data. Only 1 of 2 stroke cases in the MA population included SMT in the claims data. For the MA cohort, 21 of 24 control chiropractic visits (88%) included SMT in the claims data (Table 9).

None of the stroke cases in either population included CPT 97140 as a substitute for the more conventionally reported chiropractic manipulative treatment procedural codes (98940 – 98942). For the control groups, there were three instances where CPT 97140 was reported without CPT 98940 – 98942 in the commercial population. The CPT code 97140 was not reported in MA control cohort.

Table 3 Comorbid conditions

Conditions n (%)	Commercial			Medicare		
	Cases (n = 1159)	Controls (n = 4633)	p-value	Cases (n = 670)	Controls (n = 2680)	p-value
Hypertensive disease	767 (66.2)	2078 (44.9)	<0.0001	554 (82.7)	1721 (64.2)	<0.0001
Ischemic heart disease	300 (25.9)	638 (13.8)	<0.0001	258 (38.5)	563 (21.0)	<0.0001
Diseases of pulmonary circulation	29 (2.5)	55 (1.2)	0.0008	18 (2.7)	70 (2.6)	0.9140
Other forms of heart disease	357 (30.8)	800 (17.3)	<0.0001	306 (45.7)	713 (26.6)	<0.0001
Pure Hypercholesterolemia	9 (0.8)	24 (0.5)	0.2957	6 (0.9)	26 (1.0)	0.8590
Diseases of other endocrine glands	319 (27.5)	754 (16.3)	<0.0001	285 (42.5)	740 (27.6)	<0.0001
At least one of the conditions	829 (71.5)	2317 (50.0)	<0.0001	593 (88.5)	1885 (70.3)	<0.0001

Table 4 Chiropractic and PCP visits prior to the index date (Commercial)

Exposures	All		Age <45 yr		Age ≥45 yr	
	Cases (n = 1159)	Controls (n = 4633)	Cases (n = 98)	Controls (n = 392)	Cases (n = 1061)	Controls (n = 4241)
Most recent DC Visit						
0-1 day: n (%)	3 (0.3)	11 (0.2)	*	*	3 (0.3)	11 (0.3)
0-3 days: n (%)	6 (0.5)	21 (0.5)	*	1 (0.3)	6 (0.6)	20 (0.5)
0-7 days: n (%)	8 (0.7)	31 (0.7)	*	1 (0.3)	8 (0.8)	30 (0.7)
0-14 days: n (%)	9 (0.8)	44 (0.9)	*	3 (0.8)	9 (0.8)	41 (1.0)
0-30 days: n (%)	19 (1.6)	62 (1.3)	2 (2.0)	7 (1.8)	17 (1.6)	55 (1.3)
Most recent PCP Visit						
1-1 day: n (%)	41 (3.5)	15 (0.3)	4 (4.1)	1 (0.3)	37 (3.5)	14 (0.3)
1-3 days: n (%)	78 (6.7)	41 (0.9)	8 (8.2)	2 (0.5)	70 (6.6)	39 (0.9)
1-7 days: n (%)	115 (9.9)	93 (2.0)	10 (10.2)	4 (1.0)	105 (9.9)	89 (2.1)
1-14 days: n (%)	157 (13.5)	165 (3.6)	12 (12.2)	15 (3.8)	145 (13.7)	150 (3.5)
1-30 days: n (%)	219 (18.9)	316 (6.8)	23 (23.5)	29 (7.4)	196 (18.5)	287 (6.8)

*Insufficient data to compute an estimate.

Discussion

The primary aim of the present study was to investigate the association between chiropractic manipulative treatment and VBA stroke in a sample of the U.S. population. This study was modelled after a case–control design previously conducted for a Canadian population [32]. Administrative data for enrollees in a large national health care insurer were analyzed to explore the occurrence of VBA stroke across different time periods of exposure to chiropractic care in comparison with PCP care.

