

THE VALUE OF CASE REPORTS AS CLINICAL EVIDENCE

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ABSTRACT

Objective: To demonstrate that under certain conditions case reports may be considered by chiropractors as high-level clinical evidence.

Methods: To present a narrative of contemporary views of the hierarchical biomedical evidence pyramid and then apply from Western philosophical thinking the qualitative principles of 'aboutness' and 'consilience' to the preparation of a chiropractic case report and demonstrate the manner in which these tools increase the report's evidential value.

Discussion: The common biomedical evidence pyramid is reported by some to be flawed with little application in chiropractic practice; indeed, some health disciplines are forming new evidential hierarchies presenting a need in chiropractic to reconsider the evidential value of case reports. Palmer case reports have been a consistent feature of chiropractic and should now be written in accord with the CARE Guidelines. When written in this manner and interpreted through the philosophical lenses of aboutness and consilience, the significance to clinicians has the potential of being elevated without compromising evidence-based care.

Conclusion: Case reports represent high evidential value for chiropractors. Appropriately utilised, case reports have the potential to improve the methodological design of clinical trials, thereby improving patient care.

Keywords: Case Reports; Evidence-Based; CARE Guidelines; Philosophy; Evidence Pyramid.

INTRODUCTION

The standard pyramid of evidence is hierarchical and ranks case reports and case series as having low if not least evidential value. This paper will show that the evidence pyramid has been reconsidered by other clinical disciplines seeking a greater relevance of evidence to the patient and will propose that within chiropractic the well-written case report can have high evidential value with targeted patient relevance when interpreted through a specific philosophical lens.

We offer two means to achieve this outcome; the first is to ensure that the writing of a case report is strengthened by following the CARE Guidelines, (1) and the second is that the application of the case report at the clinical level is strengthened through the lens of two principles from Western philosophy: aboutness and consilience.

First we give a brief orientation to the status of the hierarchical evidence pyramid in clinical disciplines and show how others have come to modify it to better inform their practice.

The Hierarchical Pyramid of Evidence

Some consider that the hierarchical pyramid is dead (2) for clinical practitioners. It is reported to have unravelled in complicated clinical disciplines such as orthodontics, (3) and its limitations and inapplicability in chiropractic are recognised. (4)

Epidemiologists Walach and Loeff (5) found the hierarchical pyramid to be flawed in that *'the implicit assumptions of the hierarchical model are wrong, if generalized to the concept of evidence in total.'* La Caze (6) agrees to a point, responding: *'Therapeutic decisions require a judgment of both efficacy and effectiveness and as such an assessment of evidence in terms of both internal and external validity.'* The arguments resolve as indicating the need for a paradigm shift, where *'the theoretical foundation of "evidence-based" decision making'* is replaced *'with something considerably more complex.'*

The clinician's need

The need for clinicians is to readily access *'guidelines to effective clinical care,'* and the Mayo Clinic has proposed to modify the evidence pyramid (7) by depicting the boundaries between levels of evidence as 'wavy' and using a new lens to view the resultant. On the other hand, nursing (8) has proposed a 'new pyramid' that builds from patient interaction, and osteopaths Figg-Latham and Rajendran (9) have argued that the *'Levels of Evidence Pyramid'* needs a lens they term *'Precedence of Osteopathy'* which does nothing but create an upside-down pyramid where *'expert opinion'* is the highest level of evidence. This position lacks intellectual rigour, as it is a view based upon a small study of English osteopaths who believed that their opinion was the most important evidence.

The discipline of Occupational Therapy has presented what we consider the most credible and comprehensive new pyramid to date, calling it *'A new Evidence-Based Practice Model for Occupational Therapy.'* (10) While addressing the perceived needs of that profession, it is complex and difficult to apply to other clinical disciplines, however it is important to discuss.

The problem

The hierarchical pyramid derives from classical physics and has *'become a habit of thinking to conceptualize everything, all matter, all people, all animals, all molecules, in analogy to billiard balls moving or planets traveling an orbital sphere.'* (11) Clearly, the chiropractic patient is more than an inanimate billiard ball, (12,13) and Rosner (14) acknowledges this complexity by stating that *'clinical judgment and patient values and expectations'* form a tripartite and realistic *'guideline to effective clinical care'*.

The underlying problem with hierarchies lies in their number of interpretations (15) and the differing interpretations (16) that are needed in order to try to make sense for chiropractic of a dated construct developed for hospital-based medicine that has been hijacked (17) for pharmaceutical trials. When all is said and done, pyramids are guides, not rules. (18) Evidence-based medicine (EBM) may best be considered as a movement that emerged in the mid-90s and will continue to evolve to better guide those disciplines that adopt the movement, no matter the way they reconsider their hierarchical pyramids.

