Chiropractic Journal of Australia

Vol 43 No 3 ISSN 2200-8012 SEPTEMBER 2013

CHIROPRACTIC JOURNAL OF AUSTRALIA

EDITOR: Rolf E. Peters, DC, MCSc, FICC, FACC, FPAC
ASSISTANT EDITOR: Phillip Ebrall, BAppSc (Chiropr), PhD, FICC, FACC
ASSOCIATE EDITOR: Sharyn Eaton, PhD, DC, FICC, FACC
ASSOCIATE EDITOR (HISTORY): Stanley P. Bolton, DC, PhC, FICC, FPAC, FACC

MAIL:	Post Office Box 748	Wagga Wagga 2650 Australia
PHONE:	National: 02 6922 4466	International: +61 2 6922 4466
E-MAIL:		journal@caa.asn.au
CAA WEB SITE:		www.chiropractors.asn.au
CAA ABN		50 050 096 038

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.

Manuscripts and letters submitted for consideration to publish must conform with CJA Instructions to Authors; to obtain a reprint, send a stamped, (Australian postage) self-addressed 100 x 230 mm envelope to the *CJA* Editorial Office. This document may also be downloaded from http://www.chiropractors.asn.au. Manuscripts are subject to blind critical review and customary editorial revision to ensure clarity of meaning, correctness of grammar and conformity with *CJA* style. Letters may be edited for clarity or length.

Advertising is subject to editorial review before acceptance for inclusion in any issue of *CJA*. Acceptance does not imply endorsement. Bromides must be with the editors no later than the first day of the month preceding date of issue. Advertising rates, conditions and mechanical requirements are available on request.

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 3 SEPTEMBER 2013

Contents

Editorial: Dance in the Rubbish and you will go to Broken Hill: Karma in Pyjama
Phillip Ebrall 83

Chiropractic in Australia: Survey of the General Public
Benjamin T. Brown, Rod Bonello, Ramon Fernandez-Caamano, Petra L.Graham, Sharyn Eaton and Hilary Green 85

Transition fom Acute to Chronic Low Back Pain: A Biopsychosocial Perspective
Frank Donnoli and Michael F. Azari 93

Commentary: Clinical Uncertainty
Barry Draper and Dennis Richards 99

A Chiropractic Scholar Visits from Denmark: A Report on the Chiropractic Research Seminar
Michael Swain, Alice Kongsted, Aron Downie and Mark J. Hancock 103

Menopause, Chiropractic Examination and Treatment, and Salivary Hormone Levels: Correlations and Outcomes
Scott Cuthbert and Anthony Rosner 107

Book Review 121

Chiropractors' Association of Australia (National) Limited

CAA NATIONAL OFFICE

2/36 Woodriff Street, Penrith NSW 2750
P.O. Box 335, Penrith NSW 2751
Ph: (02) 4731 8011 Fax: (02) 4731 8088
Tollfree: 1800 075 003 Email: caa@caa.asn.au
Website: www.chiropractors.asn.au

Chief Executive Officer Mr Andrew McNamara Email: ceo@caa.asn.au

NATIONAL BOARD OF DIRECTORS

President
Dr Lawrence Tassell

Honorary Secretary
Dr Mark Uren

Treasurer
Dr Taylor Vagg

Board Members
Dr Billy Chow Dr Bryce Conrad Dr Tony Croke Prof Phillip Ebrall
Dr Tracy Kennedy-Shanks Dr Andrew Lawrence Dr Patrick Sim

COUNCIL OF REPRESENTATIVES

Dr Helen Alevaki
Dr Simone Aybar
Dr Gary Barbery
Dr Marc Cova
Dr Ari Diskin
Dr Joe Ierano
Dr Geoff Irvine
Dr Michelle Kotzman
Dr Craig Matthews
Dr Murray Stark
Dr Scott Springer
Dr Andrew Timbs
Dr Kenneth Vagg

PUBLICATIONS

The Australian Chiropractor
Ms Denise Buckley, Coordinator, magazine@caa.asn.au
P.O. Box 335, Penrith, NSW 2751, Ph: (02) 4731 8011

Chiropractic Journal of Australia
Dr Rolf E. Peters, Editor, journal@caa.asn.au
P.O. Box 748, Wagga Wagga NSW 2650, Ph: (02) 6922 4466

BRANCHES

Australian Capital Territory **President** Dr Murray Stark
Correspondence to Branch Office, P.O. Box 2002, Kambah ACT 2902

New South Wales **President** Dr Joseph Ierano
Correspondence to Branch Office, P.O. Box 61, St. Leonards NSW 1590, Ph: (02) 9437 4008

Northern Territory **President** Dr Marc Cova
Correspondence to Dr Adriana Arango, Secretary, P.O. Box 1100, Parap NT 0804, Ph: (08) 8941 4033

Queensland **President** Dr Craig Matthews
Correspondence to Branch Office, Comsec Centre, 433 Logan Road, Stones Corner QLD 4120, Ph: (07) 3394 8334

South Australia **President** Dr Andrew Timbs
Correspondence to Branch Office, G.P.O. Box 2407, Adelaide, SA 5001, Ph: (08) 8336 7562

Tasmania **President** Dr Scott Springer
Correspondence to the Secretary, 63 Main Road, Huonville TAS 7109, Ph: (03) 6264 1037

Victoria **President** Dr Helen Alevaki
Correspondence to Branch Office, P.O. Box 13163, Law Courts, VIC 8010, Ph: (03) 9328 4699

Western Australia **President** Dr Warren Genders
Correspondence to Branch Office, P.O. Box 1010, South Perth WA 6951, Ph: (08) 9367 3177

Dance in the Rubbish and you will go to Broken Hill: Karma in Pyjama

There is little as joyous as talking face to face with a colleague. In today's hyper-connected world it is easy to Twitter, SMS, email, Link, even bare one's bottom in that dreaded cesspit called Facebook. But F2F takes time and effort.

A couple of years back the words that form the title of this piece summarised an extraordinarily funny story told in F2F conversation with this writer by a chiropractor. In the true Aussie tradition the story moved through layer after layer of drama then humour to hit the punchline. This writer has struggled with finding a way to share the meaning and learning enveloped in a seemingly stupid saga. A purpose was found in a certain television program made months ago using public money but broadcast only recently.

The story above of the title seems to talk to pompous self importance, where a power-game can be played as an admonition in an attempt by an ageing traditionalist to control a young, free, spirited mind. It is these young minds that attract the Karma because they don't know or accept boundaries.

