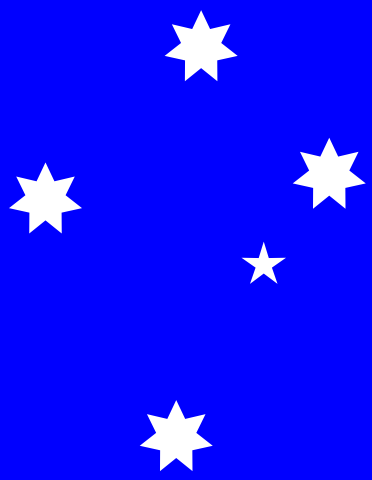
Chiropractic Journal of Australia



Vol 43 No 1 ISSN 2200-8012 MARCH 2013

CHIROPRACTIC JOURNAL OF AUSTRALIA

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The *Chiropractic Journal of Australia (CJA)* is a peer-reviewed journal of record dedicated to the advancement of chiropractic science, principles and practice. CJA is the official journal of the Chiropractors' Association of Australia (National) Limited (CAA) and is published quarterly in March, June, September and December. CJA is a participating member of the Chiropractic Research Journal Editors' Council and adheres to the standards set by that Council.

Subscriptions are accepted for a complete volume of four issues only and begin with the first (March) issue of the current year unless the forthcoming year is requested. Postpaid personal (single reader) subscription rates for 2010 are AUD$90.00 including GST within Australia, AUD$115 air mailed to other countries. Institutional (multiple reader) rates are AUD$140 including GST within Australia, AUD$155 elsewhere. Rates subject to change.

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CJA is fully indexed by the InfoRMIT, the British Library Complementary Medicine Index, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), MANTIS, and the Index to Chiropractic Literature, and selectively indexed by the Australian Public Affairs Information Service (APAIS). *CJA* is available in microform from National Archive Publishing Company, www.napubco.com

CHIROPRACTIC JOURNAL OF AUSTRALIA

VOLUME 43 NUMBER 1 MARCH 2013

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Editorial
The Way it Used to Be isn't the Way it Was[1]

As the 20th Century dawned a number of men with an interest in human health and wellness developed their concepts of chiropractic. Given the mythology that continues to surround D.D. Palmer it is easy to overlook chiropractic graduates such as Smith, Langworthy and Paxson who captured their concepts in a significant two-volume text.[2] Then along came Palmer's son who, in addition to developing chiropractic took an intelligent and abiding interest in the human condition, as attested by his travel and resultant collections. But he was far from the only one. In the chiropractic world we see Forster who, at the time of World War I published a delightfully straightforward documentation of the principles of chiropractic,[3] only to see these obfuscated a decade or two later by Stephenson[4] whom some still view as crafting chiropractic's Holy Grail.

However fascinating men and stronger women were making their mark in other fields in many amazing places around the world, some even more remote and insular than the Davenport of Palmer's day. This writer's most recent, and perhaps most intimate experiences of such men and women was just before the CAA National Development Forum of 2012, held in Tasmania.

The particular house was built about the time of the Petersen mansion which became the Palmers' home.[5] Both were large, multi-level homes in an imposing position over their respective towns. Its first occupants were Robert Sticht and his wife Marion Oak, who moved to this Tasmanian town from the mining fields of North East America. Marrying the photos from the past of Sticht in the home's office with the experience of sitting there over a century later was salutary, as was sitting at the original dining table and, later, in the billiard room to hear a history writer verbalise the first chapter of his book about Oak.

The writer coloured the story to weave a fascinating picture of the way we would like to think it used to be. However teasing the threads from other sources let one synthesise a story of the way it probably was, and the two differed. How profound a couple of weeks later to hear the words of an animated movie character say "the way it used to be isn't the way it was."[1]

Over the past couple of years we have heard detractors of chiropractic spout the way they think things used to be, in particular with regard to the construct of the subluxation, and draw the fatal conclusions that (a) the way it used to be is still the way it is, and worse (b) the way it used to be is actually the way it was.

Palmer the father literally wrote thousands of words about his concepts and provided a commentary over time of how these developed and changed. Palmer the son probably wrote as many words if not more, including a series of volumes called "The Green Books."[6] Today nobody with serious intent could reasonably seize on these historical concepts and attempt to cast an old meaning on today's dynamic, growing, global health care profession. Rather, we have a responsibility to better understand them.

In the same vein there are now chiropractors in some countries that righteously depict chiropractic as needing to follow their newly imposed destiny into mainstream medicine. If this were all they occupied themselves with then well and good, however it does not seem possible for them to share a rational view; they want theirs and only theirs to prevail globally. The result is a dichotomy that creates a far right-wing, supported by those who gather in the guise of world associations and so on, that bullies by relentless repetition in an attempt to shut-down those chiropractors in other countries who are sufficiently mature to hold less extreme views.

If ever there was a time when chiropractic was successfully well beyond pain and unaffordable interventions reliant on drugs and political largesse it is now, through the efforts of functional neurology, developmental neurology, and exciting new paradigms owned by neither medicine nor chiropractic, but contributed and developed by those very clever researchers who continue to push the boundaries at microscopic and cellular levels.

Now is the time to walk away from bullies and instead absorb what is written and spoken in the broader context. Get into the world of those working to change it, sit in their homes, and learn and value the context of their life and learning. Walk away from those who crave a sense of importance through group acceptance. Instead, walk *with* those who think, act and practise as chiropractors, like you do, knowing that nothing is as powerful as chiropractic done properly.

It is up to us to ensure chiropractic maintains the way it really should be.

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COMMENTARY:
A BASIS FOR THE THEORY OF A CENTRAL CHIROPRACTIC PRINCIPLE – THE VERTEBRAL SUBLUXATION

Peter L Rome

The title of this essay was chosen deliberately as it conveys a message similar to that of medicine demonstrating that medicine is also based on theory. The term *"theory of medicine"* is still in current usage.

In relation to the vertebral subluxation, the term *theory* was used in the title as the vertebral subluxation qualifies more as a *hypothesis,* which is defined as *"a suggested explanation for a group of facts, accepted either as a basis for further verification or as likely to be true."*[1]

Models of the vertebral subluxation hypothesis underpinning chiropractic as a profession, have been discussed in detail over the years.[2,3] There are however reservations in some quarters as to the veracity of this basic principle of chiropractic, despite well documented research and clinical results.[4]

The vertebral subluxation has been widely acknowledged in the bioscience literature, chiropractic colleges, in legislation, and by the major health professions - including medicine. This acknowledgement takes a variety of designations and similes,[5] suggesting that the *chiropractic subluxation* takes into consideration a broader *pathophysiological* and clinical perspective than just a mechanical displacement; thus the more comprehensive designation of a *complex* – the appellation Vertebral Subluxation Complex, (VSC).[6] It is noted that *physiology* of joints refers to normal joint movement[7] so that *pathophysiology* is but one factor in the complex.

Regardless of the name used for this clinical finding, the evidence is overwhelming that 'something' exists which is associated with recognised and recognisable signs and symptoms of certain spine-related conditions presenting in patients.

THE PROBLEM

In essence, some parties including a splinter group of chiropractors, seem to claim that there is no proof that the vertebral subluxation exists. They seem to ignore the tenet that "*absence of proof is not proof of absence*."[8] *"Even worse is to ignore the evidence and declare that there is none, or to hide a political agenda behind a pseudoscientific argument."*[9]

An authority on the topic,Gatterman,[2] has addressed the issue on a number of occasions. Her insightful paper in 2009 provides a solid case for the retention of the term subluxation.[9] This could be in the modified form of a Vertebral Subluxation Complex (VSC), which is arguably the most widely accepted alternative. She cites Terret as stating *"The concept of vertebral subluxation is central to chiropractic."*[10]

Further, she notes that Keating, Charlton, *et al*, state that *"There is nothing Inherently dogmatic or anti-scientific in the notion that an articular lesion may have health consequences, or that correction of joint dysfunction may relieve symptoms and/or health."*[11]

The aim of this paper is to broaden and clarify what Gatterman called the *"clinical, political, and philosophical issues that surround the construct"* of the subluxation.[9] It is also designed to emphasize awareness of the anatomical, physiological, pathophysiological and scientific connotations associated with it as well.

THE CONTROVERSY

One area of misunderstanding that has led to some misapprehension concerning the term *subluxation* in that there are two differing interpretations of the term. The traditional medical term is defined as less than a luxation or less than a dislocation; while the chiropractic definition is much broader as it involves the clinical, neural, physiological, and anatomical ramifications of the entity.

In some ways, it was perhaps unfortunate that Palmer nominated the term subluxation over a century ago. If he had designated differently, it may well have avoided the confusion and opposition to the term adopted.[12,13]

However, it is not the first word, or indeed the first 'medical' term to have more than one meaning – such terms as *appendix*, *cervical*, and *articulation* would be examples of this. An alternative term, *somatic dysfunction* also has other interpretations.

The dilemma is highlighted by the fact that in journal publications, use of the term subluxation in the MeSH and Key Words sections tends to confound and complicate the system, confuse search engines, and adds to misunderstanding and misinterpretations between health professionals.

Despite oft-repeated medical criticism of this concept of VSC, there has never been any formal medical research of the clinical entity as there has been into other evolving concepts – some of which have been adopted by medicine with a limited evidence base, after having been initially rejected, *e.g.* medical acupuncture, integrative medicine, nutritional medicine, complementary medicine, and homeopathy. Incongruously, there appears to have been no formal research underpinning the adoption of the doctrine of manipulative medicine, it just seems to have subtly entered the allopathic fold – despite the claim that chiropractic does not have an evidence base.

Some have raised another issue as to whether the VSC in its various forms even exists.[14] This is despite ample

evidence that it does. That evidence will be summarised in this paper.

THE DEFINITION OF A VSC

It must be noted that addressing the VSC is just one part of management under chiropractic health care[15-18] and that a number of definitions of a VSC have been proffered over the years. However, this paper is not seeking to establish a definition, as that would seem a more controversial task than this subluxation debate.[3] There is already an over-abundance of polemics on the topic.

THE FOUNDING PRINCIPLE

The founding principle of chiropractic may be summarised as that *interosseous articulations – especially of vertebrae, may undergo physiological change, that is, functional and/or structural change which may affect other elements, particularly neural structures and neural function – pathoneurophysiology.*[19]

It is surprising that a base of mere opinion by some could ignore or deny a significant pathophysiological neurovertebral articular complex without evidential support from formal research, particularly when it comes to patient health, well-being, and comfort.

THE SCIENTIFIC EVIDENCE

Examples: *"In contrast to the impressive body of knowledge concerning the effects of visceral afferent activity on autonomic functions, there is, generally speaking, much less information available on the reflex regulation of visceral organs by somatic afferent activity from skin, the skeletal muscle and their tendons, and from joints and other deep tissues*. Sato A, Sato Y, Schmidt RF.[20]"*The elucidation of the neural mechanisms of somatically induced autonomic functions, usually called somato-autonomic reflexes, is essential to develop a truly scientific understanding of the mechanisms underlying most forms of physical therapy, including* ***spinal manipulation*** *and traditional as well as more modern forms of acupuncture and moxibustion*." Kimura A, Sato A[21].

"Spinal manipulative therapy can affect the resting status of somatic structures via mechanical and neurological (somato-somatic reflex) mechanisms, and this can cause a change to the afferent arm of the somato-visceral reflex. It is likely that supraspinal influences play a major role in this effect.(and further) *Such changes can occur by the direct action of a somatovisceral effect at the segmental level."* Pollard H.[22]

Degrees of evidence in support of the VSC have existed for decades. In-depth research on the subluxation hypothesis appears to add to its previously observed significance and understanding. There are some 39 papers in refereed chiropractic journals which support the neurological ramifications of the VSC. Some 23 of these are listed on PubMed. Further, there are at least 21 of these papers published in medical journals. At least 7 have medical researchers as the lead author; others are chiropractic researchers who have published in these medical journals. (Appendix 1)

In recent years, substantiating research has been published by Cramer, Henderson, Bolton, Haavik, Pickar, and especially the neurophysiologists Sato *et al*., - to list a few. (Appendix 1) No formal research could be located to challenge their findings of somatic influence from the VSC upon the ANS.

It has been demonstrated independently by Japanese medical researchers that facet joint inflammation - somatic, can affect spinal nerve roots and cord reflexes.[20,21,23]

Two other early medical authorities recognise the vertebral subluxation. Hadley[24] referred to vertebral displacement and dysfunction in 1976; and in 1971, Schmorl and Junghanns recognised it as a separate entity to the medical *subluxation*, referring to it as a "vertebral locking".[25] (See Table 1.)

Table 1

OTHER MEDICAL TEXTBOOKS WHICH RECOGNISE BIOMECHANICAL SPINAL LESIONS
'Manual Therapy in Children' – Biedermann H. 2004
'Spinal manipulation' - Bourdillon JF, Day EA. 1988
'Manual of medical manipulation' – Burn L. 1994
'Textbook of orthopaedic medicine; Vol II: Treatment by manipulation and massage. - Cyriax. J. 1965
'Musculoskeletal Manual Medicine' - Dvořák J. 2008
'Managing Low Back Pain.' Kirkaldy-Willis WH, Bernard TN. 1999
'Manipulative therapy in rehabilitation of the locomotor system.' – Lewit K. 1999
'Manipulative therapy: Musculoskeletal medicine.' - Lewit K. 2009
'Orthopaedic medicine: A new approach to vertebral manipulations. - Maigne R. 1972
'The science and art of joint manipulation. v2. The spinal column.- Mennell JM.1952
'Clinical biomechanics of the spine.' – White AA, Panjabi MM. 1978
'Spinal manipulative therapy: Russian approach.' - Pikalov A. 1995

In 1995, Pikalov outlined the widespread use and scientific justification for manipulative methods in Russia. He claimed that some 5,000- 6,000 MDs were certified in manual therapy in that country and many were well published in the Russian medical literature.[26]

These developments tend to further emphasise the contradiction between European medical attitude to the subluxation and chiropractic methods compared to western attitudes.

HISTORICAL MEDICAL PRECEDENTS

Watkins states that in 1746 Hieronymus wrote: "Subluxation of joints is recognized by lessened motion of the joints, by slight change in position of the articulating bones and by pain…most displacements of vertebrae are subluxations rather than luxations."[27]

Warbasse, a medical doctor, described the chiropractic model of a 'subluxation' in his text as early as 1918. He used the term to describe the vertebrogenic neurological implications of this clinical finding. He stated that *"subluxations of vertebrae occur in all parts of the spine*

and in all degrees. When the dislocation is so slight as not to affect the spinal cord, it will still produce disturbances in the spinal nerves…. He later refers to these as *'common subluxations'* and *'finer displacements."* [28]

Maigne also recognised sacroiliac subluxations (p390) and refers to subluxations as "minor intervertebral derangements." (p27) He associates manipulation of this "anatomopathology" with various "functional disturbances manifesting as organic conditions."[29]

Finnesson discusses a "Manipulable Spinal Lesion" but recognises that it is euphemistically called a subluxation, osteopathic lesion, vertebral fixation, blockage and somatic dysfunction. Further, he does acknowledge vertebral malposition and abnormal vertebral motion amongst other characteristics of the clinical finding.[30]White and Panjabi recognise the hypothesis of the *chiropractic subluxation* and note that *"In order for manipulation to be successful, (manipulators) must somehow produce improvement using mechanical alteration…"* [31]

Gray's Anatomy

Noted significance however, has to be attributed to Gray's Anatomy where it is stated in reference to the sacroiliac joint that *"locking may occur…"* and that *"This so-called subluxation of the sacro-iliac joint causes pain"* and that *"reduction by forcible manipulation may be attempted."* [32]

Magnuson and Coulter had earlier described sacroiliac strains and subluxations as far back as 1920.[33]

Medical interest in spinal manipulation for vertebral subluxations-related disorders, so-called visceral disorders, has been documented over some decades.[34-36] Indeed the medical literature is not devoid of usage of the term subluxation in the chiropractic sense. Medicine has not devised or persisted with a distinct term to describe this complex phenomenon noted in its own literature. It has however, adopted terms used in chiropractic and osteopathy, such as *spinal dysfunction*.

