

CONSTRUCTING A CREDIBLE CASE REPORT: ASSEMBLING YOUR EVIDENCE

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ABSTRACT

The case report is a staple of chiropractic literature; however, its value has been challenged through inference by both a national regulator and a North American chiropractic researcher. This paper describes the necessary inclusions to elevate the straightforward biomedical case report prescribed by the CARE guidelines to a level of validity that allows admission as credible evidence for chiropractic practice. We endorse the CARE guidelines for standard use throughout the chiropractic profession and explain how the philosophical tenets of *aboutness* and *consilience* can be applied with hermeneutics and axiology to benefit the heuristics of clinical decision making. The additional elements essential to a credible chiropractic case report are described in detail and a chiropractic-specific lexicon is given to enrich its evidential value in the absence of clinical trials. These include a complete description of the patient demographic and clinical presentation, a full description of the clinical entity identified by the chiropractor as the target for clinical intervention, a full description of the intervention applied, and documentation of outcomes measures. The consistent use by authors of more precise language within case reports of patient presentations associated with subluxation facilitates 'aboutness' to allow consilience of more than 1 case report of similar presentations. These simple techniques will produce a stronger level of empiric evidence in chiropractic. An application of the philosophical tools of *aboutness* and *consilience* is shown to allow agglomeration of multiple reports and then interpretation with hermeneutics. The phenomenological approach to preparing a prospective case report adds value by reporting the meaning of the encounter through the patient's eyes, interpreted through axiology. A credible case report is admissible at a high level in any evidential hierarchy appropriate to chiropractic. The 'Monday morning' utility test is favorable for case reports. (*J Contemporary Chiropr* 2018;1:45-58)

Key Indexing Terms: Chiropractic; Case Report; Chiropractic; Evidence; Scholarship; CARE guidelines.

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INTRODUCTION

The chiropractic paradigm of the association of spinal health (1) with wellbeing is radically different to the medical paradigm of disease, sickness or illness, and symptom management. The case report is ubiquitous in the profession's literature and has advanced from being low on the hierarchy of evidence, above only animal studies in its perceived applicability in post-industrial medicine, to around the middle of the familiar evidence pyramid. (2) Test tube research, animal research, and opinions and editorials are now categorized as lower-level evidence than case reports, and while case control studies, cohort studies, and RCTs sit higher, the apex of the pyramid remains systematic reviews and meta-analyses.

A well-constructed credible case report has validity that allows consideration as evidence by the practitioner, with integration of the patient's preferences. This is the application of 'evidence' as advanced by Cochrane, (3) discussed by Guyatt, (4) then formalized in 1996 by Sackett's seminal editorial. (5) The value of the case report in chiropractic lies in the observation that there is little evidence for chiropractic interventions in the form of randomized clinical trials, seen by many, but not by others, as the epitome of evidence for post-industrial biomedicine. (6-9) Both nursing (10) and occupational therapy (11) appreciate the limitations of the biomedical hierarchy of evidence and are developing new ways to view the evidence pyramid to recognize greater engagement by practitioner and patient.

In Australia, the national regulator of chiropractic issued guidance (12) stating its view of evidence was based on the hierarchy used by biomedicine. This hierarchy is now independently claimed to be wrong, (13,14) suffering from flawed logic. (15) It can be argued the hierarchy of evidence used by biomedicine is of little relevance to the anthropocentric clinical discipline of chiropractic and that the case report deserves prominence in our post-positivist (16) chiropractic world, where scientific reasoning is quite similar to common-sense reasoning.

Nevertheless, the regulator considers case reports to be low evidence. Our goal is to correct that misinterpretation while noting that practice within chiropractic requires the clinician to consider evidence and more often than

not, relevant evidence is drawn from the chiropractic case-report literature.

An advanced search of the PubMed (17) data base on 1 August 2018 with the search terms '*chiropractic*' AND '*case report*' returned 901 papers across a variety of journals. On the same date, an advanced search of the profession's referent data base, the Index to Chiropractic Literature (ICL), (18) using the same terms returned 1,125 articles. The 4 chiropractic-specific journals of McCoy Press (19) searched with the same terms returned 559 articles, and the multi-discipline data base, CINAHL Plus (20) returned 531. For this growing body of evidence to be widely accepted in the future, greater attention must be given to the structure and terminology used when writing a case report.