From another perspective it talks to bullying and there is no doubt in this day and age a professor experienced in one field assuming authority in another where he is so out of his depth is not only bullying, it was an embarrassment to watch on Catalyst (ABC1, broadcast 11 July 2013). The associated threats against educational institutions that may teach something he fails to personally comprehend are also classic bullying and will be seen as such by universities and government.

Interestingly his opinion was delivered in a vacuum of evidence. Perhaps this was a wise move as the one thing worse that pretending to have evidence is to actually have it but to have not read or understood it. The chuckling neurosurgeon who grasped at a paper written, incidentally, by a team that included a noted chiropractic academic from a reputable chiropractic educational institution, failed to mention that the first adverse event listed, a fatality, was associated with treatment from a physical therapist, and that another, a neurologic deficit, with a medical practitioner. And we've not even noted than some supposed adverse effects from chiropractors were simple discomfort after treatment, nor have we spoken of how long ago those very few events occurred that were reported in that paper.

However if there is one thing worse than bullying from ill-informed fringe dwellers with the crystal clear agenda of self-preservation and empire building at public expense, it is bullying from within one's family. A current example could be that of a Canadian-based body of sports chiropractors where integrity and respect for the sovereign right of the national association in Japan, where there is fully-accredited chiropractic education, does not seem to be the guiding principle.

Eclectic self-empowered groups from the Far-West should not think they can gain commercial advantage in advanced, balanced societies such as those in the East Asia region, the world's most populous and prosperous. Only bullies would walk over the well-structured systems of learning that exist in these countries. We are fortunate in Australia that our sports chiropractic interests are led by competent individuals of the highest integrity and repute.

Another example could be found in the United Kingdom where a certain group of elitists embarrassed itself by digressing on an ill-informed tangent. Given that the peak global body, the WFC invested in a responsible process to determine and describe the Identity of Chiropractic, work that is quite rightly endorsed and supported by many associations and institutions around the world, it seemed inconceivable that one of our family would attempt to deny chiropractic's ownership of the central premise of our discipline by suggesting subluxation is merely an historical concept.

The danger of this kind of thinking has nothing to do with the concepts themselves and whether or not they exist. It is about closing down intellectual discussion and exploration. And to every scientist, this is the untenable attitude of the Crusades.

If everyone accepted the world was flat because the church said so, or that the world-wide market for computers was two or three because IBM said so, then we wouldn't be traveling in space today and this writer would be using quill and ink instead of iPad to write this. One excuse for the UK returning to the dark side of intellectual reasoning could have been their tattered economy and decaying society. Thankfully the rest of the chiropractic world continued to move forward and viewed such an anti-intellectual position as dunderheaded irrelevance.

However these behaviours of political rudeness, cultural vandalism and anti-intellectual thinking beg the question, can we really achieve unity with disunity?

We can start with the care of children. We would like to think the current emergence of experts in the field of paediatrics and peri-natal care is the expected signal of professional growth, perhaps secondary to critical mass. Given the evidence it is hard to understand why one of our

own family could be critical of those who do the extra work to become expert in this field. Thankfully, the CAA now has a Clinical Interest Group to bring the experts together and establish a definitive professional pathway.

The same may be asked about functional neurology; why aren't the concepts a fundamental learning element within pre-professional chiropractic education? How can some of our family possibly think of chiropractic as being only for back pain? Again, your association now has a Clinical Interest Group to bring the experts in neurology together to create a stronger clinical presence for the profession.

As a profession we have come to learn so much more yet most educational institutions appear reluctant to embrace new directions and content. Is this a bad dream or have our educators been asleep on this question?

What does the chiropractor next to you think? And what did the young mind associated with the title of this piece do? Danced in the rubbish of course and yes, he was exiled to teach at Broken Hill.

It is a wonderful thing to share the stories of our country's pioneers, and of course, to sit with a colleague in their clinic and share their stories of today. This writer is blessed to be able to do this in a variety of countries. It is a wonderful way to take the pulse of the profession and to learn of new things your colleagues feel should be done by its educational institutions and its elected leaders.

Who will you have dinner with tonight? What will you learn about them? What stories will you both tell?

More important, who will you laugh with?

Phillip Ebrall
BAppSc(Chiropractic), Grad Cert Tert Learning & Teaching, PhD, FICC, FACC
Professor of Chiropractic, CQUniversity-Australia
Adjunct Professor, Faculty of Medicine, International Medical University
Education Advisor, Tokyo College of Chiropractic
Assistant Editor

Chiropractic in Australia: A Survey of the General Public

BENJAMIN T. BROWN, ROD BONELLO, RAMON FERNANDEZ-CAAMANO, PETRA L. GRAHAM, SHARYN EATON and HILARY GREEN

ABSTRACT: *Background*: An increase in the use of complementary and alternative medicine was identified in several countries including Australia. There is a need to assess the current position of chiropractic within the Australian health system. *Objectives*: To estimate the lifetime prevalence of the use of chiropractic in Australia; to investigate the perceptions and attitudes of Australian general public about: their health status, the chiropractic profession, chiropractic and health services in general. *Methods*: A survey was carried out in which a novel 21-item questionnaire was utilised. To obtain a sample whose opinions would be representative of the Australian general population with a 95% level of significance and 4% margin of error, 600 respondents were required. Descriptive statistics, the chi-squared test and logistic regression were used to present and analyse the data. *Results*: 757 respondents completed the survey. A high prevalence of pain and discomfort relating to the musculoskeletal system were found, particularly in the lower back (71.1% of the respondents) and neck (55.6%). The first contact with respect to therapy for the greatest proportion of respondents was general medicine (35.5%), followed by chiropractic (16%), physiotherapy (13.8%) and massage (10.2%). Physiotherapy was rated highest in its ability to relive the symptoms (18%) followed by chiropractic (15.9%), massage (15.5%) and medicine (14%). In our sample 302 (39.9%) participants used chiropractic before and 75.9% of these consumers were satisfied or highly satisfied with the services provided. No significant differences in income, age and gender were found with regards to those individuals who reported a previous use of chiropractic services. The main reasons for not using chiropractic were: that there was no perceived need for a chiropractic intervention, associated cost, lack of information about chiropractic, lack of referral, being attended by another health professional, and concern about the safety and efficacy of the treatment. Most of the respondents considered that attending to general health and well-being was more important than simply alleviating symptoms and their personal philosophy was a major determinant when it came to the choice of health services. *Conclusions*: This study suggests that chiropractic is a thriving profession in Australia. It would appear that there is a need for chiropractic services in Australia, particularly in attending to the highly prevalent realm of musculoskeletal disorders. A considerable number of Australians already utilise chiropractic services. Encouragingly, the vast majority of these consumers are satisfied with the service provided. Chiropractic could play an even greater role within the Australian health if better integrated with the mainstream and allied medicine. A more active approach should be taken by chiropractic practitioners and institutions to improve the general public's knowledge about chiropractic.