THE EVIDENCE LEVEL OF CASE REPORTS

This paper is not the first to question the low assigned-evidential value of chiropractic case reports. With regard to their ranking level, Bolton (19) stated '*we might take issue with [low ranking] in that not only are case reports informative, but they are particularly relevant to clinical practice from whence they came.*' (19)

The main argument for this ranking is that case reports lack 'scientific rigour'. We see three reasons why case reports may be classified by some in the field of biomedicine as low ranking:

- *N of 1*: it is accepted that a case report represents a single patient or, when a case series, several. The argument that its outcomes are not applicable fails when it is appreciated that just one case with a negative outcome, such as a vertebrobasilar accident, carries significant weight. It is duplicitous to claim that one report has value when it highlights a negative outcome, and refuse to accept it when one reports a positive outcome.

Further, increasing use is being made of 'N of 1 studies' (19) to uncover subtle results that could be lost in a cohort study, particularly for individualised health issues such as pain, nutrition, and psychology. These are all factors in Waddell's biopsychosocial model of low back pain. (20) The fathers of EBM, Guyatt and Sackett, (21) speak in favour of the power of randomised trials in individualised patients (a sophisticated N of 1 study) to determine optimal therapy;

- *Not controlled*: this view fails for multiple reasons, the most obvious being that clinical care is personalised-care not recipe-care, more so in nursing (22) and chiropractic (23) and increasingly so in medicine (24) where N of 1 reports are valued. Guyatt et al (22) have developed a control protocol for N of 1 reports;
- *Unfiltered*: this argument fails completely due to the rigour of the publication process. The report must first be written which necessitates gathering and reflecting on clinical material and the relevant literature and then submitted to a journal where the editor will initially filter to accept, reject, or modify. The next stage is peer-review, typically a very critical filtering by at least two experienced practitioners with knowledge of the subject matter, followed by a final review by the author and considered-acceptance by the editor.

This paper dismisses these claimed weaknesses and proposes two methods to improve the evidential level of case reports.

ADDRESSING THE PROBLEM

The argument of this paper is that, by broadening the scientific lens to read a case report with philosophical principles, one is able to add rigour and improve the relevance of a published case report to a new clinical situation.

The first method, addressed elsewhere in detail (25,26) by one of us (PE) is to produce a case report in accord with the CARE guidelines. (1) The second is to consume a case report with regard to the Western philosophical principles of 'aboutness' and 'consilience'. We will, through the lens of the Philosophy for Medicine, (27) offer an understanding of the case report as a powerful clinical tool.

1. The CARE Guidelines

The CARE Guidelines now provide the appropriate inclusions for a case report to be acceptable for consideration to publish. These were first published in 2013 (28) as guidelines with the acronym taken from *CAsE REport Statement and checklist*. This and related documents are held online for open access. (29) These guidelines are recommended for all chiropractic journals as the preferred format for the submission of case reports for consideration to publish. However, to date the '*reporting quality of case reports in the nursing field apparently has not improved*' since the publication of these guidelines. (30) However, establishing pragmatic evidence-based guidelines that are sensitive to chiropractic populations and settings is important.

The guidelines were elaborated in 2017 (1) and are specifically intended to inform medical education. One of the lead developers of the CARE guidelines, medical researcher and editor Riley, (31) 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.*'

We offer a final comment that the value of any case report is enhanced with what McAulay calls '*competent referencing*'. (32) His paper is a valuable refresher with important guidance on the use of the literature when preparing a case report, as every report requires a literature review.

2. Philosophical Principles

Non-overlapping magisteria (NOMA)

NOMA has been applied by theologian Chaberek (33) to demonstrate that science and faith can each be held by an individual at the same time as two world-views that sit side-by-side without overlapping to the detriment of either. Whilst primarily a tool to aid an understanding of the science of evolution concurrent with acceptance of the Biblical account of creation, its use in chiropractic is to demonstrate that a conventional chiropractor is perfectly able to practice in an evidence-based manner while including Palmer's concepts of subluxation (34) and, for example, Stephenson's Principles. (35)

The term 'magisteria' primarily applies to the body of teachings of the Catholic church and has the sense that these represent an authority. Chaberek argues that these can be held at the same time as an understanding of the world-view of evolutionary science. Our application to chiropractic holds that our 'magisteria' is the body of authoritative teachings of DD Palmer which we see as conventional chiropractic, and we argue that conventional chiropractors can hold these at the same time as they apply evidence-based practice.

The literature reports surveys of practitioners (36,37) and notably students (38) but less so of some academics (39) as consistently showing acceptance of both conventional chiropractic ideas and the value of evidence in clinical practice.