The objective of this paper is to guide a clinician to draw from the body of evidence around a particular patient and to report it in a manner that allows interpretation in the manner of hermeneutics through the philosophical lenses of *aboutness* and *consilience*. This paper provides these tools and includes a guide to the preparation of a prospective case report.

DISCUSSION

Evidence in Chiropractic Practice

The proper use of evidence is essential in chiropractic and the principles of Sackett's seminal editorial in favor of EBM have been adopted and included in most developed medical and health care curricula around the world. (21,22) Today, however, some interpret EBM as having "had a strong modernist agenda with an aim to 'purify' clinical reality into a dichotomy of objective 'evidence' from nature and subjective 'preferences' from human society and culture" (23) where "misrepresented, false and unuseful findings may be the majority or even the vast majority of published research claims ... pseudoscience." (24) In a similar manner, some cynically view Palmer's ideas as dogma, (25,26) while a few other chiropractors see nothing else but RCTs with 'the data' forming the apex of the Evidence Pyramid.

Adams and some chiropractors have suggested the profession should rely on quantitative research for it to become more evidence based. (27) Walker (28) argues that 'soft-resistance' to the concept of EBM is given as being a change in terminology to 'evidence-influenced practice'.

Medical physicians Isaacs and Fitzgerald (7) asked their colleagues what they would do "if faced with a clinical problem for which there are no randomised controlled trials and no good evidence?" They concluded "There are plenty of alternatives for the practising physician in the absence of evidence. This is what makes medicine an art as well as a science."

The same applies to chiropractors, and Kawchuk's view (29) of the contemporary place of chiropractic clinical experience should be disturbing. Research in chiropractic is more than a fashionable preoccupation today; it has been the essence of chiropractic since Oakley Smith's work in 1903 on the ligaments of the IVF. Such opinions hamper chiropractic as opposed to advancing it as a science, art, and philosophy.

The relationship between evidence from science and the art of chiropractic practice has been integral to chiropractic from its beginning. Daniel Palmer himself respected the interconnectedness of science and practice in his first published writings. (30) From 1906 (31) Palmer's writings included a succession of rudimentary case reports. Also in 1906, Smith, Langworthy and Paxson wrote "Through chiropractic, science has been urged to higher development by the demands of the art, while the art has been perfected by the advance of science". (32, p.18). Smith is remembered for his pioneering research on the intervertebral foramen (33 pp. 417-31). His student Harold Swanberg, a member of the American Association for the Advancement of Science, formally published his research findings in 1914 (34) and advertised his publication in *The Chiropractor*. (35) It was not until 1919 that Smith's research up to 1907 formally entered the literature. (36)

A credible case report is able to capture the art of chiropractic in a science-based manner embedded in philosophy. Our contrarian, pragmatic position as educators is that a well-written case report with credibility slots seamlessly into Sackett's model, which includes the 'practitioner and the patient' and is admissible evidence in both clinical learning and practice.

Filtration and Extrapolation

A claim that is not supportable is that case reports are low-level evidence in that they report individual data which is not filtered by a group of peers. The biomedicalists also argue that only data from large group studies can provide meaning. The flaw in this argument is that recommendations drawn from group data are being found largely impotent to infer a clinical decision expected to produce a statistically appropriate outcome from a general group. There is also the question of publication integrity (37-40) and the withholding of negative findings. (41) Data from large groups loses value when applied to the specific, the individual under care. Perhaps this is due to the variability of the specific patient which may well place them outside the 95% confidence interval of group findings.

Nevertheless, those chiropractic academics who undertake group research argue they are the evidence filter for the profession. In a chiropractic version of a TED™ talk, (29) Kawchuk claimed science now led the chiropractic profession (min 5:00), claiming the job of researchers was to create an opinion *de novo* to represent

the profession. Kawchuk went beyond just North American opinion, projecting onto the rest of the world by claiming practitioner opinion mattered far less today and that it was "data that drove the profession" (min 5:30). He also argued that clinicians should use data to speak for the profession instead of their experience, which "doesn't have evidence."