INDEX TERMS: CHIROPRACTIC; MANPOWER; SUPPLY AND DISTRIBUTION.

Chiropr J Aust 2013; 43: 85-92.

INTRODUCTION

Recent research shows that there is an increased interest in and use of complementary and alternative medicine (CAM) in a number of countries.[1] Remarkably, this is happening at the time when conventional medicine is experiencing an unprecedented high rate of advancement in clinical and basic science research and, consequently, a rise in the number of people benefiting from this service. Indeed, CAM seems to have thrived in developed countries such as the USA, Canada, Australia and certain Western European countries, in which the benefits of modern biomedicine are felt most profoundly.[1] Furthermore, in most countries CAM treatment is not covered by national insurance systems and therefore the cost of treatment is paid by patients directly. All this suggests a high motivation to use CAM on the part of the patient.

Australia is one of the countries in which the use of CAM is substantial and its popularity is on the increase.[2-5] One of the professions that features prominently in the current landscape of Australian CAM providers is chiropractic. The chiropractic profession has a long history in Australia, and the number of registered practitioners is increasing.[5] Furthermore, Australia is one of the few countries in which chiropractic is taught in government funded universities. In fact, the world's first such department was established at Macquarie University in 1991. This expansion of chiropractic

Benjamin T. Brown, PhD
Assoc Prof. Rod Bonello, MHA, PhD
Ramon Fernandez-Caamano, PhD
Petra L. Graham, PhD
Sharyn Eaton, PhD
Hilary Green, MSc

All Macquarie University, Sydney

The Work Force Study (WFS) was funded by the Chiropractors' Association of Australia National (CAAN) and Macquarie University. No other financial support was provided for this research. The authors did not receive any financial incentives for this research. Therefore no conflict of interest was declared.

has happened in spite of some strongly constraining factors. For example, chiropractic is not covered by the Australian health insurance scheme (Medicare), although it is partially covered by most private health care schemes. Furthermore, chiropractic in Australia has received some negative publicity in recent years with the validity and efficacy of some aspects of chiropractic (and other CAM disciplines) and its place in the government funded universities having been vigorously called into question, by some interest groups such as the Friends of Science in Medicine.[6]

The reasons for the increase in demand for CAM, which have not yet been satisfactorily researched, seem to be many and different in nature. They are to be sought not only within changes in modern medicine and developments in CAM but also in the broader social, economic and political dynamics within a particular society in recent decades.[7] Therefore, understanding the broader context and complex, multidimensional network of phenomena and relationships within which health systems operate is necessary to understand the position and significance of CAM in general and chiropractic in particular. As this complex network constantly changes and evolves there is a need to regularly evaluate the status and position of the particular health professions within it. As part of this process, we investigated the Australian general public and its relation to chiropractic.

The aims of this study were to ascertain the lifetime prevalence of the use of chiropractic in Australia and to investigate the perceptions and attitudes of the Australian general public about several issues: their health status (as related to chiropractic), the chiropractic profession, as well as chiropractic and health services in general. In the last two decades there have only been a few studies carried out, on samples that would be considered representative with appropriate methodological rigour,[8] that investigated the attitudes of the general population towards CAM and chiropractic in Australia.[2,3,6] The current study was a part of a broader project entitled the Work Force Study, which focused on the current state of chiropractic in Australia.[9,10] This project was carried out through three large scale surveys: first focusing on the practitioners,[11] second on the chiropractic patients and third, the results of which are presented here, on the Australian general public.

METHODS

The research was carried out using a novel 21-item survey questionnaire. The questionnaire (Appendix 1) consisted of two parts. Basic demographic data of the respondents was recorded in the first section of the survey: age, gender, country of origin, language spoken at home, level of education, occupation, average annual household income and the place (suburb) of residence. In the second part, questions relating to chiropractic and chiropractic services were asked, including questions on respondents health status (presence of discomfort or pain, particularly in the spine and limbs), health practitioners consulted with regards to therapy and relief of the symptoms, expectations of health practitioners, and motivation to seek health care as well as more specific questions on chiropractic such as previous usage and satisfaction with the service provided. The questionnaire combined open-ended and closed questions; the latter were with dichotomous and nominal-polytomous options as well as scaled questions with Likert-scale options.

The questionnaire was administered in an electronic format via SurveyMonkey™. The data were collected between the 10th and 15th of January 2012. Sampling was carried out by an independent party – MyOpinions, a professional market research agency specialising in on-line surveys. The services of MyOpinions were employed in order to utilise their extensive databases and to minimise potential bias. Using the data from the Australian Bureau of Statistics[12] as a reference, stratified sampling was used to obtain representative samples of different strata of the Australian society with regards to age, gender and geographical distribution. Invitation to participate in this survey was sent to adults (18 years of age or over) who were Australian residents.

Descriptive statistics (tables and histograms) were used to summarise the findings and the chi-squared test and logistic regression were used to examine relationships between variables.

The ethics approval for this project was granted by the Macquarie University Human Research Ethics Committee.

RESULTS

Sample

For this survey, 842 adult members of the Australian public, sourced from the MyOpinions national database, accessed an electronic survey link. From these, a total of 757 respondents completed the survey. As noted earlier to obtain a sample of respondents whose opinions would be representative of the Australian general population with a 95% level of significance and 4% margin of error, a sample of at least 600 respondents was needed. Because a higher number of respondents were actually surveyed this implies a smaller margin of error (greater precision) was obtained. Not surprisingly (because of the design of the study), respondents for this survey closely resembled the demographic distribution reported in the 2011 Australian census[12] for the variables stratified for *i.e.* age, sex and geographical location (Table 1). Differences were observed for other census variables (see also Table 1) such as education, where lower percentages were obtained for the lowest age categories compared to the census, and a higher percentage of sample respondents had Year 12 education. Also the lowest and highest income groups were under-represented, though these may be the people who chose to not state their income. These differences however are not expected to impact on the validity of the responses.

Symptoms

Apart from assisting patients with the management of their health and well-being, chiropractors devote most of their energies to the care of patients with pain syndromes, focusing on the musculoskeletal system – particularly the spine and extremities. Thus, the respondents were asked whether or not they experienced discomfort or pain in various regions of the body. In this sample, 89.4% of respondents stated that they had suffered pain in at least one of the regions of interest, 31% had suffered pain in one or two of the specified areas, and nearly 60% in three or more areas. The most commonly reported pain was from the lower back (71.1% of the respondents) and neck (55.6%), followed by headaches (45.5%) and pain from the shoulder (45.2%) (Figure 1).