Unlike Cassidy et al. [32] and most other case–control studies [33,37,38], our results showed there was no significant association between VBA stroke and chiropractic visits. This was the case for both the commercial and MA populations. In contrast to two earlier case–control studies [32,33], this lack of association was found to be irrespective of age. Although, our results (Table 8) did lend credence to previous reports that VBA stroke occurs more frequently in patients under the age of 45 years. Additionally, the results from the present study did not identify a relevant temporal impact. There was no significant association, when the data were sufficient to calculate estimates, between chiropractic visits and stroke regardless of the hazard period (timing of most recent visit to a chiropractor and the occurrence of stroke).

Table 5 Chiropractic and PCP visits prior the index date (Medicare)

Exposures	Cases (n = 670)	Controls (n = 2680)
Most recent DC Visit		
0-1 day: n (%)	*	4 (0.1)
0-3 days: n (%)	*	8 (0.3)
0-7 days: n (%)	*	9 (0.3)
0-14 days: n (%)	1 (0.1)	15 (0.6)
0-30 days: n (%)	2 (0.3)	24 (0.9)
Most recent PCP Visit		
1-1 day: n (%)	16(2.4)	18 (0.7)
1-3 days: n (%)	30 (4.5)	36 (1.3)
1-7 days: n (%)	55 (8.2)	97 (3.6)
1-14 days: n (%)	90 (13.4)	183 (6.8)
1-30 days: n (%)	143 (21.3)	346 (12.9)

*Insufficient data to compute an estimate.

There are several possible reasons for the variation in results with previous similar case–control studies. The younger (<45 yrs.) commercial cohort that received chiropractic care in our study had noticeably fewer cases. The 0–30 days hazard period included only 2 VBA stroke cases. There were no stroke cases for other hazard periods in this population. In contrast, earlier studies reported sufficient cases to calculate risk estimates for most hazard periods [32,33].

Another factor that potentially influenced the difference in results concerns the accuracy of hospital claims data in the U.S. vs. Ontario, Canada. The source population in the Province of Ontario was identified, in part, from the Discharge Abstract Database (DAD). The DAD includes hospital discharge and emergency visit diagnoses that have undergone a standardized assessment by a medical records coder [39]. To the best of our knowledge, similar quality management practices were not routinely applied to hospital claims data used in sourcing the population for our study.

An additional reason for the disparity in results may be due to differences in the proportions of chiropractic visits where SMT was reportedly performed. Our study showed that SMT was not reported by chiropractors in more than 30% of commercial cases. It is plausible that a number of the cases in earlier studies also did not

Table 6 Estimated odds ratios and 95% confidence interval (Commercial)

Exposures	All		Age < 45 yr		Age > =45 yr	
	Odds ratio	95% CI	Odds ratio	95% Ci	Odds ratio	95% CI
Any DC Visit						
0-1 day	1.09	0.30-3.91	*	*	1.09	0.30-3.91
0-3 days	1.14	0.46-2.83	*	*	1.20	0.48-2.30
0-7 days	1.03	0.48-2.25	*	*	1.07	0.49-2.33
0-14 days	0.82	0.40-1.68	*	*	0.88	0.43-1.81
0-30 days	1.23	0.73-2.06	1.14	0.24-5.50	1.24	0.72-2.14
Any PCP Visit						
1-1 day	11.56	6.30-21.21	16.00	1.79-143.2	11.22	5.96-21.11
1-3 days	7.75	5.29-11.35	16.00	3.40-75.35	7.31	4.93-10.86
1-7 days	5.23	3.95-6.93	10.00	3.14-31.88	5.00	3.73-6.68
1-14 days	4.24	3.36-5.35	3.72	1.62-8.53	4.29	3.37-5.46
1-30 days	3.22	2.66-3.89	4.08	2.17-7.68	3.14	2.58-3.83

*Insufficient data to compute an estimate.

include SMT as an intervention. Differences between studies in the proportion of cases reporting SMT may have affected the calculation of risk estimates.

Also, there were an insufficient number of cases having cervical and/or headache diagnoses in our study. Therefore, our sample population may have included proportionally less cases where cervical manipulation was performed.