Evidence is growing that conclusions drawn from aggregated data may be worryingly imprecise. (42) For evidence to have value in clinical practice it must be relevant and be able to be extrapolated to an individual patient. The clinical relevance of research is poor when it recreates knowledge already held in the profession or has questionable value such as predicting the future of the profession from student opinion. (43) Other types of research with less value to clinicians is reporting on the profile of research colleagues as opposed to the clinical profession, (44) and that which discusses ways researchers can improve their research. (45)

Yet these outputs are considered 'filtered' and are admitted at a higher level in the flawed hierarchy than are case reports. Biomedical research findings remain 'top down' and their clinical inferences are weak. Regardless, in evidential terms case reports have been marginalized in the belief they represent unfiltered information. (46) Filtration actually occurs when a clinician selects 1 or more case reports to reflect the patient she or he is considering. This 'user' filtration admits credible case reports as a 'bottom up' knowledge pathway where the reported clinical interaction arises from the coal face of clinical practice. Evidence from case reports is the path from the specific to the general, up from one patient then across and through another clinician's filtration, down to their patient. Filtration also occurs before being available for selection by the clinician given a case report is written by a practitioner and published only after peer review by usually 2 others, and final review for acceptance by an editor. The resulting 'n of 1' report is indeed filtered information.

Aboutness, Consilience and Causation

We argue that a higher degree of filtration approaching that of a systematic review or a meta-analysis in the style of Cochrane is able to be found for case reports through the process of *consilience*. The recommendations presented are explicitly for the reporting of a clinical presentation that includes what the chiropractor calls subluxation, and where the intervention is an adjustment. These are the parameters we found during our review of learning objects for the Tokyo College of Chiropractic for the purpose of selecting case reports to be admitted to the learning experience.

We term such case reports as 'chiropractic case reports' when they meet these criteria:

1. A standardized structure;

2. Use of language specific to the clinical findings of the chiropractor; and
3. Use of complete language specific to the chiropractic intervention, especially where this intervention is the adjustment.

The 2 philosophical perspectives of *aboutness* and *consilience* are suggestive of a theological approach to interpretation and understanding by hermeneutics and axiology, discussed below. We propose these philosophical subtleties in chiropractic have been overshadowed by the embrace of EBM in a manner that excludes practice wisdom in the form of contributions from the personal experience of the practitioners and the lived experience of the patient.

Closer attention to textual reporting is required from clinicians constructing case reports about subluxation. The intent is to allow agglomeration of reports for similar patients. The philosophical notion of aboutness allows consilience to strengthen heuristic (47) clinical decision making in the chiropractic context. A benefit of allowing consilience is removal of the need for trials controlled by placebo or the withholding of treatment.

The idea of aboutness (48-51) is the qualitative equivalent of the 'confidence interval' (52-54) common to quantitative biomedical research. An example of aboutness is drawn from a recent case report by Ng. (55) The 'about' nature with Ng's patient is he was 6 years of age at his first presentation and 8 at the second; the reader's patient could be 5, 6, 7, 8 or 9 or 'about' that age. Ng's report has validity for allowing the reader to apply 'aboutness'.

The philosophical notion of *aboutness* deals with evidence from a qualitative homologue of quantitative's confidence interval (CI). Statistically, the CI is replacing the p-value and in some cases the null hypothesis. (56) The CI is typically set at 95%, to mean that 'about 95% of the time the answer will lie between value 1 and value 2'. In other words, the acceptable quantitative response is 'about' a certain value, but only 95% of the time. It is also argued that the CI can be lowered to 90%, (57) meaning there is now a 10 percent chance of any 1 patient being outside the ball-park.

Empiricists know the unattainability of an exact value and this realization underpins acceptance of Sober's (48) philosophic perspective on evidence, which argues precision is as unattainable in quantitative science as it is in qualitative sciences. An appreciation of the *aboutness* of something allows these threads to be woven into a case report without the need for the specifics demanded of definitions. A short narrative describing the patient and the reporting of external, independent diagnostic procedures represents a clinical scenario likely able to be matched, in an about manner, to a reader's patient.