Table 1

Demographic Characteristics of the Sample

	Frequency (%)	2010 Census Data (%)
Males	387 (51.1)	49.8
Age		
<25	88 (11.6)	13.2
25-44	293 (38.7)	35.1
45-64	255 (33.7)	30.7
>64	121 (16.0)	17.0
Geographical location		
New South Wales	219 (28.9)	32.4
Victoria	197 (26.0)	24.8
Queensland	162 (21.4)	20.2
South Australia	61 (8.1)	7.3
Western Australia	75 (9.9)	10.3
Other	35 (4.6)	4.9
Missing	8 (1.1)	
Education		
Below year 10	19 (2.5)	6.7
Year 10/11	93 (12.3)	19.9
Year 12	204 (26.9)	20.4
Certificate/diploma	199 (26.3)	27.5
Bachelor degree/diploma	166 (21.9)	20.3
Postgraduate degree	64 (8.5)	5.1
Missing	12 (1.6)	
Income		
<40K	202 (26.7)	31.3
40-90K	250 (33.0)	33.1
90-140K	106 (14.0)	15.7
>140K	46 (6.0)	19.9
Not stated	153 (20.2)	

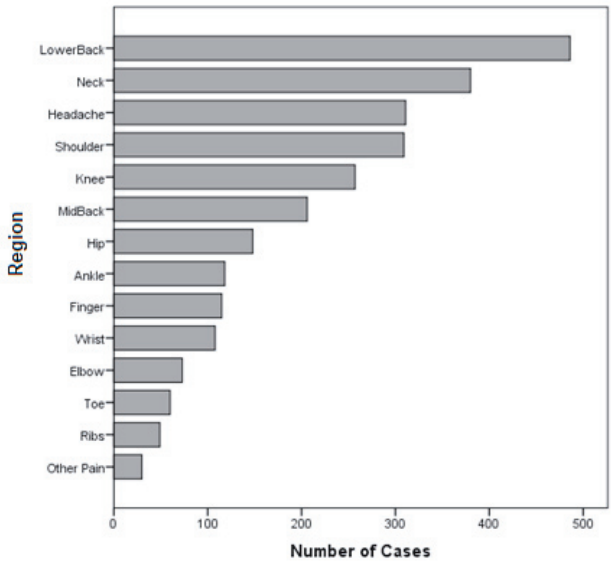

Figure 1: Prevalence of Different Types of Discomfort or Pain

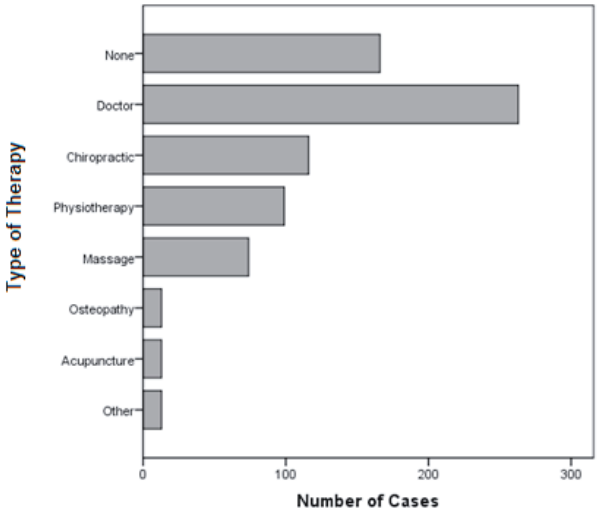

Figure 2: Respondent's First Choice of Therapy

With regards to age and gender, males and females of the same age groups, experienced pain syndromes with a similar relative frequency in almost all areas (results not presented). Some notable exceptions include the higher prevalence of headaches, neck, and lower back pain in females. Females under 65 are more likely than males to suffer headaches ($\chi_1^2 = 31.088$, $p<0.001$); in age group 25-44, females are significantly more likely than males to suffer lower back pain ($\chi_1^2 = 7.092$, $p<0.01$); in age group 25-44, females are significantly more likely than males to suffer neck pain ($\chi_1^2 = 11.214$, $p<0.001$).

Therapy Utilisation

Respondents were asked which healthcare professionals they would choose as their first contact with respect to therapy for their current health needs. They were presented with a list of six professions and were also offered the option of specifying another strategy or to opt for not engaging a health profession. As shown in Figure 2, a medical practitioner ("Doctor") was the first contact with respect to therapy for the highest number of respondents (35.5%). The next most popular answer was that respondents would choose to see 'no one' (19.3%). This response may reflect the possibility that they may have been symptom free at the time of responding to the survey and therefore felt no desire to consult anybody. Chiropractic was scored as the third highest option on this question (16%), ahead of physiotherapy (13.8%) and massage (10.2%). Osteopathy, although closely related to chiropractic in some ways, ranked far below (1.8%) the other therapies. No significant differences in the choice of therapy with regards to income ($p=0.317$) and gender ($p=0.148$) were detected. A highly significant difference in choice of therapy was observed for age ($p<0.001$), whereby older respondents were more likely to seek a doctor compared to younger respondents, and younger respondents more likely not to select a practitioner at all as first contact. This is perhaps a reflection of younger participants having a lack of current health problems as noted earlier.

It was also of interest to ascertain whether the choice of healthcare professional for first contact was informed by, or related to the nature of the respondent's health problems. As such, only those who responded 'yes' to each type of pain were examined in the following analyses. Overall medical doctors were the most popular choice as a first contact professional for all types of pain and chiropractic was the second most popular choice. For lower back pain, respondents were significantly ($p<0.001$) more likely to choose medical practitioners, chiropractic and physiotherapy than other therapies as their first contact. For neck pain, respondents were significantly ($p<0.001$) more likely to choose medical practitioners, chiropractic, and massage than other therapies as their first contact. This pattern was similar for shoulder pain ($p<0.001$). For mid-back, rib, hip, knee and wrist pain respondents were significantly ($p\leq0.001$) more likely to choose medical practitioners and chiropractic than other therapies. For headaches respondents were significantly more likely ($p<0.001$) to go to medical practitioners, chiropractors, or to not consult anyone from other therapies. For elbow, ankle, finger, and toe pain, respondents were significantly more likely ($p<0.001$) to go to medical practitioners than anyone else as their first point of contact.

Respondents were asked to identify which therapy helped them the most with easing their symptoms. On this question respondents identified other therapies as the highest (23%), physiotherapy the second highest (18%), followed by chiropractic (15.9%), massage (15.5%) and medical practice (14%) (Figure 3).