The clinical finding that chiropractors called a subluxation since 1895 has been called by a wide variety of terms – almost 300 have in fact been identified. It has been established that there are at least some 296 synonyms for the subluxation. Of these over 50% are derived from medical authors. The rest are made up from chiropractic, osteopathic and physiotherapy origins.[5]

OTHER EVIDENCE

World Health Organisation

The vertebral subluxation has already been recognised by the World Health Organisation (WHO) in its publication, *World Classification of Diseases (ICD-10),* which classifies "Biomechanical lesions, not elsewhere classified" as item M99. It further sub-classifies the VSC as item M99.1 – "Subluxation complex (vertebral)". Item M99.0 is designated "Segmental and somatic dysfunction". These come under the broader heading of "Diseases of the musculoskeletal system and connective tissue" - (M00-M99), and "Other disorders of the musculoskeletal system and connective tissue" - (M95-M99).[37]The US Medicare Office (Centers for Medicare and Medicaid) recognises the term *subluxation* in relation to spinal care provided by chiropractors.[38]

The US Agency for Healthcare Research and Quality also recognise the "vertebral subluxation in chiropractic practice – noted as the VSCP.[39]

Numerous published clinical studies with positive outcomes must indicate that spinal adjustments which address the VSC do influence patients' comfort and well being. Patient demand and a growing profession would tend to endorse that observation, as well as the plethora of anecdotal studies and the refereed literature which also supports the hypothesis.[35]

In China, the Traditional Chinese Medicine Manipulative Orthopedics Department at the PLA General Air Force Hospital in Beijing is *"Based on the hypothesis of pathomechanics of vertebral subluxation."* It originally centred on Professor Feng's hypothesis (Feng's Spinal Manipulation - FSM) and *"…was scientifically proved with the help of advanced modern equipment such as CT, MRI, thermograph and image analyzing computer software, etc. FSM therapy has been systemically and scientifically developed ever since it was medically approved and has spread over mainland China and some other countries in Asia as well now."* [40]

THE SPECIOUS LOGIC

Some have questioned the use of the term subluxation, or indeed proof of its existence. However, such reservations raise a number of queries.

If those questioning a lack of proof comprise a splinter group of chiropractors, then

- On what basis did they enter the profession in the first place, and what did they understand to be the fundamental premise upon which chiropractic was based when they practise the profession?
- If there is no proof that the VSC exists, what clinical entity do they address when they 'manipulate' a patient, and how does it differ from other segments in that spine?
- If there is no proof that the VSC exists, what do they call the lesion that they, and other professions manipulate?
- If there is no proof that the VSC exists , how do they explain the difference between a normal spine and one that they 'manipulate'?
- If there is no proof that the VSC exists, how do they differentiate between a spine without clinical signs and which is asymptomatic, with one that presents 'dysfunctional' segment-related symptoms?
- Why is palpation a standard diagnostic tool for chiropractors, and what are they seeking in conducting palpation?
- What is the difference between a vertebral segment which changes its state as a result of an adjustment/ manipulation, and one regarded as 'normal' which does not change its physiological state? How do they determine that one segment is different, if there is no 'proof'?

- If there is no proof that the VSC exists, how does a healthy spine differ from one with mechanical symptoms?
- If there is no proof that the VSC exists, how do they explain medical manipulation as espoused by medical manipulators?
- If there is no proof that the VSC exists, how would one determine if a spine does have a mechanical abnormality?
- If there is no proof that the VSC exists, how do they explain the apparent clinical results published in refereed journals and reported by patients – as shown by patient demand for their services?
- Why do they not call a *subluxation* by that name when it is recognised by so many synonyms as that term in refereed papers and medical textbooks?
- Why do they not call a subluxation or VSC by name when there are so many references to that term in refereed chiropractic papers and textbooks?
- What right do they have to call themselves chiropractors – or claim to teach *chiropractic*, if they do not adhere to what text books, history and the vast majority of the profession stand by?
- If there is no proof that the VSC exists, how do they explain or justify manipulative treatment for cervicogenic headaches, lumbogenic sciatica, and thoracogenic intercostal neuralgia?
- Where is the research cited or conducted by critics that justifies their stand that subluxations do not exist? What effort has been made to research that opinion? (To date, it seems that it is just unsubstantiated opinion, and reviews of opinions.)
- If there is no proof that the VSC exists, what is the difference between a subluxated vertebral segment which changes its state due to an adjustment/ manipulation, and manipulating one regarded as 'normal' in its physiological state?

One would have to be suspicious that a degree of selective unawareness exists - either deliberate or accidental, for there to be claims that there is no scientific basis for a hypothesis underlying the subluxation, as indicated under the *scientific evidence* mentioned earlier.

It can be stated that if there was no neurological involvement in a VSC, even at a most fundamental level, there would be no associated pain or symptom awareness, not to mention other signs and disorders identifiable by a qualified practitioner. As such, a luxation by definition, would not have associated symptoms, as it must involve more than just displacement of a bone.

It is submitted that only a dry skeleton can exhibit a subluxation without neurological (and other soft tissue) sequelae. As such, there is a need for a clear and specific term to cover the clinical entity designated here as a VSC.

Given the clinical evidence, the previous studies, as well as the ongoing research into this clinical entity, it seems impossible to deny that an identifiable, specific clinical entity exists, and that it differs from normal invertebral segmental function.

THE CONTRADICTIONS

While some may question the existence, theory, or evidence which supports 'subluxation' hypotheses, one could wonder if such an attitude is more political than scientific.

Although healthy debate is welcome and stimulating, it seems highly incongruous for individuals to enter the century-old profession of chiropractic based on what they initially understood chiropractic to be, then for them to turn around and substantially try to alter the founding precepts and general understanding of the profession. Such incongruity would apply particularly to any splinter groups whose opinions are seen as being out-of-step with the vast majority of the profession. It would be far more appropriate for them to establish their own profession under a different name.

As noted above, one would have to be suspicious that a degree of selective unawareness exists. It seems unethical and even suggestive of an inappropriate agenda for any chiropractic program, let alone a peer-reviewed, indexed journal purporting to be a *chiropractic* journal, to actively discourage and avoid use of the term subluxation.

It may be seen as somewhat misleading for the word to be removed by editors from papers submitted for consideration to publish with the result being an artificial filtering of knowledge dissemination perhaps with the intent of eradicating a sub-class of terminology from an establish health profession.

Simplistically resorting to vague terminology such as "manipulative procedures" does not clarify exactly what is being manipulated. An asymptomatic and clinically 'normal' spine would hardly be manipulated as there would be no indications to do so.[41-44]

It seems nebulous for any chiropractic journal to acknowledge the subluxation (VSC) by stating that *"In reality it's a theoretical construct."*[45] This statement is in keeping with aspects of the various *construct theories* of medicine, and cannot be seen as denying the existence of, or clinical benefits reported by patients. It must also be recognised that the there are still unknowns about how aspirin and anaesthetics work. But these are now established in medicine because 'they work'.

A recent study claimed that 3 of 16 chiropractic colleges in the US did not use the term *subluxation* in their academic catalogues. However, in using the search box on the website of those same three institutions, numerous instances of use of the term were found.[46]

For any institutional chiropractic program to discourage or ban[45] use of the chiropractic term *subluxation* that has been central to the chiropractic profession's nomenclature for over 100 years seems rather undermining. It appears to be further contradictory when papers in such a journal associated with the administrators of that program, have published using the term.[46]

Such a policy would seem inconsistent with that of the vast majority of chiropractic colleges and associations in the world.

Dorland's medical definition of a *subluxation* does not differentiate it from a *sprain*, although displacement is not mentioned in The definition of the latter, suggesting the articular bones resume their normal juxtaposition after injury. The dictionary defines *luxation* as simply a "dislocation." A 'medical subluxation' as thus defined would only be possible in a dry spine, consequently it begs a more detailed definition. Not even ligamentous injury is mentioned in the definition, which therefore portrays quite a different image.[47]

Medicine itself has adopted some alternative models of care, such as acupuncture, calling it *medical acupuncture*. It has become a recognised, if not an integrated part of medicine, yet it is still essentially a theoretical model as to how it works, or indeed what its key element of *chi* is.

One would suggest that there is less 'medical evidence' (apart from anecdotal records) underlying acupuncture than there is for chiropractic. Even so, logic would suggest that the evidence-base for all the health professions must include anecdotal evidence (as in clinical trials) as one of the evidential elements. There is no clinical health profession with a 100% evidence base of RCTs. In addition, reservations have again been raised as to the appropriateness of aspects of current EBM criteria for the clinical health professions.[48]

Questioning evidence concerning the VSC is essentially no different to the state of evidence supporting a number of medical regimens. For example, Udvarhelvi stated in 2006 that – *"Clearly, there is a lot in medicine we don't have definitive answers to."*[49] While Eddy claimed that *"only 15% of what doctors did was backed by hard evidence."*[49]

That medical journals and doctors can use the term subluxation in the chiropractic sense, and it is still denied or rejected by some, is another distinct contradiction.[36] The medical paediatrician Biedermann uses the euphemism *kinematic imbalance* to cover the same entity.[50] Lewit calls the same finding *"functional pathology,"* but also refers to *'movement restrictions'* and *disturbed function* (p33). Both describe a number of so-called visceral conditions associated with the 'vertebral subluxation.'[51]Murtagh has adopted the term *spinal manipulation* and published on the topic. He has explained "*segmental dysfunction"* as "The most common cause of back pain presenting to the doctor is *dysfunction* of the *spinal intervertebral joints*." [52]

While Bourdillon and Day are not supporters of the chiropractic hypotheses, they appear to have borrowed heavily from chiropractic for their text. Their term for the chiropractic subluxation is *spinal joint lesion*.[53]

Again, there appears to be no disputation regarding this medical recognition of these so-called lesions – only the variations on naming the vertebral subluxation.

On the other hand, Atlas recommends considering spinal manipulation of the lumbar spine for low back pain, but does not specify exactly what is to be manipulated. He has avoided using any term at all as the object to be addressed by the procedure.[54]

These medical doctors are among a number of primarily European medical doctors who have published widely on spinal manipulation. This would appear contrary to those allopathic colleagues in the English speaking countries who oppose chiropractic concepts.

While some physiotherapists (manipulative therapists) address these mechanical vertebral lesions as *spinal dysfunction*, there still seems to be a lack of a definition identifying precisely what finding they address by manipulating patients' spines. The term *spinal dysfunction* also implies purely a mechanical lesion without other involvement.

Nor does there seem to have been any reservations for use of the term *spinal lesion* or *segmental dysfunction* that some osteopaths and manipulative physiotherapists adopted. Both terms again imply merely the mechanical aspects of the VSC. In confirmation, a Medscape web site explains that manipulation has a "primary goal of restoration of diminished ROM" with no mention of subtle or apparent neural disturbance.[55]

The osteopathic definition of *somatic dysfunction* in itself does not necessarily imply related systemic effects of the lesion, and can therefore be limited or restricted in its interpretation. Like chiropractic, this has not prevented osteopaths publishing papers on a number of associated disorders, including visceral conditions.

Somatic dysfunction has been defined in osteopathy as *A defect in structure and/or function, which can be diagnosed by identifying tenderness, asymmetry, restricted motion, and tissue texture changes*.[56]

Somatic dysfunction has been associated with the term *neuromuscular lesions* in such a wide variety of conditions as dysphasia, bladder dysfunction, and tendon reflexes, and in the field of psychology, as well as with other conditions. Neuromuscular lesions have been described as:

1. in psychology, embodied neuroses. The physical manifestation of psycholo-gic defenses.
2. in neuromuscular therapy, an area of limited motion and physical tenderness.[54]

To add to the perplexity, two further definitions exist for primary somatic dysfunction. Not only are they additional meanings, but they use the same term in the offered definition. The claim that the term *subluxation* has other meanings is somewhat countered by the fact that the term *somatic dysfunction* also has other meanings and requires separate definitions to differentiate them and obviating that as an optional term.

1. any somatic dysfunction whose existence maintains an entire dys-functional pattern.
2. the initial somatic dysfunction in a pattern of dysfunction.[58]

The traditional allopathic regimen in addressing the mechanical spinal symptoms of a VSC is with pharmaceuticals (*e.g.* NSAIDS, steroids or analgesics). This may seem a contradiction, by addressing a physical condition with a chemical approach.

All such models and definitions incorporate limited elements of the more inclusive chiropractic subluxation. They do not outline the potential for wider complications incorporated in a total complex. Such a tendency would tend to overlook the clinical significance of the disturbed spinal segment, and could limit the possibility aetiology and diagnosis of some conditions.

THE DOUBLE STANDARD

If the same standard of evidential proof demanded of chiropractic was to be applied to medicine, a double standard would be revealed. In its basic form, there are the numerous drug withdrawals from markets that occur on a monthly basis, published papers critical of author independence, not to mention the medical adoption of the terms *adverse events*, *side effects* and *iatrogenic disease*. On this basis, it is submitted that there is more of a positive foundation for chiropractic care, and in particular its *raison d'être*, the VSC.

The following quote from Scientific American is notably relevant:

We could accurately say, Half of what physicians do is wrong or Less than 20 percent of what physicians do has solid research to support it. Although these claims sound absurd, they are solidly supported by research that is largely agreed upon by experts. Yet these claims are rarely discussed publicly. It would be political suicide for our public leaders to admit these truths and risk being branded as reactionary or radical. Most Americans wouldn't believe them anyway. Dozens of stakeholders are continuously jockeying to promote their vested interests, making it difficult for anyone to summarize a complex and nuanced body of research in a way that cuts through the partisan fog and satisfies everyone's agendas. That, too, is part of the problem.[59]

At least the more recent Scientific American figure seems an improvement on the British Medical Journal's editorial in 1993 which stated *...only 15% of medical interventions are supported by solid scientific evidence...(and)...only 1% of the articles in medical journals are scientifically sound ... many treatments have never been assessed at all ...*[60]

To complicate health issues further *In a review of studies published in The Cochrane Library, researchers found that both doctors and patients are largely unaware of these different and equally accurate ways of presenting the same information, and that the format in which data is presented can have a profound influence on health care decisions.*[61]

The concept of evidenced based medicine is also under question. It would appear that it does have shortcomings. Rosner states that *Evidence-based medicine (EBM) is beset with numerous problems.* He concludes that *Finally, the blinding concept of randomised controlled trials is particularly problematic in applications of physical medicine. Examples from the research literature in physical medicine highlight conclusions which are open to debate. More progressive components of EBM are recommended, together with greater recognition of the varying audiences employing EBM.*[62]

But Rosner is not the only one to raise reservations about EBM. Pring cites a very relevant quotation by noting *... that the definition of evidence remains contested, and there has not been enough attention to values, perceptions and the consumer perspective.*[63] In discussing the appropriateness of EBM, Borgerson noted that *The validity of evidence-based medicine (is) the subject of ongoing controversy*.[64] In 2010 Kerridge raised the issue of neutrality in EBM.[65] This is not to say that EBM does not have a role, but that it may not be the total answer.[66,67] Pirotta claims that *It is estimated that as little as a quarter of conventional medicine is based on Level-1 evidence*.[68]

It can be noted that although an evidence base is essential, patients must still be content with the treatment and the outcome. It is possible that they may at times prefer other forms of treatment in achieving satisfactory results.

It should also be noted that *If the chiropractic approach to low back pain had been abandoned early on due to the lack of research data, we would never have known its superiority to other conservative treatments*.[69]

Within medicine itself, there is divided opinion, as more than 50% of Australians seek some form of alternative health care annually. A past president of the AMA, and current president of the Australasian Integrative Medicine Association, Dr Kerryn Phelps, states that opposition to evidenced-based complementary medicine options is *prejudice dressed up as opinion* and that it is *… completely unbalanced, completely out of touch, and it's in denial; of the level of scientific research …* Dr Phelps goes further in response to recent criticism by Prof Dwyer by claiming that *He doesn't work in this area and doesn't know what we do. The published data is there. He is either unaware of it, or he's not looking* she says.[70]

Most pertinently, the statement by Knipschild in the Lancet in 1993 carries as much importance today as ever. He stated *It is a pity that the message does not appear to have been heard…. They (patients) continue to choose the treatment that they expect to give them the best overall benefit*.[71]

One must mention an episode of tacit acceptance of chiropractic by politico-medical forces in California in the late 1950's. At that time the chiropractic (and osteopathic) professions were offered to merge with the medicinal profession by means of a simple swap of certificates, and medicine would therefore drop all opposition to the two professions. Osteopathy accepted that offer - chiropractic did not. Such a takeover would suggest political expediency to the extent that any claim of a lack of scientific validation was false, compromised, or more likely, used conveniently to protect a monopoly.[72]

In the US chiropractors are now have positions in medical hospitals, so it would appear that the Australian signatories are quite out of date and out of step.[73] Chiropractic health care is also provided through St Michael's medical hospital in Toronto Canada.[74]

THE POSSIBLE SOLUTION

In order to avoid future confusion, a modified term such as VSC, or perhaps another satisfactory compromise may clarify the situation. Because of its widespread use, VSC would be the preferred terminology. It would be a Herculean task to change the profession's lexicon. There may be however, other elements which could serve to ameliorate the situation.