Value is found also in the philosophical idea of *consilience*. (58) The understanding from Hesse (16) is appropriate within chiropractic practice where *consilience* is the term given when several case reports allow gathering by 'aboutness' to suit a particular individual presentation. It is a valid method of representing a coming together of different perspectives, such as academia and industry (59) or practitioners using different techniques, or even several chiropractors serving different populations. *Consilience* is also a tool to examine, by inductive clinical reasoning, a single clinical issue such as fetuses-at-risk. (60)

Consilience is essentially the application of the *aboutness* of a finding collated from a number of studies reporting clinical observation regardless of source discipline or the technique used by the chiropractor. *Consilience* allows a gathering of case studies about a common clinical presentation, and for guidance to be extracted as evidence for a future planned action step or sequence.

For example, case reports on a shared topic are not required to be exact matches. However, they may be considered together on the basis they report similar clinical presentations with similar causes. The various interventions can be assessed for similarities and disparities, with *consilience* allowing a practitioner-determined, meaningful, evidence-based action with consideration of and from the patient. This represents the intent of Cochrane (3) who was the first to pursue the notion of using evidence at the bedside, sourced from the patient, his own experiences, and the literature. (61)

Sackett packaged and presented it in editorial form in 1996 (5) building on an earlier paper that classified evidence from the literature. (4) Sackett is considered the Father of EBM (62) notwithstanding EBM was first conceptualized in mid-19th century Paris. (63) Sackett mentored Guyatt, who was developing a novel method of teaching medicine at the bedside. His work with the core curriculum of the McMaster Residency Program on 'Evidence-Based Medicine' (EBM) (64) realized that a "deficit existed in medicine: biomedical science often had no translational application to clinical medicine." A properly written case report, allowing *aboutness* and *consilience*, helps to address this omission, as it may exist, in chiropractic practice and education.

A third element of relevance is that of causation. It is popular for occupational regulators and biomedicalistic chiropractors to demand that clinical explanations have 'biological plausibility'. (65) In philosophical terms, this does not track, as a "causal explanation does not need to identify a cause of the target event. It does not even need to imply that the target event was caused." (66) To be blunt, the idea of 'proving' the chiropractic subluxation in a biomedical pharmaceutical-study sense is fatally flawed and this idea must be removed as an argument against the concept, identification and management of the chiropractic subluxation as documented in a case report.

Evidence of change in clinical findings before and after adjustment allows the idea of clinical causation should the findings change while other matters remain 'about' constant. It is for neurophysiologists to determine biologically plausible mechanisms and the biomedical literature is overflowing with evidence relevant to chiropractic. For example, PubMed returns over 109,000 peer-reviewed papers using the search term 'innate' and situates it largely within the 'innate nervous system' and 'innate immune system' as describing the body's inherent ability to carry out certain functions like digestion, breathing, healing wounds and procreation. Innate is certainly far from the notion of religion as advanced by Young. (67) When 'immune system' is excluded the return drops to about 35,000. This strongly suggests it is not chiropractors doing the work to demonstrate biological plausibility of multiple notions of dis-ease, as filtering to only chiropractic papers returns 8 (at 1 August 2018); however, it remains the clinician's responsibility to engage with this entire literature.

Hermeneutics

The risk with introducing hermeneutics into a chiropractic discussion is that some critics may attempt to link this paper with the religiosity myth. (25,68-70) The relevant principle is actually that theology deals with a problem similar to that in chiropractic, the reconciliation between the chiropractic world-view and that of EBM. The theologian's challenge is to reconcile a Thomist world with that of modern evolutionary science, where each reject the other, Chaberek (71) dismisses this conflict by using the principle of Non-Overlapping Magisteria (NOMA).

The chiropractic issue is to reconcile the world-view of Palmer and his concept of subluxation and thus of chiropractic as it was founded, with modern biomedical science. The principle of NOMA reveals a completely different world to that of EBM, and the 2 have nothing to do with each other (non-overlapping). Chaberek says "According to NOMA, a conflict between science and religion does not happen, in fact it is not possible, because they speak about different things". (71 p. 13)

The use of NOMA does not equate religion with chiropractic. It says 2 schools of thought, those of chiropractic and EBM, can exist within a chiropractor's mind to allow complete acceptance of Palmer's major premise, the interconnectivity among subluxation, tone and wellbeing, and of scientific explanations of these and their application. To complete this thought, we add the idea from Pascoe (72) who wrote about Aboriginal farming in Australia "the dearth of evidence on these plants should not imply a lack of evidence, rather a lack of interest and will to explore Aboriginal interaction with the plant communities of Victoria". (p. 40).