Use of Chiropractic

Respondents were asked if they had previously sought chiropractic care. An affirmative response was received from 302 (39.9%) participants who answered the question. Using logistic regression with previous chiropractic use as the outcome and gender, age group and income group as predictors we found that neither gender ($p=0.667$) nor income group ($p=0.842$) were associated with previous

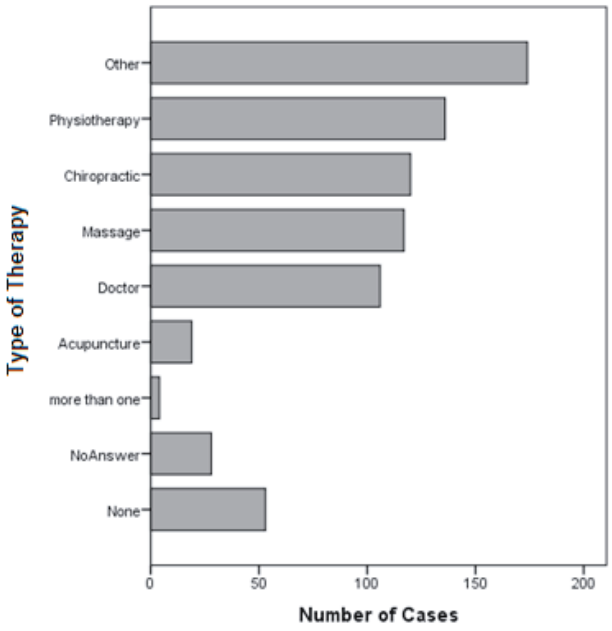

Figure 3: Patient's opinion of which therapy was most beneficial in alleviating discomfort and pain.

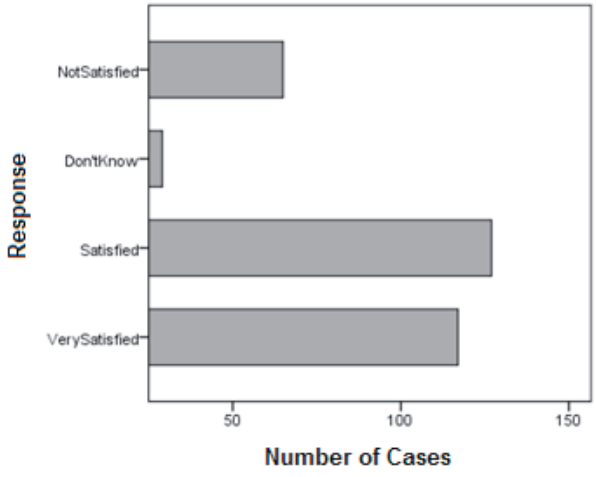

Figure 4: Satisfaction with Chiropractic Care

chiropractic use. However, the age groups variable indicated that, after adjustment for gender and income, the two oldest age categories (45-64 years and >64 years) had significantly higher odds (2.7 [95% CI=1.6 to 4.6] and 2.4 [95%CI=1.3 to 4.5] respectively) of previous chiropractic use compared to the youngest age category.

Respondents were questioned about their satisfaction with the chiropractic services that they had received in the past. The great majority of this subset of the cohort had a positive reaction to the care they received (Figure 4). At 75.9%, over three quarters of the respondents who had chiropractic care were either satisfied or very satisfied with these services. Those who did not use chiropractic offered different reasons for their decision not to consult a chiropractor. The most common reason was that there was no need to consult a chiropractor or that the symptoms and pain were not of sufficient intensity to warrant chiropractic intervention. Other common reasons were: cost of treatment, not knowing much about chiropractic, never having been referred to a chiropractor, already being attended to by another health professional (most often physiotherapist), and concern about the safety and efficacy of chiropractic treatment.

Attitudes to Health Care

Respondents were asked about their main goals in health care, specifically if they were only interested in alleviating symptoms (Table 2). Overall, participants reported a mild disagreement with the statement that they were only interested in alleviating symptoms. When presented with the alternate statement "I believe treatment should be aimed at improving my general health and well-being more so than focusing on symptoms" respondents as a whole showed high levels of agreement. Respondents were more likely to agree than to disagree with the statement "My personal philosophy influences me in deciding who I see for my health care". Responses were consistent across age and gender categories in their agreement or disagreement with all three of the above statements. Participants were more likely to disagree with the statement that family tradition influenced their selection of healthcare practitioner. While there were no gender differences in responses to this question, participants older than 45 were more likely to disagree.

DISCUSSION

Chiropractic is defined by the World Federation of Chiropractic as "a health profession concerned with the diagnosis, treatment and prevention of mechanical disorders of the musculoskeletal system, and the effects of these disorders on the function of the nervous system and general health. There is an emphasis on manual treatments including spinal adjustment and other joint and soft-tissue manipulation." [13] Indeed, research shows that the majority of the patients who use spinal manipulative therapy, do so because of musculoskeletal disorders.[14-16] This is also corroborated by results from the other two Work Force Study surveys of which highlight a focus by chiropractic consumers on musculoskeletal disorders and general health and well-being.[12]

This survey shows that in Australia there is a high prevalence of pain and discomfort in body regions which are of interest to chiropractors: lower back, neck, shoulder as well as headache. Some differences were detected with respect to age, gender and the type of pain - the clinical implication of this finding should be further investigated. The results of this survey also suggest that when patients are looking to alleviate pain and discomfort they seek help primarily from the medical practitioners. One may hypothesise that one of the reasons for this is that patients visit general practitioners first but then might be referred to other health practitioners. Chiropractic was viewed by respondents as the second choice in this respect. Furthermore, chiropractic seems to have an excellent reputation for alleviating pain and discomfort, second only to physiotherapy. Future research should focus

Table 2:

Respondent's Attitude Towards Healthcare, n (%)

Health Care	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree	N/A	Number of Responses
With respect to my health care problems, I am only really interested in alleviating the symptoms.	57 (7.6)	233 (31.1)	91 (12.2)	261 (34.9)	84 (11.2)	22 (2.9)	748
I believe treatment should be aimed at improving my general health and well-being more so than focusing on symptoms.	170 (22.8)	380 (50.9)	108 (14.5)	61 (8.2)	13 (1.7)	15 (2.0)	747
MY personal philosophy influences me in deciding who I see for my health care.	131 (17.6)	389 (52.3)	111 (14.9)	74 (9.9)	13 (1.7)	26 (3.5)	744
Family tradition has influenced me in deciding who I see for my health care.	34 (4.6)	183 (24.6)	98 (13.2)	276 (37)	115 (15.4)	39 (5.2)	745

on gathering more data on patient satisfaction with medical management of musculoskeletal disorders.