Noetics

From the Gr *nous*, [mind, intellect] and considered as common sense. It embodies the idea of what is known 'to work' in the real world of clinical practice beyond the strictures of academia. Noetics sits hand-in-hand with *phrónēsis* (below) to represent what would be most likely done by a peer in any given circumstance.

Noetics excludes the esoteric and the experimental and represents best practice in conventional chiropractic. It also excludes the extreme of 'evidence-only' practice as evident in the Danish thread of chiropractic thought, (40) the so-called evidence-based practice of the extreme left (41,42) of Wardwell's Gaussian representation (43) of chiropractic thought. Excluding this minority allows for a blended practice by the greater majority of conventional chiropractors to include spinal adjusting in accord with established principles of specialised techniques, and adjunctive approaches including exercise and nutrition, informed as needed by evidence.

Phrónēsis

Phrónēsis is a type of wisdom or intelligence best considered as 'practice wisdom'. It derives from heuristics, the act of problem-solving in clinical decision-making. *Phrónēsis* is informed by

induction (44) as much as deduction and as such has a practical character related to prudence. In terms of practice wisdom, *phrónēsis* embodies good clinical judgment or 'practice virtue'.

Aboutness

Aboutness is the quality derived from non-exactness and arises from Sober's ideas. (45) Basically if the statement is made '*I will meet you at 3:00 PM*' and that person arrives at 3:01 PM, in quantitative terms they are wrong. However when the given time of 3:00 PM is taken as 'about 3 PM' there is a degree of correctness. In terms of a case report, the practitioner may have a male patient who is 7 years old with otitis media (OM) and reads a report about another practitioner's male patient who is 6 years old. Aboutness lets the practitioner look at these two cases and make a decision whether or not the patient in the case report is 'about' the same as the presenting patient. It may be that the actual age of the reported patient is 6 years 5 months and 30 days, and the practitioner's patient is 6 years 6 months and 1 day; temporarily much closer than the reported, rounded ages may suggest.

The principle of aboutness therefore allows evidence to be drawn from case reports of a patient who is 'about' the same as a particular patient in terms of age, gender, race and other features that may be thought clinically relevant.

Consilience

Consilience is a '*drawing together of things that are about the same*'. (46,47) This requires more than one case report for it to be used as a tool, but using the case above, it allows case reports by different authors of 'about' patients with OM, maybe a different gender, race and certainly age, to be gathered with the intent to find the common thread of clinical intervention that may produce a similar and desired outcome. A 2018 study actually found '*no significant demographic differences in the incidence of children with OM ... with respect to sex, race, ethnicity, or insurance status*' (48) and while not reported, the incidence itself did not seem significantly different between genders.

THE APPLICATION OF PHILOSOPHICAL TOOLS

The use of these tools avoids the need for extrapolation from the general to the specific and allows the more clinically relevant application of discovery and implementation of clinical intervention in circumstances similar to those reported and thus most likely to deliver the outcome sought. This is defensible clinical decision-making with a high level of clinical application.

The Confidence Interval in qualitative terms

The confidence interval (CI) is a mainstay in reports of quantitative clinical research. Intimately related to the *p-value* (49) the CI represents a range in which an outcome is expected to fall. The

problem is that the *p-value* is known to be '*an unobjective and inadequate measure of evidence when statistically testing hypotheses.*' (50) The idea is that these numbers given as the CI actually estimate range in which there is a 90 or 95% chance the expected outcome will fall. This means there is a 5 to 10% chance it won't and therefore will be of no use in a particular situation. There is no way to predict where the result of any intervention will fall, which in turn diminishes the applicability of group results to individual patients.

Whereas quantitative research allows for Confidence Intervals to add meaning and relevance to data, qualitative research in the form of case reports applies the two simple tools of 'aboutness' and 'consilience'. These function with noetics and phrónēsis as dependable measures to assess the relevance or otherwise of a particular report or case series.

Case Reports Are Valuable

As clinical evidence

The case report documents a specific sequence of clinical interactions with a single patient that can be extrapolated to a similar case within a general clinical population. This is a significant difference from studies with large cohorts which draw findings from the general with the expectation they are equally applicable to any one patient.

Large cohorts generate data by amalgamating gender, age, race, and sociodemographic factors from which average, mean or median values are statistically derived and a CI created, the quantitative counterpart of qualitative's aboutness and consilience.

While it is true to state that no one case report is directly applicable to one other specific patient, an informed application of philosophical principles allows greater clinical value for extraction of specific clinical guidance from one or more case reports of similar patients.