Massimi's Theory of Abstract Objects (73) allows the notion there is an abundance of evidence for the existence

of subluxation. The biomedicalists argue for 'biological plausibility' (65) and in philosophical terms this makes no sense. Plausibility implies cause, yet a "causal explanation does not need to identify a cause of the target event. It does not even need to imply that the target event was caused". (49)

Hermeneutic findings relevant to chiropractic can be interpreted through axiology. (74-77) This tool of contemporary philosophy allows meaning to be determined from the patient experience. Hartman's (78) notion of axiologic value-levels is especially useful in prospective phenomenological case reports, a matter addressed later in this paper.

A Standardized Structure

We propose that chiropractors adopt the CARE Guidelines for the style of writing case reports. In 2013 a group published (79) guidelines with the acronym taken from Case Report Statement and Checklist. This and related documents are held online for open access. (80) The article was simultaneously published in 6 journals and adopted as a preferred format for the submission of case reports for consideration applicable to clinical practice.

The guidelines were elaborated in 2017 (81) and are specifically intended to inform medical education. Apart from a few medical publishers such as *BMJ Case Reports* (82) and *Springer's Journal of Medical Case Reports* (83) global uptake has been slow. The site Mackeeper reports "Care-statement.org is tracked by us since December, 2015. Over the time it has been ranked as high as 832 199 in the world, while most of its traffic comes from Russian Federation ... we found that Care-statement.org is poorly 'socialized' in respect to any social network. According to Siteadvisor and Google safe browsing analytics, Care-statement.org is quite a safe domain with no visitor reviews." (84)

One of the lead developers of CARE guidelines, medical researcher and editor Riley, (85) described case reports as "records written by medical professionals that outline the diagnosis, treatment, and outcomes of the medical problems of patients. They are written in a narrative style, and are extremely useful in providing early signals of effectiveness, adverse events, and cost." His interest arose because he "felt that was an area that was not being investigated by anyone in medicine, in the systematic way."

At the time of writing, mid-2018, our paper seems to be the first in the chiropractic literature to reference the CARE guidelines. It is presumed the reader has the capability to identify a case of interest and construct a reasonably written case study in the familiar manner. (86) The progressive step is for an author to write in the manner of scholarship where evidential statements and competent referencing of the literature has importance. McAulay has addressed the elements which constitute 'competent referencing' and his paper is a valuable

refresher. (87) Its guidance is no less important when preparing a case report.

While it is mandatory (88) for graduate chiropractors to demonstrate capability with locating and applying evidence, skills required to write a publishable case report are not addressed in the competencies applied by any regional accrediting body; USA, Canada, Europe or Australasia. Such abrogation of responsibility creates a need to address this matter in the profession's literature. This paper rectifies this omission.

By refining the conciseness of inclusions in a case report, an author allows better use of the resultant as evidence while withstanding critical scholarly review. While acknowledging the value of the CARE Guidelines in the medical literature, we consider the alternate paradigm of chiropractic which emphasizes detection and correction of the cause or causes of altered function in individuals warrants an enhanced approach for writing case reports suitable for the chiropractic literature. The chiropractic paradigm of the association of spinal health (1) with wellbeing is radically different to the medical paradigm of disease, sickness or illness, and symptom management.

The Language of the Chiropractic Clinical Encounter

The chiropractic clinical encounter differs from medicine due to its paradigm of wellness as opposed to illness. The case report must include a complete description of the patient demographic and clinical presentation, and a full description of the clinical entity identified by the chiropractor as the target for clinical intervention;

- Patient Description

The down-stream intent is for a reader to match the patient in the report with a patient currently presenting to them, to a close degree. It is also to allow collection and reporting of several similar case reports from different authors as an individualized case series, an even stronger form of clinical evidence when the principles of consilience and aboutness are engaged. Ng's paper (55) provides a template of an acceptable patient description. He reports an 8-year-old child, seen on 2 occasions, who had mild to moderate hearing loss. The clarity of Ng's clinical description of the patient, including the reports of the hearing tests performed independently by a specialist medical practitioner, represent the contemporary model for chiropractic case reports.