- That the term Vertebral Subluxation Complex (VSC) be defined within the introduction of all papers where it is used for perhaps five years – or at least until it is widely recognised and adopted
- The ICD to be amended to include the Vertebral Subluxation Complex (VSC)

- Another answer could be the adoption of a second term into the ICD - that being the Vertebral Subluxation Syndrome (VSS), a term advocated by Gatterman in 1992[75]
- The concept was endorsed by Fuhr in 2002.[76] There is also Jackson's text *The Cervical Syndrome* as a precedent.[77] The VSC could cover the pathophysiological or biological finding, and the VSS to represent the clinical presentation, the subluxation-related condition.
- The expression *Articular Subluxation Complex* (ASC), should be also be required as a means of covering non-spinal articulation disturbance and to differentiate it from a sprain.
- It is also essential that the WHO amend its terminology and adopt the generally accepted terminology.
- It would also then be essential for the VSC, VSS and the ASC to be included in the MeSH or Key Words listings for journals.

SUMMARY

This commentary has attempted to demonstrate:

- that there is widespread recognition of the multifaceted subluxation – the VSC

- that it has been recognised in medicine

- that there is a sound scientific basis for its recognition

- that there is sufficient evidence of the subluxation to justify its use

- that there is strong emerging research supporting this subluxation hypothesis

- that its recognition goes back over 100 years

- that subluxation of vertebrae is a recognised and accepted term – albeit as a VSC

- that the term subluxation is used in the chiropractic and medical literature and textbooks

- that evidence in support of the VSC hypothesis is a comparative situation to evidence supporting other accepted theories in other health professions, including medicine.

- that medicine, chiropractic, osteopathy and other healing sciences are all based on theories.

Some may advocate that any confusion is produced by the use of the single term *subluxation* that has lead to this dilemma, when it already has other meanings. That is a solvable situation.

Given the weight of evidence and common sense, the truly scientific approach would be for cynics to acknowledge that there is sufficient reason to justify its continued use, and to call for further research[78] to investigate why VSC's seem to have the effects and benefits they do; and that addressing them seems to resolve many symptoms and signs as suggested by Wenban and Vernon. Research has yet to be produced which *disproves* the existence and significance of the VSC.[78,79]

Those who are critical of the chiropractic hypotheses must therefore also be critical of those of their medical manipulation colleagues who not only support, practise, publish, and collaborate it, but in some cases even attend chiropractors as patients.

CONCLUSION

There does appear to be some justification to the advisability of the continued use of the solitary term subluxation. Some alternatives appear to be somewhat too broad, other have more than a solitary meaning. Given the recent usage, perhaps the best compromise for this clinical entity is the Vertebral Subluxation Complex (VSC).

The term 'subluxation' used in the chiropractic sense has far to many metaphors in the literature to be ignored as a clinical entity. It has been in use medically as well as 'chiropractically' for far too long and accepted far too widely to be dismissed. The explanatory adjuncts *Vertebral* and *Complex* to comprise the Vertebral Subluxation Complex, could satisfy most contrary views and differentiate it from an uncomplicated minor dislocation or sprain in the medical sense

There would also have to be a case for dual terms to be adopted – the VSC as well as the Vertebral Subluxation Syndrome (VSS).[80] The former would describe the patho-anatomical findings, while the latter would incorporate the clinical signs and symptoms – the pathophysiology.

It is submitted that the terms, particularly in relation to the spine, Vertebral Subluxation Complex (VSC) and Vertebral Subluxation Syndrome (VSS) would be adequate to cover the various clinical presentations associated with it.

It is further submitted that there is ample evidence even at this stage, for the existence of an identifiable pathoneurophysiological intra-articular clinical finding that is only now receiving broader recognition, and for it to be more clearly designated.

It is now a matter of just modifying the WHO classification, as well as incorporating the terms in the ICD and MeSH classifications.

Given the evidence available, it would behove critics to now outline precisely what they have against the use of the term subluxation, particularly in its revised form of a VSC or indeed a VSS. If, as some claim, there is no proof that it exists, they should then be required to describe and define what it is that they are manipulating. One could hardly find signs and symptoms to justify manipulating a normal functioning spine. A somatic dysfunction or other term in use would also need proof of existence to satisfy these same critics and justify intervention. Indeed manipulating non symptomatic patients inhibits reflexes.[81]

Perhaps detractors would be happy with a term like 'Pathophysiological Neuromechanical Articular Complex' (PNAC), however the controversy begins all over again!

Given the strength of evidence and the inter-professional recognition of the VSC as outlined, further research programs on the hypothesis are welcome and current research is most encouraging.

The topic is certainly worthy of investigative research, with the hope and expectation of further understanding of its role in health care. The goal would be for the hypotheses to be whittled down to a single definitive model of the VSC. It seems unlikely to the author at this stage that a conclusive finding would deny its significant biological influence and contribution as a legitimate form of health care for certain conditions.

In essence, the scientific basis for the vertebral subluxation complex is on solid ground. Critics are either unaware of, or choose to ignore the published research material that would enlighten them.

Furthermore there is sufficient evidence to justify continued research into the subluxation hypothesis and continued utilisation of that hypothesis in the provision of aspects of health care.

The chiropractic profession started with an hypothesis based on an observation, it has rigorously tested and clinically proved that hypothesis. Science has not disproven it.

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APPENDIX 1

CHIROPRACTIC JOURNALS

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The Chiropractic Care of an Infant Female with a Medical Diagnosis of Strabismus: A Case Report.

ANDREA L. PARISIO-FERRARO and JOEL ALCANTARA

ABSTRACT: *Objective:* To describe the chiropractic care of an infant female with a medical diagnosis of strabismus. *Clinical Features:* An 18-month-old female with strabismus and a history of surgical care to correct her visual dysfunction is presented. Neurological examination revealed primitive reflexes with Galant's and Moro retained. No abnormalities were detected with the rooting, palmar, plantar, tonic neck, and Babinski's reflexes. Pupillary and accommodation reflex were unremarkable. The positions of cardinal gaze revealed difficulties of the left eye with upward movement and abduction. The right eye revealed slowed and awkward movements throughout the entire test. Inspection of the eyes revealed bilateral esotropia. *Intervention and Outcome:* The patient was cared for with chiropractic spinal adjustments in combination with cranial-sacral therapy with positive outcome. The patient's strabismus improved as confirmed by ongoing consultations with an ophthalmologist. *Conclusion:* This case report provides supporting evidence that infants with strabismus may benefit from chiropractic care.

INDEX TERMS: (MeSH): CHIROPRACTIC; STRABISMUS; ESOTROPIA; HEALTHCARE

Chiropr J Aust 2013; 43:15-8.

INTRODUCTION

Strabismus or esotrophia, more commonly known as cross-eyed, is a manifest misalignment of the visual axes and one of the most common childhood visual disorders, occurring in 3-4% of the population.[1] In 1974, Graham reported a prevalence of 5.66% based on an observation of 4,832 children born in the City of Cardiff.[2] In a survey of 60,000 optometric eye examinations, each with orthoptic assessment, Stidwill[3] found that 5% had a binocular vision anomaly. An estimate of the prevalence rates found that of the 3,075 binocular anomalies, 74% had concomitant strabismus. Recent reports describe the prevalence of pediatric strabismus as ranging from 0.12% in 1.5-year-old Japanese children[4] to 20.1% in a cohort of low birth weight English children.[5]

In a study to assess the psychosocial implications of growing up with and living with socially noticeable strabismus, Satterfield and colleagues[6] found that indeed, psychosocial difficulties relating to socially noticeable strabismus are not just a problem for school-children but also for teenagers and adults. In addition, the child with strabismus exhibit delayed achievement of developmental milestones. For example, they demonstrate impairment in sensorimotor development and gross motor milestones.[7] To a child who is learning to grow and develop, this places considerable stress on learning, balance and crawling, walking and position sense and can be very stressful for the child to understand and interpret their environment.

Treatment of strabismus in children can range from the very simple such as an eye patch[8] to the use of corrective lenses, the use of botulinum toxin[9-10] to invasive surgery.[11] These treatment options have poor compliance[7,] have questionable effectiveness and risk of adverse events.[10]

In the interest of evidence-informed practice and explore for the possibility of chiropractic as a complementary and alternative approach to the care of the child with strabismus, we present this case report.

CASE REPORT

The mother of an 18-month-old infant presented for chiropractic consultation and possible care. The infant's mother was concerned about the cosmetic appearance of her daughter's eyes due to strabismus and the possible effects it may have on her development and socializing skills. The history examination revealed a car accident occurring during the 2nd trimester of her pregnancy with the exact week of gestation as unknown. The mother was examined at a hospital for possible injuries but was released from the lack of need for hospitalization and further medical care. She did however experience low back pain into her sacrum region as a result of the motor vehicle collision but she described it as minimal discomfort and did not seek advice or therapy. The child's mother indicated that she gave birth to her daughter at the hospital, which was induced on her due date. Total labour time was 5.5 hours, including the third stage of labour. No forceps or suction was used, although the child was OP (occiput posterior) presentation.

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This study was funded by the International Chiropractic Pediatric Association, Media, PA and Life Chiropractic College West, Hayward, CA
Conflict of Interest Notification: The authors declare no conflict of interest

Received: 5 October 2012, accepted 15 January 2013

Following the birth of her child, the infant's mother indicated that her daughter had a head lean to the right side, and preferred the left breast to feed. No treatment was given and no plagiocephaly was noted. The patient was also diagnosed with congenital hip dislocation at birth and was in a brace for 3 months from 7 weeks of age. At 5 months of age, the patient's eyes were noticeably not "straightening up" and was referred to a eye specialist who prescribed an eye patch to be worn from 6 months of age for 15 minutes every second day. The patient had bilateral esotropia with the left eye more dominant. However, depending on the angle of her head lean, there was a noticeable difference in her eyes suggestive of accommodation esotropia. After the use of the eye patch, glasses were prescribed and the patient continued to wear these glasses 2 years later. Bilateral medial rectus recession surgery was performed thereafter and post-operatively, the patient's left eye appeared to improve despite the right eye appearing more prominent with esotropic features. The patient crawled at 10 months of age and walked at 23 months. Postural examination revealed the patient's right pelvis and right shoulder were more elevated compared to the left. Her left foot also had noticeable external rotation compared to the right.

Neurological examination revealed primitive reflexes Galant's and Moro as retained. No abnormalities were detected with the rooting, palmar, plantar, tonic neck, and Babinski's reflex. Pupillary and accommodation reflex unremarkable. The 6 positions of cardinal gaze revealed difficulty of the left eye with upward movement and abduction, the right eye revealed slowed and awkward movements throughout the entire test. Inspection of the eyes revealed bilateral esotropia. Upon interaction with the patient, she was withdrawn and shy. When playing with toys, she had a preference to use her right hand for 90% of the tasks.

Chiropractic examination revealed the following subluxation listings: C_1 and S_2 vertebral bodies as right posterior with cranial listings of the occiput in extension on the right with sphenoid torsion on the right. Based on the history and physical examination findings, the patient was diagnosed with vertebral subluxation complex of the spine and cranial-sacral system complicated by strabismus. The patient's mother consented to a trial of chiropractic care. Adjustments utilizing the Activator instrument were performed along with cranial sacral therapy at weekly frequency of 4 weeks and the fortnightly adjustments for 10 months.

A medical examination suggested no need for a second surgery and a greater improvement in the patient's eye alignment and vision. Given the patient's positive response to care, the patient's adjustment frequency was scheduled to three weekly and the patient continues to receive chiropractic checks at this intensity. The patient's mother was very keen to have her daughter continue to receive chiropractic adjustments for wellbeing. The patient's mother prior to beginning chiropractic care understood a guarded prognosis. After the third adjustment, the patient's right eye was centralizing and did not have obvious esotropic features. Examination of the patient's cardinal gaze found ease of movement and fluidity in both eyes. During the trial of care, the patient's posture had also improved. The patient was reported by her mother as sleeping better and overall was a happier little girl. Approximately 6 months into care, the patient's eyes had improved in their appearance and the 6 positions of cardinal gaze demonstrated no lag time or difficulty with superior movement and abduction. The patient was using her glasses with less frequency and skilled tasks had improved with both hands. Her balance and coordination had improved with greater propensity to maintain a standing upright posture. Upon neurological and primitive reflex examination, both Galant's and Moro's reflexes were no longer present. According to the patient's mother, the patient's medical specialist examination resulted in great improvements in her testing with no need for further surgery that was previous thought to be required. The patient's vision continues to improve and as well as her overall socializing with other children. The patient's parents were very pleased with the results of chiropractic care, as was her ophthalmologist.

DISCUSSION

Strabismus is a leading risk factor for the development of amblyopia, the partial of complete loss in visual function due to inadequate or abnormal stimulation during the development of the visual system and undetectable structural abnormalities. This relationship between amblyopia and strabismus differentiates pediatric from adult- onset strabismus, where visual function is less likely to be irreversible. The importance of addressing strabismus during childhood cannot be overstated to decrease the occurrence of amblyopia, maximize stereopsis function, and improve the visual axes of the eyes for cosmetics.

The general etiologies of strabismus are many and beyond the scope of this manuscript to fully address. General causes include primary myopathies (*i.e.*, due to trauma) of the extraocular muscles, disorders of the connective tissues that comprise the globe's gimbal system (i.e., dysfunctions in EOM insertions and pulley action), peripheral disorders of nerves controlling the muscles of the eyes (*i.e.*, acquired peripheral ocular motor neuropathy), and central disorders of fusional vergence commands (*i.e.*, intermittent exotropia, accommodative esotropia.[12]

With respect to the diagnosis of strabismus in the pediatric population; from a chiropractic perspective, the importance of early detection and co-management for the initiation of treatment to prevent the consequences of strabismus (*i.e.*, amblyopia and decreased quality of life cannot be overstated are of paramount importance in pediatric care.[13] In the physical examination and diagnosis of the child presenting with possible strabismus, a simplified and practical approach to determine the normality or abnormality of the motor and sensory system, both in the primary as well as other positions of gaze is paramount. Towards these efforts, we acknowledge and recommend to the reader the article by Thomas.[14] According to Thomas, the aim of the clinical examination is to address the following questions:

1. Is fusion present under "real life" conditions?;

2. Is there a deviation (phorialatent squint; or tropia manifest squint); if so, what, if any are the compensatory mechanisms (fusional vergence) that the patient uses to compensate for the deviations?

3. What is the measurement of the deviation (distance as well as near)?; and

4. Determine the existence and nature of the suppression mechanisms if any. In terms of the role of the chiropractor, we believe the determination of fusion, fusional vergences and deviations utilizing the cover tests (the cover/uncover test, the cover test and the alternate cover test) should performed. Further assessment to address the rest of the above questions listed should be addressed with a referral to the appropriate specialist for co-management.

TREATMENT OPTIONS

As outlined previously, the medical treatment options for children with strabismus span the conservative (*i.e.,* non-surgical) to the not so conservative. The use of the eye patch[8] aims to force the brain to interpret images from the strabismus eye, allowing the eye to become more functional. However, this approach will not change the angle of the strabismus. With corrective lenses, the child's line of sight is re-directed with the aim of straightening the eye. Botulinum toxin is used to treat spasms of the ocular msucles[9-10] while surgery may be used to modify one or more of the extraocular muscles' position and/or length.[7] The aforementioned treatment options have poor compliance[8], questionable effectiveness[9] and risk of adverse events.[15]

The care of the patient with visual problems is not without controversy. Even in mainstream healthcare. For example, consider behavioral visual therapy as performed most commonly by Doctors of Optometry. In a critical evaluation of the evidence supporting the practice of behavioural vision therapy, Barret[16] concluded that a large majority of behavioral management approaches are not evidence-based, and thus cannot be advocated. The American Optometric Association however affirms its long-standing position that vision therapy is an effective therapeutic modality in the treatment of many physiological and information processing dysfunctions of the vision system.[17] Similar to the optometrists, we are too keenly aware of the dissonance between the published assessment of clinical effectiveness to that of one's clinical experience/expertise and the needs and wants of our patients.