To inform research

Case reports are defined as '*the scientific documentation of a single clinical observation and have a time-honored and rich tradition in medicine and scientific publication.*' (51) Well-constructed case reports inform formal research inquiry (52) and are in themselves a research method '*that focuses on the contextual analysis of a number of events or conditions and their relationships.*' (53) As such, they are strengthened by being evidence-based. (54)

Apart from identifying new topics to be examined with rigour, case reports provide value by informing what some chiropractic academics crudely call the 'dose/response' relationship. (55,56) When the case report literature is ignored, poor decisions are made with the design of studies. An example is infantile colic where a naive research question would seek to determine whether

chiropractic intervention is better than placebo. A knowledge of the case report literature allows the mature research question to be '*what is the optimal titration of care (patient visit number) for an infant with colic?*'

A research protocol to answer this question must be informed by the literature which reports outcomes for similar conditions most likely published as case reports. Doing so prevents design errors, an example of which is found in a recent proposal (57) for a single-blind randomised controlled trial of care for infantile colic, where the protocol allows for only four visits over two weeks. This protocol is inexplicably weak and fatally flaws the study before it begins. This critical judgment is made on the basis of previously published case reports on the resolution of colic reporting '*6 chiropractic visits over a three week period*', (58) '*8 visits over 4 weeks*', (59) and '*9 visits in a period of 11 months*'. (60) A further case report (61) details the subluxations in one such patient as C1 and Sacrum with a total of 18 visits required to achieve resolution. That 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 arise that natural resolution would be expected within 11 months, therefore the application of 'aboutness' and 'consilience' could suggest an appropriate protocol for investigating infantile colic which allows a period of 3 to 4 weeks with up to 9 interventions. Further, it is known that some cases are secondary to allergies (62), which makes an intake protocol critical to screen out subjects for whom chiropractic manual intervention may not be indicated. A more sophisticated protocol would include all potential subjects and report those entered to the manual care arm, and those managed by non-manual means.

A protocol without screened subjects and specifying 4 interventions over 2 weeks therefore lacks design credibility. Had the information reported above been available in 2000, it could have prevented another (63) flawed (64) study in 2001 of infantile colic.

THE LITERATURE REVIEW

A case report must be anchored in the literature; however, the extent is at the discretion of the author. Some attempt an exhaustive review of the literature and generally fail. Others seem to miss obvious reports previously published, while still others specifically avoid some literature, which is the point made by McAulay about not cherry-picking.

To be considered for publication, a case report today needs a pertinent review of literature, not one that pretends to be exhaustive. There is value in a key-point review of the literature of the presenting condition and of standard approaches with their outcomes and effectiveness or otherwise. It is unlikely for there to be a systematic review or meta-analysis of any specific chiropractic case, but should there be, then it is essential to cite.

Particular value lies in citing other case reports on the same or very similar presentation. After all, the point of publishing is to add to the evidence base that allows consilience through the gathering of 'about' cases. The trick is for the author to tease a particular thread showing a different approach that may have improved patient outcomes.

To this point this paper has presumed a case report is about a patient's clinical presentation, and given the political challenges to the chiropractic profession, there is specific value and merit in documenting the breadth of chiropractic practice, particularly for potentially sensitive areas of practice such as care of the ageing and care of children and infants--even for simple presentations. (65) The point is to put on record the diversity of care provided to the Australian public by conventional chiropractors practicing in a safe and responsible manner.

However, there are other matters relevant to conventional chiropractic practice that are worthy of reporting. These include anatomical discoveries (66) and new clinical tools (67) or protocols, (68) as well as reports that include cross-discipline care, (69) and interesting cases such as those with surprises like transient syncope (70) and a Chance fracture. (71) When clinical outcomes are other than expected, a 'case review' is worthy of consideration. (72)

Given the importance of X-ray to guide safe and effective patient care (73) and the dangers of not imaging a patient where indicated, (74) diagnostic images provide a rich field to report. (75) Australian chiropractors have ready access to a chiropractor who specialises in image reporting (76), and expert comment should be included in the practitioner's report. Where significant, the radiologist may become second author and provide an expanded expert interpretation of the images.

CONCLUSION

Some chiropractic journals no longer consider case reports for publication, perhaps in the belief they are 'low level evidence'. On the other hand, the prestigious medical journal *The Lancet* (77) publishes 'a single interesting case, which should not be a rarity but one that a general physician might encounter, in which there was some difficulty in reaching a diagnosis, and that provides a teaching point.' Coles at al (78) suggest that the value of a case report lies in a practitioner sharing 'their unravelling of a neurological case'. Given the intimacy of chiropractic with neurology, there are strong reasons for chiropractors to share their interesting cases using the case report method. And not just rarities, as interesting as rarities may be.