Medicine remains the first choice for health consumers. While medicine in this study was not perceived as the best option for easing symptoms, it seems to be attractive to consumers for other reasons. Just because a therapy has the ability to ease symptoms does not mean that it is the best choice of health care. For instance, some therapies relieve symptoms but if their effects are short term only, and do not contribute to a cure; they may not be viewed as a good health care option. Conversely, if the side-effects associated with easing symptoms via a certain modality are significant, this too may influence consumer perceptions. This is supported by the current study as it shows that majority of the survey participants believe that the ability to ease symptoms did not equate to a therapy being the best health choice. Furthermore, medical care is currently a relatively low or cost-free option in Australia which may influence the decision making process of healthcare consumers. Some consumers identified with medicine being 'scientific' thus making it an attractive choice over other therapies.

The results of this survey indicate that the lifetime prevalence of the usage of chiropractic in Australia is 39.9%. This finding concurs with a previous study by Wilson *et al* [17] published in 2007, suggesting a lifetime prevalence of 43%. Xue *et al* suggest that the annual prevalence figure is around 16%.[3] Other surveys [2,3,5] have established chiropractic as one of the most popular and most frequently consulted CAM professions in Australia, and this study seems to further corroborate this notion.

The results of this study are in alignment with those of Xue *et al* who found no significant difference in the use of chiropractic with relation to gender and age.[3] Xue *et al* also found that the individuals from households with an income higher than AUD $20,000 are more likely to utilise chiropractic services.[3] The current survey did not distinguish income brackets below AUD $40,000 (the lowest being "less than AUD $40,000"), subsequently the subtleties that may exist between consumers of chiropractic with low to very-low incomes were not captured in this study. No differences were found between income groups (see Table 1) with regards to previous visits to a chiropractor. One could infer from this data that only the most economically disadvantaged are less likely to use chiropractic. This is to be expected as the individuals belonging to this group are the least capable of paying for health related expenses not covered by the Medicare, or paying for membership in private insurance schemes, some of which cover the chiropractic profession.

Most of the participants who reported using chiropractic were satisfied or highly satisfied with the services provided. Although the number of those dissatisfied with chiropractic treatment is rather low, it is imperative for future research to try to establish the main reasons for dissatisfaction in this subset of patients.

The comments received from the respondents who reported that they had never used chiropractic services before are also instructive. Some of the main concerns were the cost and lack of referral from medical practitioners. One may hypothesise that better integration of chiropractic within the Australian health system would almost inevitably lead to a significant increase in the number of patients. One of the ways to achieve this might be through better collaboration and integration with mainstream medicine and allied medical professions such as physiotherapy. The latter, although not a primary healthcare provider, has several common attributes with chiropractic, and the two disciplines, as this study seems to show, are seen as most successful in relieving symptoms. The cooperation could be sought at different levels - individual practitioners, professional organisations and academic institutions. The last group is perhaps in the best position to further the process through collaborative education and research projects. These collaborative and integrative endeavours would also be an antidote against the above mentioned challenges to the efficacy of chiropractic and its place in university settings.

Other frequent reasons why chiropractic services were not utilised were the participant's lack of knowledge of chiropractic and concern about safety. This implies that better public understanding of chiropractic could lead to further increase in the number of patients. The current survey suggests that personal philosophy is an important factor in the choice of health practitioner. Therefore, one might expect, that accurate and reliable information (particularly that which is based on reliable scientific research) on chiropractic, its nature, focus and efficacy (as a primary care provider) might play an important role in the decision making process of patients. Furthermore, participants in this survey tended to agree that with respect to treatment, improving general health and well-being was more important than focusing on symptoms alone. Potential consumers of chiropractic have to be aware of the fact that improvement of general health and well-being are among the main focuses of chiropractic care.

Active engagement in education and the public presentation of chiropractic is particularly important in light of the recent assessment, according to which Australian media reporting on both CAM and conventional medicine is far from ideal.[18] Individual chiropractors in conjunction with institutions could perhaps play a more engaging role in enhancing public understanding of chiropractic. Similar suggestions concerning informing and education general public was advanced in a previous study of Australia's general public attitude towards chiropractic.[17]

CONCLUSIONS

This study concurs with other similar studies by suggesting that chiropractic is a thriving profession in Australia. There seems to exist a need for chiropractic services, particularly in attending to the highly prevalent realm of musculoskeletal disorders. A significant proportion of the Australian adult population, it would appear, already utilises chiropractic services and a considerable number of this subgroup of the population is satisfied with the service provided. It is suggested that chiropractic can make its place within the Australian health system even more prominent if these services were better integrated and covered by national insurance schemes, and if concrete steps were carried out to further improve profession's image as a primary health care provider.

Acknowledgements

The Work Force Study was funded by the Chiropractors' Association of Australia National (CAAN) and Macquarie University. No other financial support was provided for this research. The authors did not receive any financial incentives for this research.

Appendix 1: General Public Questionnaire

The questionnaire is available from http://chiro.mq.edu.au/Research/projects/Workforce_Study_General_Public_Survey.pdf

REFERENCES

1. Frass M, Strassl LP, Friehs, H, Mülner M, Kundi M, Kaye AD. Use and acceptance of complementary and alternative medicine among the general population and medical personnel: a systematic review. Ochsner J. 2012;12:45–56.
2. Xue CCL, Zhang AL, Lin V, Da Costa C, Story DF. Complementary and alternative medicine use in Australia: a national population-based survey. J Altern Complem Med. 2007;13:643-50.
3. Xue CCL, Zhang AL, Lin V, Myers R, Polus B, Story DF. Acupuncture, chiropractic and osteopathy use in Australia: a national population survey. BMC Public Health. 2008; 8:105.
4. MacLennan AH, Myers SP, Taylor AW. The continuing use of complementary and alternative medicine in South Australia: costs and beliefs in 2004. Med J Aust. 2006; 84:27–31.
5. Australian Bureau of Satistics. Australian Social Trends - Article: Complementary Therapies, Australia, 2008.
6. MacLennan AH, Morrison RGB. Tertiary education institutions should not offer pseudoscientific medical courses. Med J Aust. 2012;196:225-6.
7. Coulter ID, Williams EM. The rise and rise of complementary and alternative medicine: a sociological perspective. Med J Aust. 2004;180:587-9.
8. Ernst E. Prevalence of use of complementary/alternative medicine: a systematic review. Bull World Health Organ. 2000; 78:252-7.
9. Fernandez-Caamano R, Bonello R, Eaton S, Štrkalj G. Assessment and modelling of chiropractic and allied healthcare in Australia: background and need for a formal investigation. Chiropr J Aust. 2009;39:127-31.
10. Eaton S, Bonello R, Fernandez-Caamano R, Štrkalj G, Brown BT, Green H, Graham PL. Demographic characteristics and perceptions of supply and demand of chiropractic services in Australia: results from stage 1 of the work force study survey. Chiropr J Aust. 2012;42:82-90.
11. Eaton S, Bonello R, Green H, Graham PL, Štrkalj G, Fernandez-Caamano R. Chiropractic Workforce Study 2012: A country-wide investigation into the nature and supply of chiropractic services across Australia. Unpublished report, Macquarie University, Sydney.
12. Australian Bureau of Statistics [Internet]. 2012. Census data (2011); [accessed 9 November 2012] Available from: http://www.abs.gov.au/websitedbs/censushome.nsf/home/data?opendocument#from-banner=LN