CHIROPRACTIC CARE

As a further context to our discussions on the possible effectiveness of chiropractic care in the patient with strabismus, we performed a review of the literature by consulting Pubmed [1964-2012], MANTIS [1964-2012] and Index to Chiropractic Literature [1984-2012] using the search criteria "strabismus" and related words (i.e., esotropia, exotropia) in Boolean combination with "chiropractic." Our inclusion criteria for review specified chiropractic care in a pediatric patient (i.e., 0-18 years of age) with strabismus as a presenting complaint written in the English language. Our search found 4 articles with 2 satisfying our inclusion criteria involving children. Given the paucity of published literature, we decided to include all 4 articles in our review. Sweat and Pottinger[18] recently described the care of a 75-year-old female presenting with strabismus in addition to gait ataxia, fatigue, blood pressure fluctuations, seizures of two weeks duration, and a history of concussion. The patient was cared for with Atlas Orthogonal Technique with reported resolution of the all the patient's presenting symptoms. Salminen and colleagues[19] described the care of a 3-year-old boy with Joubert Syndrome presenting with tachypnea, occasional apnea, hemifacial spasm, nystagmus, delayed motor skill development, hypotonia and strabismus. The patient was cared for with the National Upper Cervical Chiropractic Association (NUCCA) technique. The patient's hemifacial spasm resolved with slightly improved coordination but no other significant change was reported as a result of the chiropractic care. Jamison and colleagues[20] retrospectively examined a cohort of children presenting to an optometrist. The subjects consisted of 6 children referred for chiropractic care with another 6 children acting as controls. The main outcome measure was phoria as measured by the Prentice card system. Parametric t-test detected no statistically significant differences between the two groups but the more appropriate non-parametric testing (Mann-Whitney U test) did detect statistical significant differences. The authors briefly discussed the neuro-vascular and neurophysiological effects of the chiropractic adjustments to the cervical spine. The former involved irritation of the cervical sympathetic chain resulting in Barre Lieou syndrome that ultimately affects the vascular supply to the motor and pre-motor areas for gaze control. In the latter theory, it is theorized that facilitated/aberrant cervical proprioceptive afferents projecting into the vestibular and other pre-motor areas of the brain results in dysfunctional gaze control. Chiropractic adjustments presumably correct the irritation to the cervical sympathetic chain or the aberrant proprioceptive afferents. Wiener[21] described the resolution of strabismus in a 2½-year-old girl secondary to infantile torticollis and chronic neck and head pain. The patient received chiropractic care utilizing the Neural Organizational Technique and advice on dietary restriction with the removal of sugar from the child's diet.

Despite the reported improvements in the patient presented in this case report, we caution the reader on the lack of generalizability of case reports in general. Lacking a control group, the case report is fraught with competing possible explanations on the reported improvements seen in the patient. These include the placebo effect, regression to the mean, the effects of the natural history, the demand characteristics of the clinical encounter, and subjective validation challenge. Although a temporal association was observed (i.e., care provided with concomitant improvement in the patient's symptoms), it is not sufficient to make cause and effect arguments on its own.

CONCLUSION

This case report provides for the possibility that a child with strabismus may benefit from chiropractic care vis a vis adjustments to both cranial and spinal structures. We encourage continued research in this area to examine the salutary effects of chiropractic care.

ACKNOWLEDGEMENTS

The authors thank and acknowledge the assistance of Ms. Barbara Delli Gatti, MLS from the Life West Chiropractic College Library for her expertise in the preparation of this manuscript.

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Mechanic or Gardener? Contrasting Philosophical Models Underlying Health Care

DENNIS RICHARDS

ABSTRACT: This paper traces the historical development of some philosophical models in science as this relates to health and disease. In particular, it examines, compares and contrasts the 'Western' allopathic model (the doctor as a mechanic who fixes the patient) with the 'Eastern' model of health (how this person is relating to the universe and the results of that relationship). Some basic principles of chiropractic are examined in the light of these models.

INDEX TERMS: MeSH: CHIROPRACTIC; PHILOSOPHY. Other: WELLNESS PRACTICE, CHIROPRACTIC; INNATE INTELLIGENCE.

Chiropr J Aust 2013; 43:19-24.

INTRODUCTION

According to Rosen, the task of philosophy is to ask what is the best way of life for this present journey of existence.[1] As we humans differ from each other, it should not be surprising that we often decide on different ways for our journeys, as individuals and as groups. We make these decisions consciously or subconsciously, based on different types of evidence, selecting that which seems most relevant, reliable and compelling to us.[2]

Often we unthinkingly follow Nietzsche's herd mentality, and do what others seem to be doing.[3] This is particularly true in the areas of health and disease. Few of the public realise that much of what is on offer in this important, sometimes life or death matter, is largely ultimately based on philosophical models. Few of those who work in this area have consciously and critically examined the model or mixtures of models with which they chose to practise, let alone other models.

This paper begins with a brief review of the concept of philosophical models. It then examines, compares and contrasts interpretations of what I term the 'Western' allopathic philosophical model (with the doctor as a mechanic 'fixing' the 'broken down' patient, mainly using drugs and surgery) and the 'Eastern' model of health (which addresses how this person is relating to the universe, and the results of that relationship). In addition, some basic principles of chiropractic are examined in light of these models.

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This paper is based on one submitted as part requirement for the completion of the New Zealand College of Chiropractic Academy of Chiropractic Philosophers program.
Received 18 January 2013, revised version 3 February, accepted 10 February 2013
No conflict of interest noted

PHILOSOPHICAL MODELS

In understanding what a philosophical model is, I take the word 'model' as 'a typical or specific form or style.'[4]

The word 'philosophical' is not as easy to comprehend. According to one dictionary of philosophy, 'those who study philosophy disagree to this day on how they should define their field … philosophers still find the very definition of their field controversial.'[5] To avoid this controversy, a simple and practical understanding of philosophy will be used in this paper - that of Rosen in its opening sentence. To that will be added the understanding that, 'philosophy is a condition of the psyche and so a way of life, rather than solely a system of true propositions,' to emphasise the traditional understanding of philosophy as a way of life, with practical implications and results.[6]

This approach seeks answers to the important questions of life. In the context of this paper, it seeks answers to important questions to do with health.

GREEK ORIGINS

Our Western way of thinking, and therefore many Western philosophical models and behaviours, is based on those of the ancient Greeks.[7] Indeed, DD Palmer, the founder of chiropractic, wrote that the principles of chiropractic were not new, but were directly from the Greeks. We can therefore gain insight into how we think and what we do today by examining those roots.

The tradition that Thales of Miletus predicted an eclipse of the sun in 585 BC has been marked as the beginning of philosophy and science in Western thought.[8]

Heraclitus of Ephesus (born c. 540 BC) later argued that the logos, the single divine law of the universe, '… holds always but humans always prove unable to understand it … most live as if they had their own private understanding …

and… stuff themselves like cattle.' He posited that although nature is difficult to understand, the best way to approach life is by thinking correctly, seeking wisdom, speaking the truth and paying attention to and living in accordance with nature. Although it may not appear to be so, all things are connected and one, and the only constant is change. Even something as powerful as the sun cannot overstep its boundaries without being found out and paying a price.[9] In these thoughts we can detect the concepts of universal intelligence, wholism, and the need for balance and harmony that echoed in the writings of DD Palmer and also in some concepts of ancient Chinese philosophy. These are in contrast to many principles of modern Western medicine.

Parmenides of Elea (born c. 515 BC) agreed with Heraclitus that the opinions of mortals were generally unreliable, but with little else from his predecessor. The Elean believed that nothing changed, and that this and truth could be known by 'true conviction.'[10] Thus, as in the belief system of modern Western science, the truth about things could be truly known.

Classical Greek thought on health came to be divided into two main schools. These continue to have immense influence on the ways we approach matters of health and disease today. Their origin lies in the most prominent pre-Hellenic healing deity Hygieia, who symbolised health and represented the concept that those who lived wisely and in moderation would maintain their health.[11] Religious and societal trends eventually led to goddesses such as she being repositioned as relatives of more powerful males, and she was demoted to being the daughter of the hero and main healing god Asklepios.[12] Today her approach might be called hygiene, health promotion, disease prevention, or wellness lifestyle. Palmer wrote, 'chiropractic will be valued for its preventative qualities, as much as for relieving the cause of ailments.'[13]

Hygieia's mythical sister was Panakeia, which meant 'All-Healer', and who represented the knowledge and use of remedies.[14] Today this approach might be known as allopathic therapy against disease, and it continues to be the most common approach to the treatment of disease in the Western world.

These concepts developed into the two main schools of thought, one based on the Greek island city state of Kos and the other at Knidus.

THE KOAN MODEL

The writings of the Koan teachers are known as the Hippocratic Corpus. They included a focus on well-being, on the person (rather than on the disease), and on the importance of physical observation and examination, including understanding of the person's lifestyle, behaviour and emotional state. The naming of the disease – diagnosis – was not of great importance. Disease was seen as a natural process, resulting from being out of balance with natural life habits, rather than as punishment from the gods or invasion by agents external to the body. Maintenance of health and recovery from disease were understood to come from being in balance with nature (physis) and from life habits that supported the life force. The role of the physician was to guide the person back to balance with nature, so the life force could return her to health, via vis medicatrix naturae. This conservative approach involved relatively few remedies, as excessive intervention into matters of nature would be considered hybris on the part of the physician.[15,16] This is congruent with Palmer's view of the origins of health, as his 1910 book included the following from Colville:

> 'Dame Nature is beneficent, her laws are wise and true.
> To learn and then obey them is all we have to do.
> And when we wisely work and plan the better way to learn
> No illness will exist, because its only when we turn away from nature's guidance we into error stray;
> This is the only reason that you are ill today.'[17]

It also seems to be in accord with chiropractic philosopher RW Stephenson's view, as he wrote that, 'chiropractic is a philosophy, science and art of things natural …'[18]

THE KNIDIAN MODEL

In contrast, the Knidian model stressed a focus on the disease rather than on the person, and elaborate diagnosis based on symptoms. Diseases were believed to be entities or external forces that became situated in body parts. Accordingly, treatment was directed against the invading disease rather than at supporting the life force. Remedies were more commonly used.[15] Of this approach, Palmer wrote: 'The whole object was to find an antidote, a specific for each and every ailment which could and would drive out the intruder, as though the disorder was a creature of intelligence.'[19]

In contemporary terms, the Koan model could accurately be described as 'healthcare.' On the other hand, the Knidian model is reflected in the philosophical model of what is commonly and erroneously termed 'healthcare', but should more accurately be called 'disease and injury treatment.' I will now trace the development of this model.

REBIRTH

In 1453 AD an event occurred as a result of long-term historical trends and which had enormous impacts on many aspects of Western life in the following centuries. In 312 AD the Roman emperor Constantine had converted to Christianity, and in 330 he moved his imperial capital east from Rome to Byzantium, which he re-named Constantinople. That city is now known as Istanbul, in Turkey. In 476 the Roman Empire in the west finally disintegrated and Europe entered the Dark Ages. Many scholars from the western part of the Empire had been gradually seeking safety by moving to Constantinople before that collapse. Then, nearly a thousand years later, the encroachment on Constantinople by the Ottoman Turks had led to a reversal in the movement of Greek and Latin manuscripts and those who studied and taught them back to what is today called Western Europe, particularly to the northern Italian city-states.[20] This trend, which concluded with the fall of the city and the end of the remnants of the Eastern Roman Empire in 1453, contributed to a Renaissance of interest in and learning of the classics and the accelerated development of thought and knowledge in many areas, including science and health. Galileo (1564-1642), influenced by the ancient Greek atomism of Leucippus and Democritus, and the empirical materialism of Aristotle (384-322 BC), had sought to understand the movements of

the solar system.[21,22] Francis Bacon (1561-1626) declared that Man had been created by God to interpret and hold dominion over nature. It was therefore Man's duty to study natural science and Bacon equated knowledge with power. The word 'knowledge' derived from the Latin scientia, so science was power.[23] Rene Descartes (1596-1650) established a philosophical basis for this new understanding of science. He delighted in the 'certitude' of mathematics and '… judged that no solid superstructures could be reared on foundations so infirm …' as the philosophies that had preceded his time.[24] Rejecting 'as absolutely false' all opinions that he supposed had any ground for doubt, he developed four logical precepts that he reasoned would enable him to arrive at absolute, certain knowledge.[25] The second and third of these required reduction of the matter in consideration into simple parts and then thinking from that.[26] Descartes' described his cogito - 'I think, therefore I am' - as the first principle of his philosophy, and, from that, argued that his mind, by which he was what he was, was 'wholly distinct' from his body.[27] That body, and the rest of the universe, were regarded as purely material non-vital objects, so all the physical world and its related events could be understood as machinery, created by God and subject to His mechanical laws. These concepts reinforce the reductionism, separation of mind and body, materialism and consequent mechanism that are so much a part of the modern Western medical model, and so different from traditional chiropractic and Eastern views. According to Pellegrino and Thomasma, 'Cartesianism is the unspoken philosophical substratum of contemporary medicine – the source of its great strengths and equally of its deficiencies.'[28] Descartes' determination that fixed and absolute knowledge and laws existed and were knowable was then built upon by Isaac Newton (1642-1727), who further developed the linear cause and effect method of explaining the material world and the mechanical worldview.[29] According to Channel, this perspective, the 'clockwork universe', is characterised by the belief that the universe functions like a machine, particularly a clock. Observed phenomena can be explained as inert, passive pieces of material interacting with other pieces of matter through contact or forces. Change is the result of these interactions, which are governed by predictable mathematical laws. Thus all phenomena can be comprehended by reducing complex problems into smaller parts and analysing them, and the whole can be explained by understanding its parts. These perspectives were also applied to the anatomy and physiology of living things, so mechanical concepts were used to explain activities such as respiration, circulation and thought.[30] The living organism as a mechanical system remains the model for much of thinking in science today, including medicine, notwithstanding the discoveries of quantum physics. Palmer acknowledged this model, at least at one stage of his career. In 1906 he was quoted as follows:

> 'A human being, like inanimate machines, should be examined occasionally, if any part is found to be displaced, adjust it, using as much good sense so as you would in repairing a watch, organ or steam engine.'[31]

THE DOCTOR AS MECHANIC

According to Lipton, this model posits that disease or dysfunction can be understood at the microscopic level as an effect of a malfunction in one of the steps of a chain of chemical processes. At the microscopic level, for example, if a drug molecule can be developed to replace or repair the problem step, a cure can be expected.[32] At the macroscopic level, clogged arteries resulting from poor living habits can be 'fixed' by replacing them surgically with arterial tissue harvested from elsewhere in the body.

The philosophical model at the basis of Western medicine can then be represented as follows. The human can be understood as a living machine. The heart functions like a pump, the kidneys as a filter, the brain like a computer, and the nerves like telephone wires. This body machine can best be understood and its problems treated by breaking it down – reducing it, in Cartesian fashion, into systems, organs, tissues, cells, organelles and molecules. The human in a condition of injury, dysfunction or disease therefore needs a 'mechanic' to 'fix' her. The doctor acts as that mechanic, actively and heroically using the powerful products and procedures of medical science and technology to repair on the patient – to 'cure' them. The patient is the passive recipient of treatment, or, as it is euphemistically termed, 'healthcare'. Standardisation is important in facilitating the work of the medical mechanic. Established, standardised causes of diseases lead to standardised diagnoses and the standardised treatment protocols referred to as clinical practice guidelines.[33,34]

Many considerations arise from this model. It requires the maximisation of similarities between individuals and minimisation of their differences. This enables medicine, in conjunction with science and technology, to be practised on a basis of mass production, similar to that in industry, as mass medicine. Something called 'healthcare' can be commoditised, sold and delivered through a 'health care delivery system' by 'health care providers'. One attends to one's health by purchasing products and services from others. Further reductionism would lead to specialised approaches. Chemists might regard the body as a chemical factory, and seek to understand it and its malfunctions as aberrations in the production or elimination of molecules. Synthetic chemicals could be manufactured and sold for use in intervention in these problems. Such an approach might lessen the desire for understanding of the broader underlying causes of disease conditions and the addressing of them.

Physicists could view the body in terms of its atomic structures. Ionising radiation, magnetic forces and ultrasound waves could be used to visualise internal structures and for treatment involving the destruction of pathological tissues.

Engineers could be the most obvious Cartesians, and view the body as a collection of mechanical structures. Surgery could be used to open the body and to repair, remove or replace parts of it, while it is 'stopped' by anesthetic.[33] An orthopaedic surgeon has bluntly summed up the reductionist, mechanist and materialist approach:

> 'So there is no doubt, let me state very clearly: back pain is a physical problem … Back pain is not a psychological problem. Back pain starts with a physical problem in the back … Back pain is a mechanical problem. It is mechanical in the sense that symptoms arise from the musculoskeletal system …'

After reviewing orthodox (Western) medicine's century-long efforts to find '… a structural cause for low back pain

…', he describes it as '… so much fruitless search …', and its reductionism as based on '… a fundamental bias that may not meet clinical reality.' But he stays with the mechanistic perspective, suggesting that another mechanical approach, and what might be called an expanded reductionist model. He suggests that 'dysfunction' of structures should be considered a possible explanation for back pain, even though the evidence in support of this is ' … limited or conflicting …', and with '… large gaps …' .[36]

The rise of the doctrine of specific etiology during the latter part of the 19th century promoted the concept of an individual disease as the result of a precise individual cause or agent, rather than of multiple causes. Thus even the origins of disease were reduced, from multiple complexities to simple singlenesses. If that single cause could be determined, and a specific antidote developed and delivered, a profitable industry could and has evolved. The era of the chemotherapeutical 'magic bullet' had arrived.[38]

ANOTHER PERSPECTIVE

In 1910 Palmer expressed a different understanding of the nature of the human being as follows:

'There is no similarity between living bodies which possess functions and machines by which goods are manufactured. … To attempt to demonstrate the vital acts of the human body by the working of machinery is futile. … To represent the body as a mill filled with, and composed in all its parts by, machines, shows a lack of comprehension of language and the principles of Chiropractic.'[39]

This concept is much more congruent with his statement that those principles of chiropractic are from the Greeks. Indeed, they are from elsewhere too, for, in contrast to the Western model, so is the Eastern way.