There are peer-reviewed journals designed to significantly advance the case report/series literature as high-value clinical evidence. These include the *International Journal for Practising Chiropractors*, (78) and the *World Journal of Clinical Cases*. (79)

The objective of this paper has been to demonstrate that case reports represent evidential value for chiropractors. Through '*aboutness*' and '*consilience*' they allow a highly relevant care protocol to be developed, considered, and applied for any one patient. Case reports also inform scholarly inquiry and must be used more appropriately by researchers when developing research protocols.

DECLARATIONS

Competing Interests

The authors declare that they have no competing interests.

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REFERENCES

1. Riley DS, Barber MS, Kienle GS, Aronson JK, von Schoen-Angerer T, et al. CARE guidelines for case reports: explanation and elaboration document. *J Clin Epidemiol* 2017 May 18 pii: S0895-4356(17)30037-9. DOI 10.1016/j.jclinepi.2017.04.026.
2. Tugwell P. Is the 'Evidence-Pyramid' now dead? [Editorial]. *J Clin Epi* 2015;68(11):1247-50 DOI <https://doi.org/10.1016/j.jclinepi.2015.10.001>
3. Mulimani PS. Evidence-based practice and the evidence pyramid: A 21st century orthodontic odyssey. *Am J Orthod Dentofacial Orthop* 2017 Jul;152(1):1-8 DOI 10.1016/j.ajodo.2017.03.020
4. Amorin-Woods LG. Sophisticated research design in chiropractic and manipulative therapy; what you learn depends on how you ask. Part C: Mixed Methods: "Why can't science and chiropractic just be friends?" [Part 3 of 3]. *Chiropr J Aust* 2016;44(2):<http://www.cjaonline.com.au/index.php/cja/article/view/70>
5. Walach H, Loef M. Using a matrix-analytical approach to synthesizing evidence solved incompatibility problem in the hierarchy of evidence. *J Clin Epi* 2015;68:1251-60 <http://dx.doi.org/10.1016/j.jclinepi.2015.03.027>
6. La Caze A. The hierarchy of evidence and quantum theory [Variance and Dissent]. *J Clin Epi* 2016;72:4-6 <http://dx.doi.org/10.1016/j.jclinepi.2015.06.014>
7. Murad MH, Asi N, Alsawas M, Alahdab F. New evidence pyramid. *BMJ Evid Based Med* 21(4):125-7 DOI 10.1136/ebmed-2016-110401
8. Thompson CJ. 6SPyramid-7levels Categories, Nursing Education Expert blog May 9 (2017) adapted from (C) DiCenso, Bayley, & Haynes, 2009, accessed 7 Apr 2018 at <https://nursingeducationexpert.com/pre-appraised-evidence/6spyramid-7levelscategories/>
9. Figg-Latham J, van Rajendran D. Quiet dissent: The attitudes, beliefs and behaviours of UK osteopaths who reject low back pain guidance. A qualitative study. *Musculo Sci Prac* 2017;27:95-105 <https://doi.org/10.1016/j.math.2016.10.006>
10. Tomlin G, Borgetto B. Research Pyramid: A new evidence-based practice model for occupational therapy. *Am J Occ Ther* 2011;65:189-96 at <https://ajot.aota.org/Article.aspx?articleid=1853025>
11. Walach H. Old habits die hard - a reply to Adam La Caze. *J Clin Epi* 2016;72:7-9 <http://dx.doi.org/10.1016/j.jclinepi.2016.01.024>