Our results were consistent with previous findings [32,33] in showing a significant association between PCP visits and VBA stroke. The odds ratios for any PCP visit increase dramatically from 1–30 days to 1–1 day (Tables 6 and 7). This finding is consistent with the hypothesis that patients are more likely to see a PCP for symptoms related to vertebral artery dissection closer to the index date of their actual stroke. Since it is unlikely that the services provided by PCPs cause VBA strokes, the association between recent PCP visits and VBA stroke is more likely attributable to the background risk related to the natural history of the condition [32].

Table 7 Estimated odds ratios and 95% CI (Medicare)

Exposures	Odds ratio	95% CI
Any DC Visit		
0-1 day	*	*
0-3 days	*	*
0-7 days	*	*
0-14 days	0.26	0.03-2.00
0-30 days	0.32	0.08-1.39
Any PCP Visit		
1-1 day	3.66	1.85-7.26
1-3 days	3.38	2.07-5.51
1-7 days	2.37	1.68-3.34
1-14 days	2.09	1.60-2.73
1-30 days	1.81	1.46-2.25

*Insufficient data to compute an estimate.

A secondary goal of our study was to assess the utility of employing chiropractic visits as a surrogate for SMT. Our findings indicate there is a high risk of bias associated with using this approach, which likely overestimated the strength of association. Less than 70% of stroke cases (commercial and MA) associated with chiropractic care included SMT. A somewhat higher proportion of chiropractic visits included SMT for the control groups (commercial = 76%; MA = 88%).

There are plausible reasons that support these findings. Internal analyses of claims data (not shown) consistently demonstrate that one visit is the most common number associated with a chiropractic episode of care. The single visit may consist of an evaluation without treatment such as SMT. Further; SMT may have been viewed as contraindicated due to signs and symptoms of vertebral artery dissection (VAD) and/or stroke. This might explain the greater proportion of SMT provided to control groups in both the commercial and MA populations.

Overall, our results increase confidence in the findings of a previous study [32], which concluded there was no excess risk of VBA stroke associated chiropractic care compared to primary care. Further, our results indicate there is no significant risk of VBA stroke associated with chiropractic care. Additionally, our findings highlight the potential flaws in using a surrogate variable (chiropractic visits) to estimate the risk of VBA stroke in association with a specific intervention (manipulation).

Our study had a number of strengths and limitations. Both case and control data were extracted from the same source population, which encompassed national health plan data for approximately 36 million

Table 8 Odds ratio and 95% CI for association between # of exposures during 30-day hazard period

Exposures	All cases		Age <45 yr		Age >45 yr	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Commercial						
Any DC* visit	1.03	0.86-1.26	1.32	0.64-2.71	1.01	0.81-1.25
Any PCP visit	2.01	1.77-2.29	2.38	1.55-3.66	1.97	1.72-2.26
Medicare						
Any DC* visit	0.54	0.23-1.28				
Any PCP visit	1.51	1.32-1.73				

*DC = Chiropractic.

commercial and 3 million MA members. A total of 1,829 cases were identified, making this the largest case–control study to investigate the association between chiropractic manipulation and VBA stroke. Due to the nationwide setting and large sample size, our study likely reduced the risk of bias related to geographic factors. However, there was a risk of selection bias – owing to the data set being from a single health insurer – including income status, workforce participation, and links to health care providers and hospitals.

Our study closely followed a methodological approach that had previously been described [32], thus allowing for more confident comparisons.

The current investigation analyzed data for a number of comorbid conditions that have been identified as potentially modifiable risk factors for a first ischemic stroke [40]. The differences between groups were statistically significant for most comorbidities. Information was not obtainable about behavioural comorbid factors e.g., smoking and body mass. With the exception of hypertensive disease, there are reasons to question the clinical significance of these conditions in the occurrence of ischemic stroke due to vertebral artery dissection. A large multinational case-referent study investigated the association between vascular risk factors (history of vascular disease, hypertension, smoking, hypercholesterolemia, diabetes mellitus, and obesity/overweight) for ischemic stroke and the occurrence of cervical artery dissection [41]. Only hypertension had a positive association (odds ratio 1.67; 95% confidence interval, 1.32 to 2.1; P <0.0001) with cervical artery dissection.