- The Clinical Entity Identified as The Target for Clinical Intervention

It is insufficient to simply report 'subluxations were found ...' and give a spinal level or number of, or to locate subluxation elsewhere in imprecise terms. How was it known to the practitioner the found site was a subluxation?

Nor is it sufficient to write, as did Ng, "Patient's vertebral

subluxation was analyzed and corrected using KST with the use of the Arthrostim instrument". (55) What is KST? What is the validity and examiner reliability of KST? Scholarship requires the intervention to be referenced to the literature and a sales brochure or seminar notebook is not sufficient, nor is the use of a proprietary name such as "after undergoing Pierce chiropractic care." (89)

Hoying and Bulla's case report (89), however, can be admitted as evidence as they are concise with their description of intervention, stating "All hand adjustments were delivered using a Zenith 230-Plus Pierce Hylo adjusting table (Williams Healthcare Systems, Elgin, IL), while the patient was lying in the prone position. Each hand adjustment is commonly referred to as a 'toggle-set' as opposed to a 'toggle recoil' because it does not utilize a recoil like traditional toggle adjustments do." They also assiduously describe their use of infrared spinal thermography and other instruments to identify what they called subluxation. The presenting complaint is quantified.

However, while their report is weakened by not documenting the patient's reported subjective outcomes, strength is found in its objective documentation of findings while the question remains, how did the patient feel? Is it possible for objective findings to change, as reported, yet for the patient to still have recurrent low back pain? This omission renders this case report 'about' acceptable as evidence for cause and effect of subluxation, albeit in empirical terms and not the lived patient experience. What is clinically meaningful is their association of subluxation with change in autonomic function.

Detailed descriptions are imperative to allow a case report to have clinical meaning and relevance, and this includes the description of what was found for the clinician to address. The evidence base to allow subluxation as a finding lies in subluxation being a clinical concept and not the name of a physical object; (90) a functional lesion that points to a clinical diagnosis (91) associated with a therapeutic intervention delivered with an intent (92,93) and expected outcomes. (94)

Senzon argues a clinical understanding of subluxation can be drawn from as far back as Oakley Smith's research in 1905. (95) As early as 1906, Smith had published (32 pp. 23, 26) that altered movement was the signature of a dysfunctional vertebral unit, a finding that progressed to motion palpation (96) to detect subluxation. Faye claims he first proposed the movement-based subluxation model in 1967 (97) yet he did not publish until the late 1980s. (98) It is likely the refinements arose from research in the European scholarly school of Gillet, (99) Illi (100) and Sandoz (101) in the 1950s and 60s. Although records are hard to find, therapeutic manipulation has a long history in Europe, dating from the 1860s as noted by Gaucher-Peslherbe. (102)

From this starting point it is possible to précis-read the work of Flesia, (103) then Dishman (104) and Lantz, (105,106) as refreshed by Ebrall in 2004 (107) with consideration to Lantz's subsequent thinking about an expanded model based on his work in Gatterman. (108)

Case reports not using the term subluxation are of lesser value to chiropractors even though they may deal with spine-related disorders. This is not withstanding the value of those about other clinical presentations where subluxation may not be relevant. When something is found by a chiropractor in the spine, and addressed in the manner of chiropractic, then consideration must be given to the suitability of naming that 'something' subluxation. Such reports can be admitted as evidence for chiropractic to the exclusion of reports using one of the more than 500 or so synonyms found by Rome. (109) Synonymic terms lack the defined construction of the documented subluxation model, none more so than 'somatic dysfunction' or 'vertebral lesion'. A clear definition of 'adjustment' allows distinction from 'manipulative therapy (110) as applied by other disciplines.

To allow a case report to be admitted for learning purposes within the TCC curriculum, we determined that at least 3 of 5 commonly accepted components of the complex must be given. These have evolved over time and are reported in the literature as movement change, perhaps Bergman's PARTS model, (111) neural change including autonomics even with a musculoskeletal presentation, (112) muscle change, (113) ligamentous change including those ligaments not generally recognized, such as the first thoracic ligament, (114) the transverse occipital ligament, (115) and the nuchal ligament, (116) and/or vascular change, a clinical finding revealed by infrared thermography, (117) or the neurocalometer. (118)