12. McDowall D, Emmanuel E, Grace S, Chsaseling M. Tone as a healthy concept. *Complement Ther Clin Pract* 2017;29:27-34 <https://doi.org/10.1016/j.ctcp.2017.08.001>
13. Richards D, Emmanuel E, Grace S. Duelling ontologies: Might vitalism offer balance and value? [Reflection]. *Explore* 2017;13(2):133-7 <http://dx.doi.org/10.1016/j.explore.2016.12.004>
14. Rosner AL. Evidence-based medicine: Revisiting the pyramid of priorities. *J Bodywork Movement Therapies* 2012; 16(1):42-49. doi:10.1016/j.jbmt.2011.05.003
15. Burns PB, Rohrich RJ, Chung KC. The Levels of Evidence and their role in Evidence-Based Medicine. *Plast Reconstr Surg* 2011;128(1):305-10 DOI 10.1097/PRS.0b013e318219c171
16. Alper BS, Haynes RB. EBHC pyramid 5.0 for accessing preappraised evidence and guidance. *BMJ Evid Based Med* 2016;21(4) DOI <http://dx.doi.org/10.1136/ebmed-2016-110447>
17. Bolton J. Evidence-based case reports [Commentary]. *J Can Chiropr Assoc* 2014;548(1):6-7 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3924510/pdf/jcca_58_1_006.pdf
18. Shaneyfelt T. Pyramids are guides not rules: the evolution of the evidence pyramid [Editorial]. *BMJ Evid Based Med* 2016;21(4) DOI <http://dx.doi.org/10.1136/ebmed-2016-110498>
19. Schork NJ, Goetz LH. Single-subject studies in translational nutrition research. *Annual Rev Nut* 2017;37:395-422 <https://www.annualreviews.org/doi/pdf/10.1146/annurev-nutr-071816-064717>
20. Waddell G. The biopsychosocial model, In *The back pain revolution 2e*. Edinburgh: Churchill Livingstone 2004:265-81
21. Guyatt G, Sackett D, Taylor DW, Chong J, Roberts R, et al. Determining optimal therapy--randomized trials in individual patients. *N Engl J Med* 1986;314(14):889-92 DOI 10.1056/NEJM198604033141406
22. Al-Kaiyat M. Precision Coordination: The growing role of the nurse coordinator in the era of personalized medicine. *Clin J Onc Nurs* 2018;22(1):113-5 <http://dx.doi.org.ezproxy.scu.edu.au/10.1188/18.CJON.113-115>
23. Myburgh C, Brandborg-Olsen D, Albert H, Hestbaek L. The Nordic maintenance care program: What is maintenance care? Interview based survey of Danish chiropractors. *Chiropr Manual Ther* 2013;21:27. <http://www.chiromt.com/content/21/1/27>
24. Chalmers I, Smeeth L, Goldacre B. Personalised medicine using N-of-1 Trials: Overcoming barriers to delivery [Discussion]. *Healthcare* 2019;7(4),134 DOI 10.3390/healthcare7040134
25. Ebrall PS, Murakami Y. How to write a well constructed, credible Case Report for Integrative Medicine. *Jap J Int Med* 2018;11(3):285-91
26. Ebrall PS, Murakami Y. Rigorous case reports in chiropractic: Towards credible evidence. *J Jap Soc Chiropr Sci* 2019; *in press*
27. Weatherall DJ. Philosophy for medicine [Book Review]. *J R Soc Med* 2004;97(8):403-5 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1079566/pdf/0970403.pdf>
28. Gagnier JJ, Kienle G, Altman DG, Moher D, Sox H, Riley D, CARE Group. The CARE Guidelines: Consensus-based clinical case reporting guideline development. *Glob Adv Health Med*. 2013;2(5):38-43. DOI 10.7453/gahmj.2013.008. PMID: 2441669
29. CARE Case Report guidelines. About, <https://www.care-statement.org/about>
30. Yasng KL, Lu CC, Sun Y, Wang B, Shang Y, et al. How about the reporting quality of case reports in nursing field? *World J Clin Cases* 2019;7(21):3505-3516 DOI 10.12998/wjcc.v7.i21.3505
31. Integrative Therapeutics. Personal insights: Q&A with Dr David Riley, Case reports. Accessed 8 Sep 2018 <https://www.integrativepro.com/Resources/Integrative-Blog/2016/Personal-Insights-David-Riley-Case-Reports>