THE DOCTOR AS GARDENER

Based on ancient understandings of life, the universe and man's relationship to it, the Eastern model asks, as did Rosen, what is the best way for the present journey of existence, and responds that the answer is literally a certain 'way' of life. This way is explained in the ancient Chinese classic The Tao:

'Hold on to the center.
Be aware when things are out of balance.
Stay centered within the Tao.
As it acts in the world, the Tao
is like the bending of a bow…
It adjusts excess and deficiency
so that there is perfect balance.'[40]

This is congruent with Palmer's fundamental assertion that:

'Life is the expression of tone. In that sentence is the basic principle of Chiropractic.'[41] 'In health there is normal tension, known as tone, the normal activity, strength and excitability of the various organs and functions as observed in a state of health … Diseases are conditions resulting from either an excess or deficiency of functionating.'[42]

And, further from the Tao, 'It is always present within you. You can use it any way you want.'[43] This brings to mind another of Palmer's fundamentals:

'To express the individualized intelligence which runs all the functions of our bodies ... I chose the name Innate. Innate - born with ... a part or portion of that All Wise, Almighty, Universal Intelligence, the Great Spirit, the Greek's Theos, the Christian's God, the Hebrew's Helohim, the Mahometan's Allah, Hahneman's Vital Force, new thot's Divine Spark, the Indian's Great Spirit, Hudson's Subconscious Mind, the Christian Scientist's All Goodness, the Allopath's Vis Medicatrix Naturae - the healing power of nature.'[44]

The philosophical model at the basis of the Eastern way might be represented as follows: Humans are part of the Tao, one complete and completely inter-related wholeness. They exist between and as part of heaven and earth, with the earth supplying the physical needs for life. So both the earth and the human should be regarded in the same way, as a garden, and taken care of accordingly.

Mind-body dualism, reductionism and mechanism have little place in this perspective. Humans are to be perceived not as machines, but as living microcosms of the living universe, having within them and living subject to the same primeval forces that affect that macrocosm. (This also resonates with Palmer's concepts of universal or macrocosmic and innate or microcosmic intelligence.). Humans and their achievements and civilisations are not distinct from nature. Humans '… are nature, manifest as people.'[45] There are no sharp distinctions, only relative differences.

Disease is not perceived as an entity or an agent that has invaded the body, nor are symptoms seen as isolated experiences, but as to-be-expected results of an imbalance – an excess or deficiency, a disharmony – in the person's relationship with the universe, a deviation from the Tao, the 'Way.'[46] Health is seen as a natural, to-be-expected part of living in the right way, in harmony with the Tao. One should not wait to become sick before paying attention to one's health. 'Prevent trouble before it arises. Put things in order before they exist.'[47] One should be continually engaged in learning how to be more on the Way and more alive. On this path, self-responsibility gives self-power.[48] Only the mediocre doctor waits till the person is ill then applies treatment, the magic bullet.[49] The work of the doctor is to teach the Way – the best way to live. As the universe is seen as a garden, and the person part of that, the Way on the individual level involves caring for the individual as one would a garden, and cultivating her life in accord with the conditions and seasons of life. Although strong measures may occasionally be needed to deal with extreme conditions, generally what is needed is the right preparation, cultivation, watering, fertilisation (feeding) and weeding of the human garden. We cannot stop or change the winds or the weathers we encountered in life, so we should learn to live with them.[50]

DIFFERENCES

There are many major differences between these two models and therefore there are different consequences. The Western model is deliberately exclusive – it excludes the intangible, as that cannot be contained, examined, studied, controlled, mass-produced, or sold. Its 'Rolls Royce' way of knowing, the randomised controlled trial, intentionally attempts to rule out anything unknown or variable. In contrast, the Eastern model regards the intangible as the

fundamental imperative of all, seeing total inclusiveness as the essential reality. Major differences are also illustrated in the contrasting semantics and metaphors used in each model. Western medicine is frequently spoken of in military terms. Its sciences, technologies and procedures seek to dominate natural processes, so much that treating disease is often seen as 'war', and can therefore be expressed in military metaphors. We frequently hear of 'the war on cancer,' or that someone lost their battle against cancer, in spite of everything in the 'therapeutic armamentarium' having been tried.[51] Medicine has been defined as, 'the management and care of a patient for the purpose of combating disease or disorder.' (italics added), and an editor of the British Medical Journal has grimly described medicine's activities as '… an unwinnable battle against death, pain and sickness.'[52,53] Normal immune system function would be described as 'The Body At War.'[54] In contrast, the Eastern way warns against the use of force: 'Those who try to control, who use force to protect their power, go against the direction of the Tao. … The Tao nourishes not by forcing. By not dominating, the Master leads.'[55] It speaks gently of nature, and its metaphors are of nature - fire, earth, metal, water, wood, heat, cold and wind. Its subjects and objects do not oppose each other. Rather, they are inter-related parts of one greater whole. There is no civil war, and its answers come not from opposition, but from interaction. According to Palmer, chiropractic also is in this peace movement. 'Chiropractors do not combat disease. We do not look upon it as an enemy that must be fought, conquered and vanquished.'[56]

From the dominance and war thinking of Western medicine stems another major difference between the two models. War often involves collateral damage, destruction and death, even often to those not participating in the fighting. Somewhat similarly, in medicine, iatrogenesis is a not uncommon result of the activities of the Western medical model and activities based on it.[57-60] As one example, a study of adverse reactions to prescription drugs in one country alone found that, on average, 586,922 children are taken to a medical doctor or a hospital emergency department per annum as a result of such reactions to properly prescribed drugs administered on an outpatient basis.[61] In stark contrast, a systematic review of eight data bases, going back 105 years, found only fourteen cases of direct adverse events associated with 'spinal manipulation' of children worldwide.[62]

CONCLUSION

The Western and Eastern philosophical models of health are remarkably different. As a result, the activities that stem from each are also very different. The Western model is based on reductionism, materialism, mechanism and the strong belief that true and useful knowledge is obtained by science. In essence, its activities involve the doctor acting as a mechanic and prescribing drugs or applying surgery to 'fix' the patient.

In contrast, the traditional Eastern model is based on a broad wholism that implicitly involves understanding the person as an integral part of the natural and supernatural universe. She is metaphorically viewed as part of the universal garden, and loss of health understood as the result of improper tending to that garden, best dealt with mainly by returning to the correct way of doing that. The contemporary relevance of this model is undeniable. In her November 7, 2008 address to the World Health Organisation Congress on Traditional Medicine in Beijing, World Health Organisation Director-General Dr Margaret Chan stated that:

'Public health owes the notion that prevention is better than cure to China and the Huangdi Neijing, the most important book of ancient Chinese medicine.

During its 3,000-year history, traditional Chinese medicine pioneered interventions such as diet, exercise, and awareness of environmental influences on health, … as part of a holistic approach to health.

Other ancient medical systems in other countries, such as Ayurveda in India, offer similar approaches to health. These are historical assets that have become all the more relevant given the three main ills of life in the 21st century: the globalization of unhealthy lifestyles, rapid unplanned urbanization, and demographic ageing. These are global trends with global consequences for health, most notably seen in the universal rise of chronic noncommunicable diseases, such as heart disease, cancer, diabetes, and mental disorders.'[63]

Like the philosophical model of traditional chiropractic, these models are not new, but have their foundations in ancient societies and philosophical interpretations. The Eastern model in particular shares many commonalities with that of chiropractic. The benefits of the Western model cannot be ignored or dismissed. However, given the crisis in its application, particularly in terms of cost, iatrogenesis, and lack of efficacy in addressing current epidemics of chronic diseases caused by poor lifestyle choices, it would seem that careful consideration of the greater application of the Eastern model, or Western understandings of it, would be a wise way.[64-66]

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A Commentary - The Role of Therapeutic Alliance in Physical and Manual Therapies

STANLEY INNES and MELAINIE CAMERON

Abstract: The role and importance of the therapeutic alliance (TA) has been extensively studied in the delivery of psychological services. More recent research has highlighted its significance in non psychological disciplines, in particular physical and manual therapies. The authors review the literature relevant to this transition and describe the nature of TA and how it may be utilised for improved treatment outcomes.

INDEX TERMS: PSYCHOTHERAPEUTIC PROCESSES;MANUAL THERAPY; OUTCOME ASSESSMENT; HEALTHCARE.

Chiropr J Aust 2013;43:25-7.

INTRODUCTION

The therapeutic alliance is traditionally thought of as a significant factor influencing outcomes from psychological interventions. In a recent conference, the power of non-specific effects, expectations, and therapeutic alliance were identified as emerging trends promising new directions research on low back pain in primary care,[1] reflecting a growing awareness that the therapeutic alliance may also be a significant factor in physical and manual therapies.

In a recent Australian study exploring the therapeutic alliance between physiotherapists and patients, Ferreria *et al* suggested that it is a significant predictor of response to treatment in chronic low back pain.[2] 182 patients with chronic low back pain were allocated to general exercises, motor control exercises, and spinal manipulative therapy groups. Therapeutic alliance was found to be a significant predictor of global perceived effect of the type of intervention and functional outcomes. Differences were as large as 4 points on an 11 point scale and could represent an improvement from a status of "no change" to a status of "completely recovered" in the patient outcome scores.

In a 2007 US study of the physician–patient relationship, Feurtes *et al* suggested that working alliance could be measured in medical care.[3] Further, it appeared to be strongly associated with patients' adherence to, and satisfaction with, treatment. Feurtes *et al* recommended that patients' self-efficacy ought to be assessed and promoted because it is also associated with treatment adherence and outcomes may be predicted on the basis of to the strength of the working alliance.

We contend, along with Johansson *et al* that these results, together with other research across healthcare disciplines, indicate that the expectancy-alliance-outcome mediational chain is a general phenomenon, not limited to subgroups of patients or modes of treatment.[4]

WHAT IS THE THERAPEUTIC ALLIANCE?

In its simplest form it is described as the relationship between a psychologist or psychotherapist and a patient, and it is regarded as important for the outcome of psychological therapy.[5]

The therapeutic alliance construct refers to the collaborative aspect of the relationship between therapist and client(s) in the context of psychotherapy. The conceptualization of the alliance that has been most prominent in individual psychotherapy, proposed by E.S. Bordin in 1979,[6] includes three components:

(1) an agreement between therapist and client about the goals of treatment,

(2) an agreement about the therapy tasks needed to accomplish those goals, and

(3) the emotional bond developed between therapist and client that allows the client to make therapeutic progress.

An important finding that has emerged from a large number of studies is that the alliance assessed early in treatment predicts ultimate therapeutic success across a variety of clinical issues and treatment modalities.[7] A positive relationship between client and counsellor may be one of the most important and most frequently overlooked variables for predicting client response to an intervention. It accounts for more variance in psychological treatment outcomes than any single client characteristic.[8]

Therapeutic Alliance Across Differing Therapeutic Domains.

Therapeutic alliance (TA) is a strong predictor of outcomes in individual psychotherapy across diverse treatment orientations and modalities.[7,8]

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We certify that there is no conflict of interest with any financial organisation regarding the material discussed in the manuscript.

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Received 18 November 2012, accepted 10 February 2013

TA has been shown to be a significant factor in determining outcomes in adolescent eating disorders. These reviews evaluated psychological treatments for Anorexia Nervosa, Bulimia Nervosa and Binge Eating Disorder and were conducted in a primary care setting. High attrition and non-compliance rates are common among participants with these syndromes. However the studies reviewed indicated the importance of a strong therapeutic alliance between provider and patient as a central determining factor in improved outcomes.[9,10] Similar results have also been found in children with poorly controlled diabetes[11] and with speech dysfluency.[12]

The results of interventions to enhance patient adherence to medication have been inconsistent. A recent study chose to explore the nature of the TA as a possible factor. Forty-six clinicians were trained in 'medication alliance'. The quality of the therapeutic relationship was also enhanced. It was concluded that clinician training to support improved patient adherence should include strategies that also enhance the therapeutic alliance.[13]

Although cognitive-behavioural therapy for paediatric obsessive-compulsive disorder is considered a first-line treatment, not all youth have a positive treatment response, suggesting the need for investigating factors that may enhance or reduce treatment effects. Findings in this study indicated that stronger child-rated, parent-rated and therapist-rated TA's were predictive of better treatment outcome. Second that larger and more positive early alliance shifts were predictive of better treatment outcome.[14]

Strength of the TA may reduce the likelihood of the relapse of depression. Psychoeducation has proven to be an effective treatment method for the prevention of relapse in recurrent depression. However, little is known about the processes which could account for the effects of psychoeducational treatment. These were investigated as predictors of reducing the recurrence risk in depression. One year after treatment, no associations were found between therapist adherence or competence and the risk of relapse. The patients' view of the therapeutic alliance was moderately associated with the time to relapse. The latter was the most important predictor of time to relapse, explaining 15% of variance.[15]

Therapeutic Alliance and Outcomes

TA appears to be established early on and its impact at this stage has its greatest power for predicting positive outcomes. Early alliance has been found to be a better predictor of outcome than when averaged across sessions or measured in the middle or late phase of treatment.[16]

Two recently published reviews have sought to measure its impact in psychotherapy. Included were over 200 research reports based on 190 independent data sources, covering more than 14,000 treatments. The overall aggregate relation between the alliance and treatment outcome was r = .275 (k = 190).[17,18] A substantial and significant figure.

Dropping Out of Therapy

A meta-analytic review of 11 studies (1,301 participants) examined the relationship between psychotherapy dropout and therapeutic alliance in adult individual psychotherapy.[19] Results of the meta-analysis demonstrated a moderately strong relationship between psychotherapy dropout and therapeutic alliance (d = .55). Findings indicate that clients with weaker therapeutic alliance are more likely to drop out of psychotherapy. Exploratory analyses were conducted to determine the influence of variables moderating the relationship between alliance and dropout. Client educational history, treatment length, and treatment setting were found to moderate the relationship between alliance and dropout. Studies with a larger percentage of clients who completed high school or higher demonstrated weaker relationships between alliance and dropout. Studies with lengthier treatments demonstrated stronger relationships between alliance and dropout. Inpatient settings demonstrated significantly larger effects than both counselling centres and research clinics. These findings have been recently replicated.[20]

Implications for Therapy?

Researchers have provided evidence that client ratings of the alliance are stronger predictors of treatment outcome than are counsellor ratings.[21,22] Thus it is the eyes of the recipient of therapy not the administrator of the intervention. It is client focused.

The impact of the TA is not a sign of psychopathology or psychological vulnerability in the client. Psychiatric symptoms do not predict alliance formation.[23] It is a normal and natural part of a therapeutic interaction.

The therapist's level of experience appears to have a relationship to the quality of the TA. In a review of 12 studies, a small positive relationship between the therapists' experience and the quality of the therapeutic relationship early in treatment was found.[24] A more recent study explored the therapists' level of experience and was not found to be predictive of patients' alliance ratings.[25]

Evidence from the attachment literature suggests that the quality of a client's early relational or family experiences may influence his or her ability to form an alliance early in individual psychotherapy. Researchers have linked insecure attachment styles with poor initial alliances in individual psychotherapy.[26,27]

How to Foster TA

Sue *et al* suggest that the presence of warmth, friendliness, genuineness, open posture, good eye contact, empathy, and Active Listening by the therapist are hall marks of the TA.[28] This is further enhanced by frequently repeating back what client has said for clarification. This demonstrates a respect for the patient.

It should be borne in mind that the impact of a clinical encounter resonates well beyond the treatment room. It does not only happen in office contact time. During the days-long or week-long intervals between therapy sessions, patients typically recollect, reflect on, practice, and imaginatively elaborate on experiences they had during sessions with their therapists. These intersession experiences have been studied for some time with the Intersession Experience Questionnaire (IEQ) in Germany and the United States. Significant associations were found between certain IE factors and therapeutic alliance, varying in strength by treatment duration and country.[29]

Research on racial dynamics in the counselling dyad suggests that the therapist must be aware of how both his/her own as well as the client's racial identity affects the client.[28]

CONCLUSION

It is the authors contention that current research is beginning to unravel the size of the impact that the therapeutic alliance may have in determining outcomes in physical and manual therapies. As such it important for the prudent practitioner to be mindful of its nature and seek to enhance its role. We are hopeful that continuing research in manual therapies will deepen our understanding of this mediating factor and ways to utilise it for improved outcomes.

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In Memoriam

William F. Holmberg, DC, FPAC, FICA
30 June 1931 – 6 January 2013

Palmer Community mourns passing of Dr. William Holmberg

My dear friend, William F. Holmberg, D.C., F.P.A.C., F.I.C.A., 81, passed away on January 6, 2013, in Naples, Fla. He was born in Birmingham, Ala., and served in the U.S. Army and attended Birmingham Southern College and the University of Alabama prior to matriculating at Palmer. He graduated from Palmer College of Chiropractic in 1955 and was in private practice in Rock Island, Ill., until he retired in 1995. Dr. Holmberg was the major fundraiser for the Wilk *et al v* AMA anti-trust case.