While the effect of other unmeasured confounders cannot be discounted, there is reason to suspect the absence of these data was not deleterious to the results. Cassidy, et al. found no significant differences in the results their case-crossover design, which affords better control of unknown confounding variables, and the findings of their case–control study [32].

Our results highlight just how unusual VBA stroke is in the MA cohort (prevalence = 0.021%) and – even more so – for the commercial population (prevalence = 0.0032%). As a result, some limitations of this study related to the rarity of reporting VBA stroke events. Despite the larger number of cases, data were insufficient to calculate estimates and confidence intervals for seven measures of exposure (4 commercial and 3 MA) for chiropractic visits. Additionally, we were not able to compute estimates specifically for headache and neck pain diagnoses due to small numbers. Confidence intervals associated with estimates tended to be wide making the results imprecise [42].

There were limitations related to the use of administrative claims data. "Disadvantages of using secondary data for research purposes include: variations in coding from hospital to hospital or from department to department, errors in coding and incomplete coding, for example in the presence of comorbidities. Random errors in coding and registration of discharge diagnoses may dilute and attenuate estimates of statistical association" [43]. The recordings of unvalidated hospital discharge diagnostic codes for stroke have been shown to be less precise when compared to chart review [44,45] and validated patient registries

Table 9 Chiropractic (DC) visits with spinal manipulative treatment (SMT)

	Commercial			Medicare		
	DC visit with SMT	Any DC visit	Total # in sample	DC visit with SMT	Any DC visit	Total # in sample
Stroke cases	13	19	1159	1	2	670
Controls	47	62	4633	21	24	2680
All	60	81	5792	22	26	3350

[43,46]. Cassidy, et al. [32] conducted a sensitivity analysis to determine the effect of diagnostic misclassification bias. Their conclusions did not change when the effects of misclassification were assumed to be similarly distributed between chiropractic and PCP cases.

A particular limitation in using administrative claims data is the paucity of contextual information surrounding the clinical encounters between chiropractors/PCPs and their patients. Historical elements describing the occurrence/absence of recent trauma or activities reported in case studies [47-51] as potential risk factors for VBA stroke were not available in claims data. Confidence was low concerning the ability of claims data to provide accurate and complete reporting of other health disorders, which have been described in case–control designs as being associated with the occurrence of VBA stroke e.g., migraine [52] or recent infection [53]. Symptoms and physical examination findings that would have permitted further stratification of cases were not reported in the claims data.

The reporting of clinical procedures using current procedural terminology (CPT) codes presented additional shortcomings concerning the accuracy and interpretation of administrative data. One inherent constraint was the lack of anatomic specificity associated with the use of standardized procedural codes in claims data. Chiropractic manipulative treatment codes (CPT 98940 – 98942) have been formatted to describe the number of spinal regions receiving manipulation. They do not identify the particular spinal regions manipulated.

Also, treatment information describing the type(s) of manipulation was not available. When SMT was reported, claims data could not discriminate among the range of techniques including thrust or rotational manipulation, various non-thrust interventions e.g., mechanical instruments, soft tissue mobilizations, muscle energy techniques, manual cervical traction, etc. Many of these techniques do not incorporate the same biomechanical stressors associated with the type of manipulation (high velocity low amplitude) that has been investigated as a putative risk factor for VBA stroke [54-56]. It seems plausible that the utility of future VBA stroke research would benefit from explicit descriptions of the particular type of manipulation performed.

Moreover, patient responses to care – including any adverse events suggestive of vertebral artery dissection or stroke-like symptoms – were not obtainable in the data set used for the current study.

In the absence of performing comprehensive clinical chart audits, it is not possible to know from claims data what actually transpired in the clinical encounter. Further, chart notes may themselves be incomplete or otherwise fail to precisely describe the nature of interventions [57]. Therefore, manipulation codes represent surrogate measures, albeit more direct surrogate measures, than simply using the exposure to chiropractic visits.