32. McAulay BJ. Rigor in the philosophy of chiropractic: Beyond the Dismissivism/Authoritarian polemic. *J Chiropr Humanit* 2005;12:16-32
33. Chaberek M. *Aquinas and Evolution*. Trinity, BC: Chartwell Press 2017:13
34. Senzon, S.A. The chiropractic vertebral subluxation Part 1: Introduction. *J Chiropr Humanit* 2018; 25C:10-21 DOI: 10.1016/j.echu.2018.10.002
35. Senzon, S.A. The Chiropractic Vertebral Subluxation Part 4: New perspectives and theorists from 1916 to 1927. *J Chiropr Humanit* 2018; 25C:52-66 <https://doi.org/10.1016/j.echu.2018.05.001>
36. Schneider MJ, Evans R, Haas M, Leach M, Hawk C, et al. US chiropractors' attitudes, skills and use of evidence-based practice: A cross-sectional national survey. *Chiropr Man Ther* 2015;23:16. <http://www.chiromt.com/content/23/1/16>
7. Bussi eres AE, Terehost L, Leach M, Stuber K, Evans R, et al. Self-reported attitudes, skills and use of evidence-based practice among Canadian doctors of chiropractic: A national survey. *J Can Chiropr Assoc* 2015;59(4):332-348.<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4711333/>
38. de Luca KE, Gliedt JA, Fernandez M, Kawchuk G, Swain MS. The identity, role, setting , and future of chiropractic practice: A survey of Australian and New Zealand chiropractic students. *J Chiropr Educ* 2018;32(2):115-25 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6192485/>
39. Parkinson J, Lau J, Kalirah S, Gleberzon BJ. Attitudes of clinicians at the Canadian Memorial Chiropractic College towards the chiropractic management of non-musculoskeletal conditions. *J Can Chiropr Assoc* 2011;55(2):107-19 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3095585/>
40. Ebrall P, Murakami Y. A Critical analysis of the Reality Distortion of chiropractic among scientists with constructive criticism of the current debate. *J. Phil Princ Prac Chiropr* 2019;July 11 <https://www.vertebralesubluxationresearch.com/2019/07/10/a-critical-analysis-of-the-reality-distortion-of-chiropractic-among-scientists-with-constructive-criticism-of-the-current-debate/>
41. Edwards J. What Is the CCE Trying to Pull? [News]. *Dynamic Chiropractic* October 21 2010;28(22): <http://www.dynamicchiropractic.com/mpacms/dc/article.php?id=54917>
42. Kent C. A New Direction for the CCE? *Dynamic Chiropractic* [News]. November 18 2010;28(24): <https://www.dynamicchiropractic.com/mpacms/dc/article.php?id=55021>
43. Wardwell W. Continuing Problems and Dilemmas, In *Chiropractic. History and Evolution of a New Profession*. St Louis: Mosby Year Book 1992:257
44. Milton JR. Induction before Hume. *Br J Phil Sci* 1987;38:49-74 <https://academic.oup.com/bjps/article-abstract/38/1/49/1557159?redirectedFrom=fulltext>
45. Sober E. Constructive empiricism and the problem of aboutness. *Br J Phil Sci* 1985;36(1):11-8 <http://www.jstor.org/stable/687153>
46. Robertson D. The consilience of autonomic neuroscience: can we all work together? *Auton Neurosci* 2001;17;92(1-2):100 DOI 10.1016/S1566-0702(01)00307-1
47. Peterson A. Consilience, clinical validation, and global disorders of consciousness [Opinion]. *Neurosci Consciousness* 2016;1-9 DOI 10.1093/nc/niw011
48. Chang JE, Shapiro NL, Battacgaryya N. Do demographic disparities exist in the diagnosis and surgical management of otitis media? *Laryngoscope* 2018 Dec;128(12):2898-2901 DOI 10.1002/lary.27396
49. Altman DG. How to obtain the P value from a confidence interval. *BMJ* 2011;343:d2304 DOI <https://doi.org/10.1136/bmj.d2304>
50. Hubbard R, Lindsay RM. Why p-values are not a useful measure of evidence in statistical

significance testing. *Theory Psychology* 2008;18:69. DOI 10.1177/0959354307086923 <http://tap.sagepub.com/content/18/1/69>

51. Gopikrishna V. A report on case reports. *J Conservative Dent* 2010;13(4):265-71 DOI 10.4103/0972-0707.73375

52. Nissan T, Wynn R. The clinical case report: a review of its merits and limitations. *Research Notes* 2014, 7:264 <http://www.biomedcentral.com/1756-0500/7/264>

53. Sayre JW, Tokelau HZ, Ye F, Mazza J, Yale S. Case reports, case series – From clinical practice to evidence-based medicine in graduate medical education. *Cureus* 2017;9(8):e1546 DOI <https://dx.doi.org/10.7759%2Fcureus.1546>

54. Guimarães CA. Evidence based case report. *Rev Col Bras Cir* 2015;42(5):280 DOI 10.1590/0100-69912015005001

55. Passmore SR, Gelley GM, Malone Q, MacNeil BJ. Tactile perception of pressure and volitional thrust intensity modulate spinal manipulation dose characteristics. *J Manipulative Physiol Ther* 2019;42(5):335-42 <https://www.ncbi.nlm.nih.gov/pubmed/31272711>

56. Pasquier M, Daneau C, Marchand A-A, Lardon A, Descarreaux M. Spinal manipulation frequency and dosage effects on clinical and physiological outcomes: A scoping review. *Chiropr Man Ther* 2019;27:23. <https://chiromt.biomedcentral.com/articles/10.1186/s12998-019-0244-0>

57. Holm LV, Jarbøl DE, Chgristenson HW, Søndergaard J, Hestbæk L. The effect of chiropractic treatment on infantile colic: study protocol for a single-blind randomized controlled trial. *Chiropr Man Ther* 2018;26:17 DOI 10.1186/s12998-018-0188-9

58. Rollette D. Improvement of infant colic and reflux following chiropractic care: A case report & selective review of the literature. *J Paed Mat Fam Health Chiropr* 2012;2:143-8 <https://www.vertebralesubluxationresearch.com/2017/09/10/improvement-of-infant-colic-and-reflux-following-chiropractic-care-a-case-report-selective-review-of-the-literature/>