13. World Federation of Chiropractic 2001[Internet]. Definition of Chiropractic. [accessed 9 November 2012] Available from: http://www.wfc.org/website/WFC/website.nsf/WebPageDefinitionOfChiropractic? OpenDocument.

14. Ailliet L, Rubinstein SM, de Vet HC, Characteristics of chiropractors and their patients in Belgium. J Manipulative Physiol Ther. 2010;33:618-25.

15. Hawk C, Ndetan H, Evans MW Jr. Potential role of complementary and alternative health care providers in chronic disease prevention and health promotion: an analysis of National Health Interview Survey data. Prev Med. 2012;54:18-22.

16. Hurwitz EL: Epidemiology: Spinal manipulation utilization. J Electromyogr Kinesiol. 2012;22:648-54.

17. Wilson K, Swincer K, Vemulpad C. Public perception of chiropractic: a survey. Chiropr J Aust. 2007;37: 135-40.

18. Bonevski B, Wilson A, Henry DA. An analysis of news media coverage of complementary and alternative medicine. PLoS ONE. 2008;3(6): 2406

Transition from Acute to Chronic Low Back Pain: A Biopsychosocial Perspective

FRANK DONNOLI and MICHAEL F. AZARI

Abstract: *Introduction*: Low back pain (LBP) is the most costly and the most common musculoskeletal condition in industrialised countries, and is the most common cause of disability particularly for those under the age of 45. Most of disability and the associated costs relate to the condition when it becomes chronic. It is therefore necessary to study the factors that lead to chronicity, and the clinical predictors that can be used to warn clinicians against such an outcome. This review explores these predictors, as well as the beliefs and perceptions of practitioners about these predictors that inform their clinical decision-making that could impact on the patients' transition to chronicity. A number of these predictors of chronicity in LBP are beginning to be established, they include: *Pain predictors*: earlier literature categorises these predictors into three levels, primary or preinjury, secondary or pre chronicity and tertiary or chronic outcome predictors. Literature in recent times has pointed to psychological factors as being clearly associated with the development of chronicity. *Disease related factors*: Few associations have been identified between the disease related factors and chronicity. *Occupational factors*: have been found to contribute significantly to the risk of chronicity. Workers with subacute LBP receiving workers compensation reported that stress, fear and beliefs about work correlated strongly with progression to chronicity. *Psychological factors*: with adverse bearing on prognosis have been identified in most studies, psychological profile at presentation has a much stronger influence on outcome than does conventional clinical information and *Psychosocial factors:* the way people "deal with the demands and challenges of everyday life" in a number of studies these have been reported to be associated with development of chronicity and have been defined as "yellow flags". *Practitioners' beliefs and perceptions:* each profession dealing with chronic pain has its own knowledge base and beliefs about the causes and treatment of chronic LBP that are based on training, group perceptions, clinical experience and memory. These factors can have an impact on the progression to chronicity. *Decision making:* the literature on decision making processes has demonstrated that there are many factors that may bias a decision; these include accommodation bias, past experience and cognitive biases, the decisions as to which strategy to use in the treatment of LBP may be similarly wrought with these factors. *Conclusion:* According to much of the literature, chronicity in LBP is more closely related to demographic, psychological and occupational factors. It is important to have an understanding of these factors in order to manage LBP patients more effectively. In addition it may be instructive to examine the sources and content of continuing education that are available to practitioners.

INDEX TERMS: LOW BACK PAIN; PSYCHOLOGY; CASE MANAGEMENT.

Chiropr J Aust 2013;43: 93-8.

INTRODUCTION

Low back pain (LBP) is the most costly and the most common musculoskeletal condition in industrialised countries, and is the most common cause of disability particularly for those under the age of 45.[1-3] In the United States, it is estimated that LBP accounts for 11 billion dollars in lost wages annually, while simulation models suggest that the total cost may be greater than 20 billion dollars per year.[4] In Australia, the estimated combined (direct and indirect) cost of LBP is in excess of 9 billion dollars per annum.[5] In the U.S., musculoskeletal impairment is the most prevalent impairment in people up to 65 years of age, and spinal impairments the most frequently reported subcategory of musculoskeletal impairment.[6] A survey, by Walker and co-workers in 2004, of 3000 Australian adults estimated the point prevalence of LBP at 25.5%, six month period prevalence at 64.6% and lifetime prevalence at 79.2%.[7] It has been estimated that in any one year approximately 3-4% of the population in all industrialised countries experience a temporarily disabling episode of LBP and that more than 1% of the working age population is permanently disabled by this problem.[1] Only about 5% of sufferers seek medical advice, and most of them respond to conservative treatment. However, approximately 10% of those who experience an acute attack of LBP in the general population go on to become chronic pain sufferers.[8] This review explores the evidence for the factors that are associated with, or may have an influence in, the transition from acute to chronic LBP. It also examines the way practitioners involved in

Frank Donnoli, BAppSc(Chiro), GradDipArts, GradDipPsych, MEd
Discipline of Chiropractic, School of Health Sciences

Michael F. Azari, BAppSc(Chiro), BSc(Hons), PhD
Discipline of Chiropractic, School of Health Sciences
Health Innovations Research Institute, RMIT University

Received: 10 April 2013, accepted with revisions: 17 June 2013

Conflict of Interest Statement: The authors have no conflict of interest with regards to this manuscript.

the assessment and treatment of people with chronic LBP, develop beliefs and perceptions of current literature about the transition from acute to chronic LBP. Further to this, we explore what information practitioners use to develop these beliefs and perceptions, in order to make a decision about the treatment of patients with chronic LBP. This review is based on a search strategy using Medline and PsychINFO databases with the following key words: psychosocial, predictors, transition, chronicity, and low back pain. Information on decision-making was included on the basis that it was: directly relevant to the subject material; and made specific reference to the key words.