Our study was also limited to replication of the case–control design described by Cassidy, et al. [32]. For pragmatic reasons, we did not attempt to conduct a case-crossover design. While the addition of a case-crossover design would have provided better control of confounding variables, Cassidy, et al. [32] showed the results were similar for both the case control and case crossover studies.

The findings of this case–control study and previous retrospective research underscore the need to rethink how to better conduct future investigations. Researchers should seek to avoid the use of surrogate measures or use the least indirect measures available. Instead, the focus should be on capturing data about the types of services and not the type of health care provider.

In alignment with this approach, it is also important for investigators to access contextual data (e.g., from electronic health records), which can be enabled by qualitative data analysis computer programs [58]. The acquisition of the elements of clinical encounters – including history, diagnosis, intervention, and adverse events – can provide the infrastructure for more actionable research. Because of the rarity of VBA stroke, large data sets (e.g., registries) containing these elements will be necessary to achieve adequate statistical power for making confident conclusions.

Until research efforts produce more definitive results, health care policy and clinical practice judgments are best informed by the evidence about the effectiveness of manipulation, plausible treatment options (including non-thrust manual techniques) and individual patient values [20].

Conclusions

Our findings should be viewed in the context of the body of knowledge concerning the risk of VBA stroke. In contrast to several other case–control studies, we found no significant association between exposure to chiropractic care and the risk of VBA stroke. Our secondary analysis clearly showed that manipulation may or may not have been reported at every chiropractic visit. Therefore, the use of chiropractic visits as a proxy for manipulation may not be reliable. Our results add weight to the view that chiropractic care is an unlikely cause of VBA strokes. However, the current study does not exclude cervical manipulation as a possible cause or contributory factor in the occurrence of VBA stroke.

Competing interests

All authors are employees of UnitedHealth Group – a U.S based commercial health care company. The authors declare that they have no other competing interests.

Authors' contributions
DE conceived of the study, and participated in its design and coordination. JT participated in the design of the study, performed the statistical analysis and helped to draft the manuscript. TMK participated in the design and coordination of the study, and wrote the initial draft and revisions of the manuscript. WMB participated in the coordination of the study and the statistical analysis, and helped to draft the manuscript. All authors contributed to the interpretation of the data. All authors read and approved the final manuscript.

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Appendix 12

Appendix 12 –

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Biller J, Sacco RL, Albuquerque FC, Demaerschalk BM, Fayad P, Long PH, Noorollah LD, Panagos PD, Schievink WI, Schwartz NE, Shuaib A, Thaler DE, Tirschwell DL; on behalf of the American Heart Association Stroke Council. Cervical arterial dissections and association with cervical manipulative therapy: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2014;45:3155–3174.

Or

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Appendix 13

Appendix 13 –

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Can be found at:

http://docplayer.net/37004902-Systematic-review-systematic-review-and-meta-analysis-of-chiropractic-care-and-cervical-artery-dissection-no-evidence-for-causation.html

Appendix 14

Appendix 14 –

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Herzog, Walter et al. Internal Carotid Artery Strains During High-Speed, Low-Amplitude Spinal Manipulations of the Neck. Journal of Manipulative & Physiological Therapeutics, Volume 38, Issue 9, 664 – 671.

Appendix 15

Appendix 15 –

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Quesnele, Jairus J. et al. Changes in Vertebral Artery Blood Flow Following Various Head Positions and Cervical Spine Manipulation. Journal of Manipulative & Physiological Therapeutics, Volume 37,

Issue 1, 22 – 31.

Appendix 16

Appendix 16 –

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Can be found at:

Carlesso LC, Macdermid JC, Santaguida PL, et al. Beliefs and Practice Patterns in Spinal Manipulation and Spinal Motion Palpation Reported by Canadian Manipulative Physiotherapists. Physiotherapy Canada. 2013; 65(2):167-175.

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Appendix 17

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Can be found at:

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Appendix 18

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Appendix 19

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Can be found at:

https://www.researchgate.net/publication/283786239_Vertebral_artery_dissection_in_evolution_found_during_chiropractic_examination