Dr. Holmberg served in various administrative positions at Palmer College from 1983 to 2005, including vice president of Alumni and Development. He chaired divisions of three capital campaigns for Palmer, for the Alumni Auditorium, the Campus Center and the David D. Palmer Health Sciences Library. He also served on the Palmer Board of Trustees from January to October 1983. While serving as president of the Chiropractic Centennial Foundation (CCF), Dr. Holmberg was the guiding force behind the CCF and the 1995 centennial year celebrations. He was named a Fellow in the Palmer Academy of Chiropractic in 1970 and served as the Fellows historian for many years. Dr. Holmberg also was active in the Association for the History of Chiropractic (AHC) and received the AHC's prestigious Lee-Homewood Chiropractic Heritage Award in 1999. He continued to serve Palmer College as a consultant for the alumni, development and enrollment areas from 1998 to 2005.

He married his wife, Barbara, in 1956. They had two daughters, Teresa and Kris. Following in her father's footsteps, Dr. Kris Holmberg graduated from Palmer College in 1988.

From the beginning of his long career, Dr. Holmberg was extremely active in the profession and passionate about chiropractic. Even into retirement he continued to influence countless chiropractors to be more active in their profession, to take greater pride in their history and to be better practitioners of their art.

Palmer Chancellor Dennis Marchiori, D.C., Ph.D., remarked, "Dr. Bill Holmberg has been a significant figure in the Palmer community for decades. His work, passions, and accomplishments surround us at the College, in our alumni and profession."

The Holmberg family held a small, private service in Florida this week. A memorial service is being planned for May in the Quad Cities, with details to be announced later. Dr. Holmberg requested that any donations in his memory be made to the Association for the History of Chiropractic.

Bill, a fellow historian, Lee-Homewood award winner, Presidents Club member and Fellow of the Palmer Academy of Chiropractic had been a good friend and adviser to my late wife, Dr. Mary Ann Chance and me for nearly 20 years, whenever we met at Homecoming. He will be sadly missed. Vale, dear Friend.

Rolf E. Peters, DC, MCSc, FICC, FACC, FPAC
Founding President
Association for the History of Chiropractic - Australia

The Clinical Significance of Spina Bifida Occulta at C1: A Case Control Study

MICHAEL R GLOVER, RAFAL KWASNIEWSKI, PETER BULL and HAZEL JENKINS

Abstract: *Aim:* The purpose of the paper was to investigate any correlation between spina bifida occulta of the atlas (SBO of C1) and the incidence of headaches or neck pain in a cohort of patients presenting for chiropractic treatment. *Methods:* A case control study design was selected for this research. Patients were selected retrospectively from those that had presented for chiropractic treatment at the Macquarie University chiropractic outpatient clinics. The presence of self-reported headache (HA) and neck pain (NP) at the time of initial consultation was compared in two groups of 32 subjects. All patients in the experimental group had SBO of C1 evident on x-ray; the control group was formed from gender matched patients whose x-rays did not show SBO of the atlas. *Results:* 50% of the experimental group reported neck pain or headache on initial consult compared to 46.9% in the control group. Statistical analysis indicated no significant difference in the frequency of headache or neck pain reported between the two groups.*Conclusion:* These results indicate that SBO of C1 does not appear to be associated with an increased presentation of headache or neck pain.

INDEX TERMS (MeSH): SPINA BIFIDA OCCULTA; ATLAS; NECK PAIN; HEADACHE. (OTHER) C1; SPONDYLOSCHISIS.

Chiropr J Aust 2013;43:29-32.

INTRODUCTION

The atlas (C1) is the most superior cervical vertebrae and is formed from three ossification centers. Two lateral centers extend posterolateraly and fuse together by 3 to 5 years of age, forming the posterior arch.[1] Chung[2] estimated that congenital bony anomalies of the atlas are present in 0.3% to 0.7% of the population, although other studies have indicated a much higher incidence of between 4% and 6%.[3-8] Cleft of anterior arch of the atlas is extremely rare and is present in 0.1% of the population.[9] A failure to fuse of the posterior arch of the atlas is known as spina bifida occulta (SBO), and according to research by Childers and Wilson occurs in approximately 1% to 6% of population.[3] The most in depth research into the incidence of congenital non-union of the posterior vertebral arch of C1 was performed on 1613 postmortem specimens and found a 4% incidence of SBO in the general population.[4-8]

Clinical significance of spina bifida occulta of the atlas remains controversial. Currarino described five potential clinical presentations of SBO of the atlas:

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Received 21 February, accepted 3 March 2013
No conflict of interest was noted

1. Asymptomatic, with detection occurring incidentally during radiographic imaging.
2. Neck pain related to trauma.
3. The development of sudden neurological symptoms.
4. A variety of neurological symptoms for some time before discovering abnormality.
5. SBO discovered during chronic neck pain workup.[10] Conversely other authors have concluded that SBO of C1 is of little clinical significance and is most often an incidental finding.[6,11-13]

The aim of our study is to investigate whether SBO of the atlas is associated with an increased presentation of headache (HA) and neck pain (NP) and therefore whether SBO of C1 may be a contributing factor within these pain syndromes.

METHODS

I. Literature search

A search through the scientific databases: Index to Chiropractic Literature, Science Direct and Ovid-Medline was performed. The key words used were: (spina bifida) OR (posterior arch defect) OR (posterior arch cleft) AND (atlas) OR (C1) OR (spondyloschisis) OR (correlation) OR (association). The search for papers on a correlation between SBO of C1 and HA or NP returned very few hits, with the majority of publications being case reports of less than 10 patients.

II. Participants

The study was conducted on patients who presented for chiropractic treatment to one of the three Macquarie University Chiropractic outpatient clinics. Screening of

Table 1. Characteristics of the participants and types of radiographic examination

Group	Males	Females	Age [years] x_{AVG} ±SD	X-rays type
SBO (N=32)	Both groups: N=9; 28.1%	Both groups: N=23; 71.9%	43.4 ±19.8	Both groups: C^0=29 C^0+T^0=1 FS=2
CTR (N=32)			41.72±16.2	

C:^{o} – cervical series, T:^{o} – thoracic, and FS: – full spine radiographs

approximately eight-hundred x-ray reports was performed to identify patients who had SBO of C1 on their radiographs. Patients whose progress notes were available and contained the standard initial consultation form were included into the experimental (SBO) group. Thirty two subjects meeting the criteria were found, among them 23 females and 9 males.

The control group (CRL) of 32 subjects was then was selected to closely match the SBO group. Within the SBO group 29 of the patients had performed cervical imaging only, one cervical and thoracic series, and two subjects underwent full spine radiography.

The control group (CRL) was then created by randomly selecting two patients who had undergone full spine x-rays, and one who had both cervical and thoracic spine films taken. Then from the pool of patients who underwent cervical imaging only, 9 males and 20 females were added. The study was designed to mirror the gender distribution of the SBO group to ensure the results would not be affected if frequency of HA and NP is gender dependent. As both groups were taken from the same population with a sample size above 30, we expected the age distribution of the control group not to differ from that of the SBO group.

The regions of radiographic imaging was also matched to the experimental group as a patient who had only undergone a cervical series only is potentially more likely to have HA or NP complaints than a person who underwent full spine x-rays. Basic demographic data and type of the radiographic surveys is contained in Table 1.

III. Research Design

The research was designed as a retrospective study. All the participants, before receiving treatment in the clinics signed consent for use of their clinical and demographic data for research purposes. The protocol was approved by Macquarie University Ethics Committee.

A second investigator blinded to the grouping of each patient analysed the data from the patient file to determine the presence of neck pain or headaches at the time of initial consultation.

Regarded as a positive for HA or NP was every patient who on the initial consultation form had:

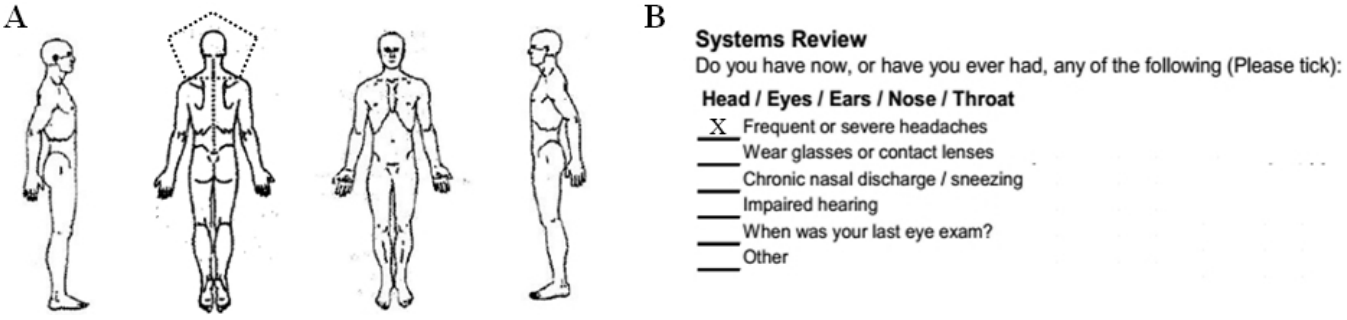
A. Explicitly named the reason for consultation as HA or NP or both OR

B. Circled head or neck area on any of the four pictures (Fig. 1 part A) OR

C. Ticked the box in "System Review" section asking for a history of frequent or severe HA (Fig. 1 part B).

Patients who had one or more positive responses were classified as positive.

Patients' complaints were not graded; any positive result for HA or NP was assigned 1'; any negative result was assigned '0'.



Part A – silhouettes on which patients circle localisation of their complaint/pain and area Area considered to be a positive indicated by the dotted line polygon on the second from the left

Part B – part of the "System Review" section where patients are asked for HA.

Figure 1: Relevant parts of the standard Macquarie University student outpatient clinics initial consult form

IV. Statistical Analysis

All the statistical tests were performed using Statsoft's package Statistica, version 8.0.

To compare distribution of the variable age within the groups with normal distribution Shapiro-Wilk's W test had been used. Homogeneity of variance was assessed with Levene's test and finally t-Student's test for independent groups was performed.

Differences of combined HA and NP complaints between the groups were compared with χ-square test.

RESULTS

The age distribution in SBO and CRL groups proved to be not different from normal distribution ($p<0.01$) and the variances of the variable were homogenous. Consequently t-Student's test was performed, which did not refuse the hypothesis that the variable age was drawn from the same population. Summary of the distribution of the variable age for each group is shown on box and whisker plot (Fig. 2). Fifty percent or more of the patients in both the CRL and SBO groups stated that their main complaint did not involve headache or neck pain. The patients' complaints were grouped into four categories (Fig. 3).

The result of χ^2 test showed that frequency of HP and NP was not associated with SBO of C1. Detailed results of performed tests are shown in Table 2. Approximately half of the patients included in this study who underwent x-ray examination in the Macquarie University chiropractic outpatient clinics had complained of either HA or NP at the time of initial consultation. There was no statistically significant difference between the cumulative rates of HA and NP in patients with SBO of C1 when compared to the control group.

DISCUSSION

The results of this study support previous conclusions[6,11-13] that SBO of C1 is of little clinical significance and is most often an incidental finding. Within the literature review few research papers on SBO at C1 were found. The articles were largely based on a very limited number of cases and for that reason the final conclusions cannot be considered representative of the general population. No publications discovered looked specifically for any association between SBO of the atlas with HA or NP and because of this we do not have a reference point to compare results of our study. There may be various reasons for this lack of research. One possibility is that SBO of C1 may be discovered during

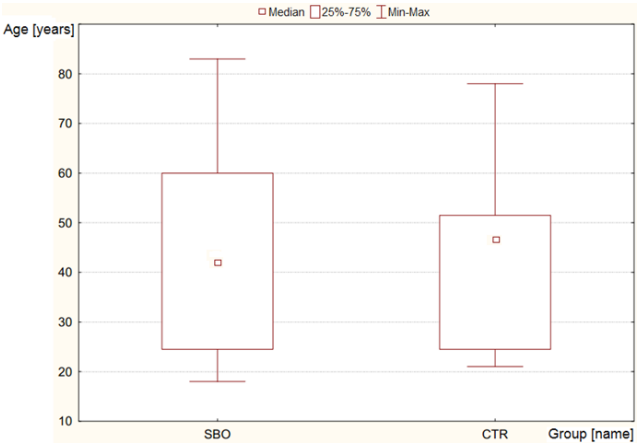


Figure 2. Medians, quantiles, and ranges of variable age in the experimental group (SBO) and the control group (CRL).

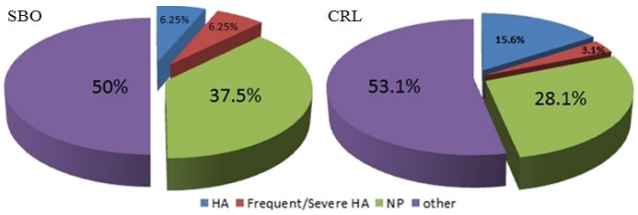


Figure 3. Frequencies of complaints grouped into four types; SB – the experimental group; CRL – the control group.

Table2. Results of performed statistical analyses

Group	Test's name	Result	P-level	Comment
SBO CTR	Shapiro-Wilk W	W=0.91 W=0.91	P=0.01 P=0.01	The distribution does not differ significantly from normal
SBO CTR	Levene's test	F(1,62)=1.34	P=0.25	Hypothesis of homogeneity of variances was not rejected
SBO v CRL	t-Student's (independent variables)	t=0.38	P=0.71	The age of participants does not differ significantly between the groups
SBO v CRL	Chi-square (df=1)	x^2=0.06	P=0.80	It appears that there is no association between SBO of C1 and HA/NP

dental procedures[6] and is subsequently outside of their area of interest. Secondly imaging is often requested subsequent to head or neck injury and symptoms such as headache or neck pain may be regarded to be a direct result of the trauma.

There is, however, in the scientific literature a gap in knowledge and further research is needed to investigate if SBO of C1 causes an increased incidence of headaches and neck pain. The results of this study suggest that there is no association, however due to the relatively small sample size further investigation is warranted. Future investigations could be designed to be more sensitive, grading severity of HA and NP and identifying patients who presented to other healthcare professionals for treatment of their headache or neck pain. The retrospective nature of this study was also a limiting factor. All patients included in the study had undergone cervical radiography for clinical reasons. This would suggest that a higher incidence of HA and NP would be expected in both the experimental and control groups than would be indicated in the normal population. The incidence of neck pain has been reported to be between 15% and 50%,[14,15] however, which is consistent with the values found in this research. Neck pain and headache individually showed different incidences between the two groups and statistical analysis of these two pain syndromes separately may have been more appropriate to assess for any clinical significance with respect to SBO of C1. A prospective study of a larger, random group of subjects would be ideal to assess more accurately the incidence of SBO, the incidence of NP and HA and how these may correlate with each other.

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Letters to the Editor

To the Editor:

RE: Eaton, S. Commentary: The Double Edged Sword of Chiropractic Semantics. Chiropr J Aust; 2012; 42:141-2.

Dr Eaton in her commentary on the use of language within the chiropractic profession certainly brings a unique perspective and insight into the problems and challenges facing chiropractors in communicating their ideas and concepts to new students, patients and the wider scientific community. Dr Eaton clearly points out the problems associated with static ideas reflected in many of our definitions and descriptions of what chiropractic 'Is'.

Problems associated with the use of historical terms by chiropractors are exemplified in the concept of the 'vertebral subluxation.' Dr Ebrall in a previous commentary,[1] "Subluxation: What's in a Name?" states that the term subluxation has multiple meanings, and causes endless angst. It could be suggested from an historical perspective that the problems commented on by Drs Eaton and Ebrall are not related to semantics or the lack of application of evidence based practice guidelines by the profession. In respect to these two factors chiropractors would appear no different to other contemporary healthcare professions.

Rather than the chiropractic profession being "static and incongruent with evidence based enquiry" it could be argued that it is static and incongruent with philosophical and scientific enquiry. Dr Eaton embraces both of these disciplines with the observation that "chiropractors who are reluctant to think of subluxation as a 'hypothesis' demonstrate a limited understanding of the significance of our epistemology." The hypothesis is the foundation of scientific enquiry and epistemology is a branch of philosophy.