Instrumentation is a valid clinical tool and description of its application enriches any case report, as examples heart rate variability (HRV), (119) infrared thermography (IRT), or perhaps both together. (120) Palmer considered "the filaments of nerve tissue create heat", (121) the asymmetry of which is the principle behind today's IRT thought indicative of VSC and perhaps associated with HRV. IRT measures paraspinal skin temperatures (122,123) reflecting dilation or constriction of capillaries, rather than 'filaments.' McCoy (124) reviewed 72 papers on its use to characterize subluxation and found "good to excellent reliability for the technique." Yet others reported "Inter-examiner reliability demonstrated fair to good agreement for identifying comparable (full pattern) and disparate (adaptation) thermographic findings." (125) Others reported "Intraexaminer and interexaminer reliability of paraspinal thermal scans using the TyTron C-3000 were found to be very high, with ICC values between 0.91 and 0.98" (126) This evidence associates subluxation, whatever it may be, with effects detectable

by observation, which is empiricism where all knowledge is derived using human senses aided by, where needed, instruments.

Holt et al (127) have shown the benefits of a 'battery of tests' to identify subluxation and the language and methods reported in their paper have value within a chiropractic case report.

The Therapeutic Intervention, and Outcomes

The two key points to include in a credible case report for chiropractic are a full description of the intervention applied especially where this intervention is the adjustment, and documentation of outcomes measures.

A full description of the intervention: The term adjustment can be taken as the prime therapeutic intervention of chiropractic on the basis it is an action known by observations of its force and time dimensions, (128-130) amenability to training, (131,132) and has some gender difference with performance. (133) We also know a higher proportion of female students experience injury while training. (134) The neurological responses to a high-velocity low-amplitude thrust into the spine are known. (135,136) The chiropractic adjustment is considered to be based on a pre-determining analysis, and implemented as a refined form of the more generalized and non-specific manipulation. It may be considered as the highest order of psychomotor skill on the manipulation spectrum. It is especially directed at a specific osseous structure, more often a vertebral articulation than a peripheral articulation (137); however, extremities are important considerations especially within sports chiropractic in both younger people (138) and adults. (139)

The finer the description the greater the value of a case report. The very least it must contain is identification of the spinal level, remembering it is the joint that is adjusted, not a bone. Therefore it is not sufficient to state 'C7 was adjusted' as while the segmental contact may be on C7, it would be either the C7/T1 joint complex, or that of C6/C7, or indeed both or parts of each. Contact needs to be described in terms of the structure contacted as in spinous, lamina and so on and the clinician's contact point, as in pisiform and so on. The more detail given the more replicable the adjustment, so detail such as laterality, the thrust as high-velocity, low amplitude, and the assumed vectors or line of drive should be reported. Where mechanical assistance is used it too should be described in a manner to allow replication, including any settings of the instrument specific to the case.

Adjunctive therapies and patient education and guidance such as exercise and nutrition should also be described, with an inclusion of indicated compliance at follow-up.

- Documentation of outcomes measures:

There are many outcomes measures appropriate for use

by chiropractors including the Visual Analogue Scale (VAS), the Neck Disability Index (NDI), the Oswestry, and so on. No references are given at this point as the options include different languages and it becomes an individual choice of which to use with consideration of the patient demographic, the clinical presentation, and the language of practice. Whichever is chosen must be consistently used within the clinic's data base for cases of similar nature.

The important requirement is to include a report of the pre- and post-intervention measurements found in a specific case. The objective is to allow agglomeration of reports using similar measures, perhaps for differing presentations. Outcomes are strengthened when written to convey a sense of efficacy. This could be captured by comparing a patient's outcomes with their findings at intake, or by listing other approaches reported to have been previously tried by the patient with little or no effect.

Prospective or Retrospective?

Case reports are usually written following a retrospective review of an interesting case. An alternative is to write from the prospective vantage. Either approach is appropriate and while none is better than the other, retrospective is more straightforward. Gordon's retrospective report of the management of deformational plagiocephaly included 23 patients. (140) While taking time to collect, this somewhat remarkable number of cases forms a very solid case series and demonstrates the essential requirement of consistent clinical record keeping. This report can be used as an exemplar of a retrospective case report, noting that the intervention also included a description of the use of home bedding.