59. Castellucci RR. Resolution of colic in an eight week old infant undergoing chiropractic care: A case study. *J Paed Mat Fam Health Chiropr* 2012;4:109-112 <https://www.vertebralesubluxationresearch.com/2017/09/10/resolution-of-colic-in-an-eight-week-old-infant-undergoing-chiropractic-care-a-case-study/>

60. Colman LA, Merced J. Resolution of infantile colic in a three-month-old infant undergoing chiropractic care to reduce subluxation: A case report and selective review of literature. *J Paed Mat Fam Health Chiropr* 2016;1:22-27 <https://www.vertebralesubluxationresearch.com/2017/09/10/resolution-of-infantile-colic-in-a-three-month-old-infant-undergoing-chiropractic-care-to-reduce-subluxation-a-case-report-and-selective-review-of-literature/>

61. Guliani K, Rubin D. Improvements in developmental delay, colic and GERD in a child undergoing chiropractic care: A case report and review of literature. *J Paed Mat Fam Health Chiropr* 2012;1:1-4 <https://www.vertebralesubluxationresearch.com/2017/09/10/improvements-in-developmental-delay-colic-and-gerd-in-a-child-undergoing-chiropractic-care-a-case-report-and-review-of-literature/>

62. Miller J. Evidence-Based Chiropractic Care for Infants: Rationale, Therapies, and Outcomes. Amarillo Tx: Praeclarus Press LLC 2019 <https://www.amazon.com/Evidence-Based-Chiropractic-Care-Infants-Rationale/dp/1946665363>

63. Olafsdottir E, Forshei S, Fluge G, Markestad T. Randomised controlled trial of infantile colic treated with chiropractic spinal manipulation. *Arch Dis Child* 2001 Feb;84(2):138-41 DOI 10.1136/adc.84.2.138 PMID: PMC1718650

64. Grunnet-Nilsson. Infantile world Federation of Chiropractic. Colic - the evidence base for spinal manipulation. Proceedings, WFC's and FCER's International Conference on Chiropractic Research. Toronto: WFC 2005

65. Ellis WB, Ebrall PS. The resolution of chronic inversion and plantar flexion of the foot: A

pediatric case study. *J Chiropr Technique* 1991;3:55-9

66. Smoll N, Ebrall P. The piriformis muscle and its relationship to the autonomies of the pelvis: A single bilateral case. *Chiropr J Aust* 2010;40:86-7

67. De Souza R, Ebrall PS, Kimpton A. Preliminary report: Practice-based measures of wellbeing in a typical Australian chiropractic practice. *Chiropr J Aust* 2007;37:126-34

68. Ebrall PS, Bales G, Frost B. An improved clinical protocol for ankle cryotherapy. *J Manual Med* 1992;6:161-5

69. Gimblett PA, Saville J, Ebrall P. A conservative management protocol for calcific tendinitis of the shoulder. *J Manipulative Physiol Ther* 1999;22:622-7

70. Ebrall PS, Ellis WB. Transient syncope in chiropractic practice: A case series. *Chiropr J Aust* 2000;30:82-91

71. Plaughner G, Alcantara J, Hart CJ. Management of the patient with a Chance fracture of the lumbar spine and concomitant subluxation [case report]. *J Manipulative Physiol Ther* 1996;19(8):539-51 <https://www.ncbi.nlm.nih.gov/pubmed/8902666>

72. Ebrall PS. Residual disability from delayed manipulative treatment for mechanical low-back pain: A case review. *Chiropr J Aust* 1993;23:54-8

73. Kent C. An Evidence-Informed approach to spinal radiography in vertebral subluxation centered chiropractic practice. *A Vert Subluxation Res* 2017:142-6

74. Carpani J. Chiropractors should carry out X-rays before treating clients to prevent future deaths [News Report]. *The Telegraph* 18 November 2019 5:24 PM retrieved from <https://www.telegraph.co.uk/news/2019/11/18/chiropractors-should-carry-x-rays-treating-clients-prevent-future/>

75. Ebrall PS, Molyneux TP. Rotary subluxation of the atlas: An exploration of the diagnostic potential of the CT scan. *Chiropr J Aust* 1993;23:42-7

76. Dr Martin D. Timchur. Professional Radiology Outcomes. About, retrieved 20 November 2019 https://proxraymanagement.com/pro_team/dr-martin-d-timchur

77. Coles A, Mukherjee M, Compston A. Case reports in *The Lancet* [Correspondence]. *The Lancet* 2003;361(9364):P1230 DOI [https://doi.org/10.1016/S0140-6736\(03\)12946-7](https://doi.org/10.1016/S0140-6736(03)12946-7)

78. International Journal for Practising Chiropractors. Home at 02 December 2019 <https://www.ijpconline.org>

79. World Journal of Clinical Cases. Home at 02 December 2019 <http://www.wjgnet.com/2307-8960/current.htm>