However, from an ontological perspective,[2] another branch of philosophy that deals with the nature of reality or being, subluxations do not, and cannot exist. They are not a hypothesis as suggested by Dr Eaton, and their existence cannot be confirmed or disproved by scientific enquiry. They only exist by definition as an arbitrary collection or group of things that do exist. The medical definition of a subluxation is not hypothetical, it is defined as a quantifiable entity with the following characteristics:[3]

(1) a localized kyphotic angulation at the level of injury

(2) anterior rotation, or displacement, of the subluxed vertebra

(3) anterior narrowing and posterior widening of the disc space

(4) widening of the space between the subluxed vertebral body and the subjacent articular masses

(5) displacement of the inferior articulating facets of the subluxed vertebra with respect to their contiguous subjacent facets; and

(6) widening of the interspinous space ("fanning")

Scientific enquiry, with the formulation of hypotheses, can commence once the definition of a subluxation is formulated as a quantifiable entity and accepted by the profession. The scientific questions that then need to be addressed by chiropractors do not relate to the existence of subluxations, but to the clinical utility of such an ontological construct. Chiropractic philosophy provides the rationale for the definition and is not reciprocal with science. Science generally reciprocates with dogmatically held beliefs.

The role of science is to provide reliable and valid measurements relating to the elements the chiropractic profession chooses to include in the definition of a vertebral subluxation. Evidence based practice can then be used as a clinical tool in "actively seeking support for and improvement of chiropractic clinical practice through the integration of the best available research evidence, combined with clinical expertise and patient preferences."[4]

"*Ontological and epistemological positions are often not spelled out in research papers. They may not need to be spelled out, but need to be understood since they are at the basis of what is done, of the methods used*."[5] Scientific credibility for chiropractic will come not with semantic changes but with the ability of the profession to measure the independent variables (subluxations) that it directly attempts to influence and the dependant variables (health and wellbeing) that emerge as a result of that intervention. The concept of a subluxation and the definition used by the chiropractic profession at any given time can be as dynamic as needs and evidence dictate. The terms used by chiropractors may be a double edged sword as long as they are not Excalibur and set in stone.

John Dulhunty DC, MACC

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To the Editor:

RE: Eaton, S. Commentary: The Double Edged Sword of Chiropractic Semantics. Chiropr J Aust; 2012; 42:141-2.

I find this commentary unclear, as it lacks concrete details. It states that 'The Skeptic Organisation and the 'Friends of Science' (FOS) are highly active in Australia. On two occasions … the University Executive has asked me to change the name of the discipline or the word "Chiropractic" to "manual" or "physical" therapies.' FOS address climate science, not chiropractic.[1] Does it mean the 'Friends of

Science in Medicine' ('FOSIM'), funded by the Australian Skeptics, Inc. ('AS')?[2] Has the MU Executive ('UE') been influenced by their activities to request the name change?

The commentary states that 'The word "chiropractic" is seen as synonymous with non-evidence based practice.', and inaccurately cites Ernst in support.[3] Is the UE relying on one paper by Ernst, in spite of his record?[4,5] His book's 43-page chapter on chiropractic, published five years ago, is supported by just five references. He refers those seeking more to the book's web site, which still offers only the statement 'References coming soon.'[6,7] Has the UE used this standard of evidence to judge chiropractic as synonymous with non-evidence based? Is it ignoring the evidence supporting chiropractic?[8,9]

The commentary states that

> '… "subluxation" has a more political and clinical meaning than a scientific meaning. The Skeptics and FOS perceive the word subluxation as "dogma", or a word that is intended to be self-evident as opposed to a word that is embedded in evolving scientific principles.'

'Subluxation' *is* 'clinical', as that is where they are found and corrected. By the accepted definition, 75% of the evidence-base of practice *is* 'clinical.'[10] What is its 'political' meaning? What about the substantial evidence contrary to these claims?[11,12]

To which static model, historical model and historical concepts does the commentary refer? With what should they be replaced, and on what basis of evidence?

Which 'similar language' should be used 'that expresses what chiropractic does', so 'we relate better to our health delivery colleagues'? The language of medicine? What is it that chiropractic does, expressed in that language? What evidence is there that the changes suggested would lead to relating better?

What in the UE's standards of critical thought has apparently led it to disregard the evidence supporting chiropractic?

Dennis Richards BSc, DC, Grad Cert Phil Studies, ACP, FACC, FICC

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Editor's note: Dr Eaton declined to respond

Chiropractic Journal of Australia

INFORMATION FOR AUTHORS

Chiropractic Journal of Australia (CJA) is a peer-reviewed journal of record dedicated to the advancement of chiropractic science, principles and practice and seeks to fulfil this purpose by critical review and publication of research and scholarly works relating to the scientific bases and clinical applications of chiropractic, and supportive presentations of an educational and/or professional nature.

Manuscripts are accepted for *consideration to publish* with the understanding that they represent *original* unpublished work which is submitted solely to CJA, *i.e.* has not been, and will not be, submitted elsewhere until a final decision has been reached by the editors, and that the work contains nothing that is libellous, obscene, unlawful or an invasion of privacy. Continuing call for papers includes:

Investigations. Reports of original research relevant to the practice of chiropractic, education of practitioners and the role of chiropractors in the health care delivery system and public education.

Hypotheses. Preliminary studies that may establish a basis for further, in-depth investigations.

Literature Reviews. Critical assessments of current knowledge of a subject of interest, with emphasis on better correlation, exposition of ambiguities and delineation of areas that may constitute hypotheses for further study.

Case Reports. Accounts of the diagnosis and treatment of unusual, difficult or otherwise interesting cases that may have independent educational value or may contribute to better standardisation of care for a particular health problem when correlated with similar reports of others.

Case Reviews. A retrospective, comparative evaluation of the diagnosis and treatment of several cases of a similar condition.

Historical Articles. Documentation of aspects of the history of chiropractic, including biographical sketches, legitimation of the profession, emergence of institutions and development of professional education.

Technical Reports. Evaluation of equipment or procedures that are new or have not previously been so evaluated.

Commentary. In-depth essays on matters relating to the clinical, professional, educational, and/or politicolegal aspects of health care principles and practice.

Letters to the Editors. Communications intended to amplify, clarify or draw attention to a deficiency in a paper published recently in CJA. Authors are afforded the privilege of counter response.

All manuscripts (including letters) must be accompanied by a properly executed *Letter of Transmittal* (Form A).

Upon submission, it is to be accepted by all parties that no further dissemination of any part of the material contained in the manuscript is permitted, in any manner, without prior approval from the editors in writing. Non-observance of this stipulation may result in summary rejection of the manuscript.

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Manuscripts must be submitted in the English language and prepared in accordance with "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" as revised from time to time by the International Committee of Medical Journal Editors (ICMJE),[1] from which the following instructions are adapted.

ISSUES TO CONSIDER BEFORE SUBMITTING A MANUSCRIPT

Redundant or Duplicate Publication

CJA will not consider manuscripts that are simultaneously being considered by other journals and does not normally consider for publication a paper on work that has already been reported in a published paper or is described in a paper submitted or accepted for publication elsewhere. This policy does not preclude consideration of a paper that has been rejected by another journal or of a complete report that follows publication of a preliminary report, such as an abstract, nor does it prevent consideration of a paper that has been presented at a scientific meeting if not published in full in a proceedings or similar publication. Press reports of the meeting will not usually be considered as breaches of this rule, but such reports should not be amplified by additional data or copies of tables and illustrations. When submitting a paper an author should always make a full statement to the editors about all submissions and previous reports that might be regarded as prior or duplicate publication of the same or very similar work. Copies of such material should be included with the submitted paper to help the editors decide how to deal with the matter.

Preliminary release, *e.g.* to public media, of scientific information described in a paper that is undergoing peer review or that has been accepted but not yet published is a violation of CJA policy. Should preliminary release of data in the public interest be warranted (*e.g.* to warn the public of health hazards), prior written permission of the editors must be secured.

Acceptable Secondary Publication

Secondary publication in the same or another language, especially in other countries, is justifiable, and can be beneficial, provided all of the following conditions are met:

1. The authors have received approval from the editors of both journals; the editor concerned with secondary publication must have a photocopy, reprint, or manuscript of the primary version.
2. The priority of the primary publication is respected by a publication interval of at least one week (unless specifically negotiated otherwise by both editors).

3. The paper for secondary publication is intended for a different group of readers; an abbreviated version could be sufficient.
4. The secondary version reflects faithfully the data and interpretations of the primary version.
5. A footnote on the title page of the secondary version informs readers, peers, and documenting agencies that the paper has been published in whole or in part and states the primary reference.

Permission for such secondary publication should be free of charge.

Multiple publication other than as defined above is not acceptable; if authors violate this rule they may expect appropriate editorial action to be taken.

Protection of Patients' Rights to Privacy

Patients have a right to privacy that should not be infringed without informed consent. Identifying information should not be published in written descriptions, photographs, and pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) gives written informed consent for publication. Informed consent for this purpose requires that the patient be shown the manuscript to be published.

Identifying details should be omitted if they are not essential, but patient data should never be altered or falsified in an attempt to attain anonymity. Complete anonymity is difficult to achieve, and informed consent should be obtained if there is any doubt. For example, masking the eye region in photographs of patients is inadequate protection of anonymity.

MANUSCRIPT PREPARATION & SUBMISSION

Editors and reviewers spend many hours reading manuscripts and therefore appreciate receiving manuscripts that are easy to read and edit. These instructions to authors are designed to accomplish that goal.

General Principles

The text of observational and experimental articles is usually (but not necessarily) divided into sections with the headings Introduction, Methods, Results, and Discussion. This so-called "IMRAD" structure is not simply an arbitrary publication format, but rather a direct reflection of the process of scientific discovery. Long articles need subheadings within some sections (especially the Results and Discussion sections) to clarify their content. Other types of articles, such as case reports, reviews, and editorials, are likely to need other formats.

Double-spacing of all portions of the manuscript—including the title page, abstract, text, acknowledgments, references, individual tables, and legends—and generous margins make it possible to review and edit the text line by line, and add comments and queries, directly on the paper copy.

During the editorial process reviewers and editors frequently need to refer to specific portions of the manuscript, which is difficult unless the pages are numbered. Authors should therefore number all of the pages of the manuscript consecutively, beginning with the title page.

Reporting Guidelines for Specific Study Designs

Research reports frequently omit important information. The general requirements listed in the next section relate to reporting essential elements for all study designs. Authors are encouraged in addition to consult reporting guidelines relevant to their specific research design, *e.g.*, randomised controlled trials, http://www.consort-statement.org; studies of diagnostic accuracy, http://www.consort-statement.org/stardstatement.htm; systematic reviews and meta-analyses, http://www.consort-statement.org/Initiatives/MOOSE/moose.pdf; observational studies in epidemiology, http://www.strobe-statement.org; meta-analyses of observational studies in epidemiology, http://www.consort-statement.org/Initiatives/MOOSE/moose.pdf.

Obligation to Register Clinical Trials

Clinical trials, *i.e.*, any research project that prospectively assigns human subjects to intervention or concurrent comparison or control groups to study the cause-and-effect relationship between a medical intervention and a health outcome, must be registered in a registry meeting the criteria set out in the ICMJE Uniform Requirements.[1] The trial registration number must be included at the end of the abstract as a condition of consideration for publication.

Authorship

Authorship should be based on 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published. Authors should meet conditions 1, 2, and 3. All persons designated as authors should qualify for authorship, and all those who qualify should be listed. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. One or more of the listed authors should be identified as the person(s) who take responsibility for the integrity of the work as a whole, from inception to published article; such author(s) shall be designated as guarantor(s) in the published article. All contributors who do not meet the criteria for authorship should be listed in the Acknowledgements.

Preparation of Manuscript

Type your manuscript on ISO A4 (212 x 297mm) or US letter size (8 1/2 by 11 inches) with margins of 25mm (1 inch) using Microsoft Word Times Roman in 12 point. Use double-spacing throughout, including the title page, abstract, text, acknowledgments, references, individual tables, and figure legends. Number pages consecutively, beginning with the title page. Put the page number in the upper or lower right-hand corner of each page.

Title Page

The title page should carry the following information:

- The title of the article, which should be concise, but include all important information, such as study design, and all information that will make electronic retrieval of the article both sensitive and specific.
- Authors' names, institutional affiliations, highest academic and professional degrees.
- If applicable, the name of the department(s) and institution(s) to which the work should be attributed.
- Disclaimers, if any.
- The name, mailing address, telephone and fax numbers and email address of the author responsible for correspondence about the manuscript.
- Source(s) of support in the form of grants, equipment, materials, or all of these.
- A short running head of no more than 40 characters (count letters and spaces) at the foot of the title page.

Conflict of Interest Notification

To prevent information on potential conflict of interest for authors from being overlooked or misplaced, it is necessary for that information to be part of the manuscript. It should therefore be included on a separate numbered page immediately following the title page.

Abstract and Index Terms

Abstracts of original research reports, literature reviews and case reports should be structured (see Appendix 1). The abstract should state the purposes of the study or investigation, basic procedures (selection of study subjects or experimental animals; observational and analytical methods), main findings (give specific data and their statistical significance, if possible), and the principal conclusions. Emphasise new and important aspects of the study or observations. Abstracts should be relatively short, in general up to 250 words.

Below the abstract provide 3-10 index terms that will assist indexers in cross indexing the article and may be published with the abstract. Use terms from the medical subject headings (MeSH) list of *Index Medicus*; if suitable MeSH terms are not available for some main subjects covered in the paper, other terms may be used, but must be identified as such.

Introduction

Provide a context or background for the study (*i.e.*, the nature of the problem and its significance). State the specific purpose or research objective, which may be more sharply focused when stated as a question. Give only strictly pertinent references and do not include data or conclusions from the work being reported.

Methods

This section should include only information available at the time the plan or protocol for the study was written; all information obtained during the conduct of the study belongs in the Results section.

Selection and description of participants. Describe your selection of the observational or experimental subjects (patients or laboratory animals, including controls) clearly, including eligibility and exclusion criteria and a description of the source population. Because the relevance of such variables as age and sex to the object of research is not always clear, explain their use when they are included in the report; *e.g.*, why only subjects of certain ages were included or why women were excluded. When using variables such as race or ethnicity, define how the variables were measured and justify their relevance.

Ethics. When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000. Do not use patients' names, initials, or hospital numbers, especially in illustrative material. When reporting experiments on animals, indicate whether the institution's or a national research council's guide for, or any national law on, the care and use of laboratory animals was followed.

Technical information. Identify the methods, apparatus (give manufacturer's name and address in parentheses), and procedures in sufficient detail to allow other workers to reproduce the results. Give references to established methods, including statistical methods (see below); provide references and brief descriptions for methods that have been published but are not well known; describe new or substantially modified methods, give reasons for using them, and evaluate their limitations. Precisely identify all drugs and chemicals used, including generic name(s), dose(s), and route(s) of administration.

Authors submitting review manuscripts should include a section describing the methods used for locating, selecting, extracting, and synthesising data. These methods should also be summarised in the abstract.

Statistics. Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis testing, such as the use of P values, which fails to convey important information about effect size. References for the design of the study and statistical methods should be to standard works when possible (with pages stated). Define statistical terms, abbreviations, and most symbols. Specify the computer software used.

Results

Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasise or summarise only important observations. Extra or supplementary materials and technical detail can be placed in an appendix where it will be accessible but will not interrupt the flow of the text.

When data are summarised in the Results section, give numeric results not only as derivatives (*e.g.* percentages) but also as the absolute numbers from which the derivatives were calculated, and specify the statistical methods used to analyse them. Restrict tables and figures to those needed to explain the argument of the paper and to assess its support. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables. Avoid non-technical uses of technical terms such as "random" (which implies a randomising device), "normal," "significant," "correlations," and "sample."

Where scientifically appropriate, analyses of the data by variables such as age and sex should be included.

Discussion

Emphasise the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. For experimental studies it is useful to begin the discussion by summarising briefly the main findings, then explore possible mechanisms or explanations for these findings, compare and contrast the results with other relevant studies, state the limitations of the study, and explore the implications of the findings for future research and for clinical practice.

Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data. In particular, authors should avoid making statements on economic benefits and costs unless their manuscript includes economic data and analyses. Avoid claiming priority and alluding to work that has not been completed. State new hypotheses when warranted, but clearly label them as such.

Acknowledgments

At the end of the article, one or more statements should specify (1) contributions that need acknowledging but do not justify authorship, such as general support by a departmental chair, scientific adviser, critical review of the study, data collection; (2) acknowledgments of technical help; (3) acknowledgments of financial and material support.

Persons who have contributed intellectually to the paper but do not meet the criteria for authorship must have given their written permission to be named (Form C), because readers may infer their endorsement of the data and conclusions.

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References

Although references to review articles can be an efficient way of guiding readers to a body of literature, they do not always reflect original work accurately. Readers should therefore be provided with direct references to original research sources whenever possible. On the other hand, extensive lists of references to original work on a

topic can use excessive space on the printed page. Small numbers of references to key original papers will often serve as well as more exhaustive lists.

Avoid using abstracts as references. References to papers accepted but not yet published should be designated as "in press" or "forthcoming"; authors should obtain written permission to cite such papers as well as verification that they have been accepted for publication. Information from manuscripts submitted but not accepted should be cited in the text as "unpublished observations" with written permission from the source. State pages in books where applicable.