Prospective work can be daunting yet there are ways to strengthen the process which require specific methodologies perhaps better conducted by a third person. The strength of a prospective case report lies in its ability to also be a qualitative research report in the manner of phenomenology. This approach asks a question and then gathers first-person (patient) reports of his or her experience regarding the matter questioned with chiropractic care, an expression of the perceived value of chiropractic.

Phenomenology determines an answer when a theme starts to recur, usually around 7 responses with interview methodology, and is a powerful way to understand aspects of quality (141) in clinical phenomena such as 'at what point does the frequency of care warrant cessation or reduction?' The validity of the findings is multiplied when more than 1 chiropractor undertakes a parallel enquiry. The consilience of 2 or more sets of results from such case reports is a valuable way to inform further research.

Interpreting value requires use of axiology, previously mentioned. (142-145) This tool of contemporary philosophy allows meaning to be derived from

the patient experience. Hartman's (146) notion of axiologic value-levels is especially useful for showing the systematic value of chiropractic care, the extrinsic value of detecting subluxation and its correction by adjustment, and the intrinsic value placed by the patient on the outcome of wellbeing.

We consider the prospective case report to be a valid method for learner-assessment in clinical training. Its power lies in its need to demonstrate a student's vertical integration of knowledge.

Case Reports Inform Research

As an example, a naive research question would seek to determine whether chiropractic intervention in infantile colic is better than placebo, whereas a mature research question could be 'what is the optimal titration of care (patient visit number) for an infant with colic'? All research protocols should be informed by the literature where found outcomes for a particular research question have previously been published as case reports.

Using the example of infantile colic, referring to a case series or even a singular case report would prevent design errors. An example of such a design error in study protocol regarding infantile colic is found in a recent proposal (147) for a single-blind randomized controlled trial, where the protocol allows for only 4 visits over 2 weeks. This protocol is inexplicably weak and fatally flaws the study before it begins.

Such a critical judgement of that proposal by these authors is allowed on the basis on previously published case studies reporting resolution of colic requiring "6 chiropractic visits over a three-week period", (148) "8 visits over 4 weeks", (149) and "9 visits in a period of 11 months". (150) A further case report (151) details the subluxations in 1 such patient as C1 and Sacrum with a total of 18 visits required to achieve resolution. This report also includes the nature of the intervention as "infant toggle Headpiece and Logan Basic Protocol", an example of the specificity of language needed to increase the validity of a chiropractic case report.

Singular case reports thus indicate a range of 6 to 18 visits over a time period ranging from 3 or 4 weeks to 11 months. An argument may be that natural resolution would be expected within 11 months; therefore, the application of 'aboutness' and 'consilience' could suggest an appropriate protocol may be a range of 3 to 4 weeks with a number of interventions between 6 and 9.

A protocol of 4 interventions over 2 weeks lacks design credibility. Had the information reported above been available in 2000 it could have prevented another (152) flawed (153) study in 2001 of infantile colic.

A global weakness of inappropriate methodology is the exclusion of the first-person experience. Case reports,

singular or as a series, not only gather evidential data, but when prospectively conducted with a phenomenological element they may capture the values the patient places on their experience. In this regard any future study of the effect of chiropractic care on infantile colic must include documentation of the parent's experience and the value they place on chiropractic care for their own health through improvement to the wellbeing of their infant.

CONCLUSION

The credibility of a case report constructed as recommended in this paper significantly advances its validity as evidence in the contemporary chiropractic encounter. This paper has reported the value of a credible chiropractic case report to the advancement of quality patient care.

A targeted history of chiropractic has reported the interconnectedness of the science and art of chiropractic which has existed since chiropractic's inception. We argue that today's veneration of data over clinical experience is misguided and this view emphasizes the high value of a credible case report in the evidential hierarchy appropriate to chiropractic. The 'Monday morning' utility test is favorable for case reports.

An application of the philosophical tools of *aboutness* and *consilience* has been shown to allow agglomeration of multiple reports and then interpretation with hermeneutics. The phenomenological approach to preparing a prospective case report adds value by reporting the meaning of the encounter through the patient's eyes, interpreted through axiology.

Every ounce or gram of effort invested in writing in a punctilious manner provides a pound or kilogram of value and this represents a very rewarding outcome for the practitioner and a valuable addition to the literature of the chiropractic profession.

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