Avoid citing a "personal communication" unless it provides essential information not available from a public source, in which case the name of the person and date of communication should be cited in parentheses in the text. For scientific articles, authors should obtain written permission and confirmation of accuracy from the source of a personal communication.

The references must be verified by the author(s) against the original documents.

References should be numbered consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by Arabic numerals in parentheses. References cited only in tables or legends in figures should be numbered in accordance with the sequence established by the first identification in the text of a particular table or figure.

Use the style of the examples in Appendix 2, which are based on the formats used by the NLM in *Index Medicus*. The titles of journals should be abbreviated according to the style used in *Index Medicus*. Consult the *List of Journals Indexed in Index Medicus* (http://www.nlm.nih.gov).

Tables

Tables capture information concisely and display it efficiently; they also provide information at any desired level of detail and precision. Including data in tables rather than text frequently makes it possible to reduce the length of the text. On the other hand, use of too many tables in relation to the length of the paper may make layout difficult and interrupt flow of the text.

Type or print out each table with double spacing on a separate sheet. Do not submit tables as photographs. Number tables consecutively in the order of their first citation in the text and supply a brief title for each. Give each column a short or abbreviated heading. Place explanatory matter in footnotes, not in the heading. Explain in footnotes all non-standard abbreviations that are used in each table. For footnotes use the following symbols in this sequence: *, †, ‡, §, ‖, ¶, **, ††, ...

Identify statistical measures of variations such as standard deviation and standard error of the mean.

Do not use internal horizontal and vertical rules.

Be sure that each table is cited in the text.

If you use data from another published or unpublished source, obtain permission and acknowledge fully.

The editors, on accepting a paper, may recommend that additional tables containing important back-up data too extensive to publish may be deposited with an archival service or made available by the authors. In that event, an appropriate statement may be added to the text. Submit such tables for consideration with the paper.

Illustrations

Illustrations will be printed in black and white; do not rely on colour for contrast when preparing bar graphs, pie charts and internal markers.

Figures should be professionally drawn and photographed; freehand drawings and typewritten lettering are unacceptable. Instead of original drawings, roentgenograms and other original material, send sharp, glossy black-and-white photographic prints, usually 127 x 173 mm (5 x 7 in) but no larger than 203 x 254 mm (8 x 10 in). Letters, numbers and symbols, should be clear and even throughout and of sufficient size that when reduced for publication each item will still be legible. Titles and detailed explanations belong in the legends for illustrations, not on the illustrations themselves.

Each figure should have a label pasted on its back indicating the number of the figure, author's name, and top of the figure. Do not write on the back of figures or scratch or mar them by using paper clips. Do not bend figures or mount them on cardboard.

Photomicrographs must have internal scale markers. Symbols, arrows or letters used in the photomicrographs should contrast with the background.

If photographs of persons are used, either the subjects must not be identifiable or their pictures must be accompanied by written permission to use the photograph.

Figures should be numbered consecutively in the order of first citation in the text. If a figure has been published, acknowledge the original source and submit written permission from the copyright holder to reproduce the material. Permission is required irrespective of authorship or publisher, except for documents in the public domain.

Legends for Illustrations

Type legends for illustrations using double spacing, starting on a separate page, with Arabic numerals corresponding to the illustrations. When symbols, arrows, numbers or letters are used to identify parts of the illustration, identify and explain each one clearly in the legend. Explain the internal scale and identify the method of staining in micrographs.

Units of Measurement

Measures of length, height, weight and volume should be reported in metric units (metre, kilogram, litre) or their decimal multiples. Temperatures should be given in degrees Celsius. Blood pressures should be given in millimetres of mercury. All haematological and clinical chemistry measurements should be reported in terms of the International System of Units (SI).

Abbreviations and Symbols

Use only standard abbreviations. Avoid abbreviations in the title and abstract. The full term for which the abbreviation stands should precede its first use in the text unless it is a standard unit of measurement.

SENDING THE MANUSCRIPT TO THE JOURNAL

Manuscripts must be submitted electronically to journal@caa.asn.au as an attachment, in either Microsoft Word or Rich Text Format. Illustrations must **never** be embedded in the text; each should be attached as a separate .jpg or .tif file, identified as Figure 1, Figure 2, *etc*.

Manuscripts will not be considered for publication before the following are received by mail:

- A covering letter signed by all co-authors disclosing any prior or duplicate publication or submission elsewhere of any part of the work.
- A statement that the manuscript has been read and approved by all authors, and that the requirements for authorship as previously stated in this document have been met and that each co-author believes that the manuscript represents honest work.
- Any additional information that may be helpful to the editors.

- An originally executed Letter of Transmittal (Form A), and if applicable, Model Release (Form B), Acknowledgement Permission (Form C), permission to reproduce published material, and permission to report sensitive personal information.

REFERENCE

1. International Committee of Medical Journal Editors. Uniform requirements for manuscripts submitted to biomedical journals. http://www.icmje.org, accessed 1 February 2008.

Appendix 1

STRUCTURED ABSTRACT COMPONENTS

ORIGINAL RESEARCH REPORT	LITERATURE REVIEWS META-ANALYSIS	CASE REPORTS
Objective	Objective	Objective
Design	Data Sources	Clinical Features
Setting	Study Selection	Intervention and Outcomes
Patients/Participants	Data Extraction	Conclusions
Intervention	Data Synthesis	
Main Outcome Measure(s)	Conclusion	
Results		
Conclusion		

All sections of the structured abstract relevant to the type of article must be addressed in clear prose, using complete sentences, keeping in mind that section headings may be removed prior to publication, depending on type of article and editorial policy at the time.

Articles containing original data concerning the course (prognosis), cause (aetiology), diagnosis, treatment, prevention or economic analysis of a clinical disorder or an intervention to improve the quality of health care must include a structured abstract of no more than 250 words with the following headings and information:

Objective: State the main question or objective of the study and the major hypothesis tested, if any.

Design: Describe the design of the study, indicating, as appropriate, use of randomisation, blinding criteria, standards for diagnostic tests, temporal direction (retrospective or prospective), and so on.

Setting: Indicate the study setting, including the level of clinical care (for example, primary or tertiary, private practice or institutional).

Patients, Participants: State selection procedures, entry criteria and numbers of participants entering and finishing the study.

Interventions: Describe the essential feature of any interventions, including the method and duration of administration.

Main Outcome Measure(s): The primary outcome measures should be indicated as planned before data collection began. If the hypothesis being reported was formulated during or after data collection, this fact should be clearly stated.

Results: Describe measurements that are not evident from the nature of the main results and indicate any blinding. If possible, the results should be accompanied by confidence intervals (most often the 95% interval) and the exact level of statistical significance. For comparative studies, confidence intervals should relate to the difference between groups. Absolute values should be indicated when risk changes or effect sizes are given.

Conclusions: State only those conclusions that are directly supported by the data, along with their clinical application (avoiding over-generalisation) or where additional study is required before the information should be used in usual clinical settings. Equal emphasis must be given to positive and negative findings of equal scientific merit (further details can be obtained from Haynes RB *et al*. More informative abstracts revisited. Ann Intern Med 1990; 113:69-76).

Abstracts for review articles should have the following information:

Objectives: State the primary objective of the review article.

Data Sources: Describe the data sources that were searched, including dates, terms and constraints.

Study Selection: Identify the number of studies reviewed and the criteria used for their selection.

Data Extraction: Summarise guidelines used for abstracting data and how they were applied.

Data Synthesis: State the main results of the review and the methods used to obtain these results.

Conclusions: State primary conclusions and their clinical applications, avoiding over-generalisation. Suggest areas for additional research if needed.

Abstracts for case reports should have the following headings and information:

Objective: The objective describes what the case report attempts to accomplish. Is it presenting a rare case? Or, perhaps, it is describing an unusual response to treatment. Describe briefly the intent and import of the report.

Clinical Features: List the important clinical features of the condition discussed, including important physical findings, neurological and orthopaedic findings, radiographic or other imaging results and any other special studies performed.

Intervention and Outcome: Describe the type of care rendered to the patient and the ultimate response to therapy.

Conclusions: What was learned from the case? What did the author conclude, and what recommendations might be made?

Appendix 2

EXAMPLES OF CORRECT FORMS OF REFERENCES

Articles in Journals

1. Standard journal article

List the first six authors followed by *et al*. (Note: NLM now lists up through 25 authors; if there are more than 25 authors, NLM lists the first 24, then the last author, then *et al*.)

Vega KJ, Pina I, Krevsky B. Heart transplantation is associated with an increased risk for pancreatobiliary disease. Am J Intern Med 1996 Jun 1;124(11):980-3.

As an option, if a journal carries continuous pagination throughout a volume (as many medical journals do) the month and issue number may be omitted (Note: For consistency, this option is used throughout the examples in Uniform Requirements. NLM does not use this option.).

Vega KJ, Pina I, Krevsky B. Heart transplantation is associated with an increased risk for pancreatobiliary disease. Ann Intern Med 1996;124:980-3.

More than six authors:

Parkin DM, Clayton D, Black RJ, Masuyer E. Friedl HP, Ivanov E, *et al*. Childhood leukaemia in Europe after Chernobyl: 5 year follow-up. Br J Cancer 1996;73:1006-12.

2. Organisation as author

The Cardiac Society of Australia New Zealand. Clinical exercise stress testing. Safety and performance guidelines. Med J Aust 1996;164:282-4.

3. No author given

Cancer in South Africa [editorial]. S Afr Med J 1994;84:15.

4 Article not in English

(Note: NLM translates the title to English, encloses the translation in square brackets, and adds an abbreviated language designator.)

Ryder TE, Haukeland EA, Solhaug JH. Bilateral infrapatellar seneruptur hos tiddligere frisk kvinne. Tidsskr Nor Laegeforen 1996;116:41-2.

5. Volume with supplement

Shen HM, Zhang QF. Risk assessment of nickel carcinogenicity and occupational lung cancer. Environ Health Perspect 1994;102 Suppl 1:275-82.

6. Issue with supplement

Payne DK, Sullivan MD, Massie MJ. Women's psychological reactions to breast cancer. Semin Oncol 1996;23(1 Suppl 2):89-97.

7. Volume with part

Ozben T, Nacitarhan S, Tuncer N. Plasma and urine sialic acid with non-insulin dependent diabetes mellitus. Ann Clin Biochem 1995;32(Pt 3):303-6.

8. Issue with part

Poole GH, Mills SM. One hundred consecutive cases of flap lacerations of the leg in ageing patients. N Z Med J 1994;107(986 Pt 1):377-8.

9. Issue with no volume

Turan I, Wredmark T, Fellander-Tsai L. Arthroscopic ankle arthrodesis in rheumatoid arthritis. Clin Orthop 1995;(320):110-4.

10. No issue or volume

Browell DA, Lennard TW. Immunologic status of the cancer patient and the effect of blood transfusion on antitumor responses. Curr Opin Gen Surg 1993;325-33.

11. Pagination in Roman numerals

Fisher GA, Sikic BI. Drug resistance in clinical oncology and hematology. Introduction. Hematol Oncol Clin North Am 1995 Apr;9(2):xi-xii.

12. Type of article indicated as needed

Enzenberger W, Fischer PA. Metronome in Parkinson's disease [letter]. Lancet 1996;347:1337.

Clement J, De Bock R. Hematological complications of hantavirus nephropathy (HVN) [abstract]. Kidney Int 1992;42:1285.

13. Article containing retraction

Garey CE, Schwarzman AL, Rise ML, Seyfried TN. Ceruloplasmin gene defect associated with epilepsy in EL mice [retraction of Garey CE, Schwarzman AL, Rise ML, Seyfried TN. In: Nat Genet 1994;6:426-31]. Nat Genet 1995;11:104.

14. Article retracted

Liou GI, Wang M, Matrogoon S. Precocious IRBP gene expression during mouse development [retracted in Invest Ophthalmol Vis Sci 1994;35:3127]. Invest Ophthalmol Vis Sci 1994;35:1083-8.

15. Article with published erratum

Hamlin JA, Kahn AM. Herniography in symptomatic patients following inguinal hernia repair [published erratum appears in West J Med 1995;162:278]. West J Med 1995;162:28-31.

Books and Other Monographs

Note: Previous Vancouver style incorrectly had a comma rather than a semicolon between the publisher and the date.

16. Personal author

Ringsven MK, Bond D. Gerontology and leadership skills for nurses. 2nd ed. Albany (NY): Delmare Publishers; 1996.

17. Editor, compiler as author

Norman IJ, Redfern IJ, editors. Mental health care for elderly people. New York: Churchill Livingstone; 1996.

18. Organisation as author and publisher

Institute of Medicine (US). Looking at the future of the Medicaid program. Washington: The Institute; 1992.

19. Chapter in a book

Note: Previous Vancouver style had a colon rather than a p before pagination.

Phillips SJ, Whisnant JP. Hypertension and stroke. In: Laragh JH, Brenner BM, editors. Hypertension: pathophysiology, diagnosis, and management. 2nd ed. New York: Raven Press; 1995. p. 465-78.

20. Conference proceedings

Kimura J, Shibasaki H, editors. Recent advances in clinical neurophysiology. Proceedings of the 10th International Congress of EMG and Clinical Neurophysiology; 1995 Oct. 15-19; Kyoto, Japan. Amsterdam: Elsevier; 1996.

21. Conference paper

Bengtsson S, Solheim BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sep. 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. p. 1561-5.

22. Scientific or technical report

Issued by funding/sponsoring agency:

Smith P, Golladay K. Payment for durable medical equipment billed during skilled nursing facility stays. Final report. Dallas (TX): Dept. of Health and Human Services (US), Office of Evaluation and Inspections; 1994 Oct Report No.: HHSI-GOEI69200860.

Issued by performing agency:

Field MJ, Tranquada RE, Feasley JC, editors. Health services research: work force and educational issues. Washington: National Academy Press; 1995. Contract No.: AH-CPR282942008. Sponsored by the Agency for Health Care Policy and Research.

23. Dissertation

Kaplan SJ. Post-hospital home health care: the elderly's access and utilization [dissertation]. St Louis (MO): Washington Univ.; 1995.

24. Patent

Larsen CE. Trip R, Johnson CR, inventors; Novoste Corporation, assignee. Methods for procedures related to the electrophysiology of the heart. US patent 5,529,067. 1995 Jun 25.

Other Published Material

25 Newspaper article

Lee G. Hospitalizations tied to ozone pollution: study estimates 50,000 admissions annually. The Washington Post 1996 Jun 21;Sect. A:3(col. 5).

26. Audiovisual material

HIV+/AIDS, the facts and the future [videocassette]. St Louis (MO): Mosby-Year Book; 1995.

27. ***Legal material***
Public law:
Preventive Health Amendments of 1993; Pub. L. No. 103-183, 107 Stat. 2226 (Dec. 14, 1993).
Unenacted bill:
Medical Records Confidentiality Act of 1995; S. 1360, 104th Cong., 1st Sess. (1995).
Code of Federal Regulations:
Informed Consent, 42 C.F.R. Sect. 441.257 (1995)
Hearing:
Increase Drug Abuse: the Impact on the Nation's Emergency Rooms: Hearings Before the Subcomm. on Government Operations, 103rd Cong., 1st Sess. (May 26, 1993).

28. Map
North Carolina. Tuberculosis rates per 100,000 population, 1990 [demographic map]. Raleigh: North Carolina Dept. of Environment, Health, and Natural Resources, Div. of Epidemiology; 1991.

29. Book of the Bible
The Holy Bible, King James version. Grand Rapids (MI): Zondervan Publishing House; 1995. Ruth 3:1-18.

30. Dictionary and similar references
Stedman's medical dictionary. 26th ed. Baltimore: Williams & Wilkins; 1995. Apraxia; p. 119-20.

31. Classical material
The Winter's Tale. act 5, scene 1, lines 13-16. The complete works of William Shakespeare. London: Rex; 11973.

Unpublished Material

32. In press
(Note: NLM prefers "forthcoming" because not all items will be printed.)
Leshner AI. Molecular mechanisms of cocaine addiction. N Engl J Med. In press, 1996.

Electronic Material

33. Journal article in electronic format
Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis [serial online] 1995 Jan-Mar [cited 1996 Jun 51; 1(1):[24 screens]. Available from: URL: http://www.cdc.gov/ncidod/EID/eid.htm.

34. Monograph in electronic format
CID, clinical dermatology illustrated [monograph on CD-ROM]. Reeves JRT, Maibach H. CMEA Multimedia Group, producers. 2nd ed. Version 2.0. San Diego: CMEA; 1995.

35. Computer file
Hemodynamics III. the ups and downs of hemodynamics [computer program]. Version 2.2 Orlando (FL): Computerized Educational Systems; 1993.

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CHIROPRACTIC JOURNAL OF AUSTRALIA

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Oxford Printery, Wagga Wagga

Vol 43 No 1 ISSN 2200-8012 MARCH 2013