PAIN PREDICTORS

The International Association for the Study of Pain (IASP), which was founded in 1973 and is the world's largest multidisciplinary organisation focused specifically on pain research and treatment, has defined chronic pain as pain that persists beyond the normal time for healing. In practice, this may translate to less than one month to more than six months.[9] This definition has remained the benchmark for many studies, was reviewed in 2011 and has remained unmodified from the 1994 publication. It is important to note that this definition implies that pain should cease once the damaged area has healed. Unfortunately for many however, this does not occur. Identifying the reasons why one develops chronic pain is the dilemma that faces clinicians dealing with the assessment and treatment of the ever-increasing number of chronic LBP sufferers. Predicting what subpopulation of patients could develop chronic LBP after experiencing an acute episode of LBP is an area that has received some research attention in recent years. Earlier literature categorised these predictors into three groups: primary or pre-injury predictors, that identify the percentage of an uninjured population likely to develop a LBP incident; secondary, or pre-chronicity, predictors that identify those with an acute LBP incident likely to develop chronic difficulties; and tertiary, or chronic outcome predictors, which identify treatment success or failure in chronic patients.[10,11] The literature in recent times has pointed to psychological variables as being clearly associated with the development of chronicity. Fransen and co-workers for instance, have found that, in contrast to acute back pain, individual and psychological factors are more highly associated with chronic back pain than objective physical or biomechanical measures.[12] A number of reviews of the literature have concluded that particular psychosocial factors, such as fear and avoidance behaviours, are potent risk factors, especially in the transition from an acute to a chronic LBP. Linton suggested that these factors might be used for the early identification of patients at risk of developing persistent pain. Cats-Baril and Frymoyer[4] established, through a consensus process, a group of 28 factors organised into 8 categories that were predictive of LBP disability. These categories were: injury; diagnosis; demography; anthropometric characteristics; medical history; job related factors; health behaviour; and psychosocial factors. This seminal work has provided a basis for subsequent studies, as the factors known to be associated with chronicity have been understood to be primarily patient related, occupational, or psychosocial. It is now widely accepted that a biopsychosocial model, rather than the traditional biomedical model, is needed to account for transition to chronicity in LBP.[13]

DISEASE RELATED FACTORS

Few associations have been identified between disease-related factors and a chronic course of LBP. Functional symptoms, physical findings, and treatment methods have failed to predict chronicity in most studies. In fact, The Fourth International Forum for Primary Care Research on LBP has documented the paradigm shift in this field from viewing LBP as a 'biomedical injury' to a multifactorial biopsychosocial pain syndrome.[13] The initial severity of the pain for instance, is less closely related to chronicity than social demographic and occupational factors, and the extent of anatomic damage does not influence the risk of chronicity.[14] In addition, there is evidence that patients in whom the exact nature of the lesions is determined were more likely to have a favourable outcome, whereas those with doubtful diagnosis are more likely to experience recurrence and disability.[15] This supports the notion that patients with greater degrees of personal control are less likely to develop LBP chronicity.[16] In another study, the number of days of work lost was greater in those patients who failed to develop a clear understanding of their medical condition.[17] This point in particular, stresses the need for uniform methods of assessment, diagnosis of, and decision-making for, LBP conditions that have the potential for chronicity. Hence, the importance for a general awareness of the beliefs and perceptions of practitioners involved in the initial assessment of these conditions, as it is in the initial stages of assessment that the transition from acute to chronic pain maybe prevented. An interesting caveat is that it has recently been demonstrated in a prospective cohort study that in the subpopulation of LBP suffers that present to chiropractors, general health and duration of LBP episode prior to consulting a chiropractor are predictors of chronicity rather than psychosocial factors.[18]

OCCUPATIONAL FACTORS

Occupational factors contribute significantly to the risk of chronicity. While it has been reported that approximately 10% of LBP sufferers in a general practice setting progress to chronicity,[8] this figure has recently been reported to be as high as 23% in nurses working in small Greek hospitals.[19] This may be due to heavy physical work placing significant stress on the spine thereby increasing the likelihood of a chronic course. However the risk of chronicity is not proportional to the frequency of LBP in specific jobs.[14] A low level of formal education seems to predict a chronic course, particularly in males, and this is independent of: age; pain severity; occupation; and the presence of sciatica.[20] The level of educational attainment was among the four best predictors of chronicity in a prospective study conducted in the United States. In this study, predictors of future function, employment, and medical utilization were drawn from 21 clinical, demographic, and psychosocial variables using multivariate techniques. Education, previous episodes, and whether the patient "always feels sick" were independently associated with most outcome measures, but prescribed therapy and physical findings were not. These 3 items created a scale defining subgroups with 3-fold differences in outcomes (*e.g.*, 35% functionally improved in the worst group *vs* 93% in the best, p less than 0.001). Data from a national survey supported the importance of education and self-rated health as correlates of back related disability.[21] Educational underachievement has also been closely correlated with

language difficulties, and associated with poorer outcomes in a number of other diseases including arthritis.[14] In addition, Soucy and colleagues, studying 248 workers with subacute LBP who were receiving workers' compensation, have reported that perceived stress, fears and beliefs about work correlated strongly with progression to chronicity.[22] Taken together, these studies highlight the importance of physical as well as psychological demands associated with work on chronicity of LBP.

PSYCHOLOGICAL FACTORS

Psychological factors with an adverse bearing on prognosis have been identified in most studies. Burton and colleagues have demonstrated that the patient's psychological profile at presentation has a much stronger influence on outcome than does conventional clinical information gathered at the time.[23] Similarly, Shaw and co-workers have demonstrated, using 140 men in a cohort study, that a history of major depressive disorder increases the likelihood of chronicity in LBP by a factor of five. They further demonstrated significant correlations with LBP chronicity of a range of other pre-existing psychiatric/psychological conditions including: generalised anxiety; post-traumatic stress disorder; and nicotine addiction.[24] Klenerman and co-workers found evidence of psychological morbidity, particularly fear avoidance behavior, at the onset of the presenting attack in susceptible subjects.[8] In a large prospective study, Van der Windt and colleagues also identified fear of movement was a factor in progression to chronicity in LBP cases.[25] A prospective study in 2007 in Australia has reported that evidence-based management of acute LBP, in which patient reassurance and communication was emphasised, was more effective than usual care by a general practitioner and reduced the recurrence rate from 27% to 6%.[26] It is generally believed that at the earliest stage of LBP fear should be identified, and where it is severe, should be addressed as part of the treatment, to prevent progression to chronicity.[27-29] However, controversy continues to surround this issue, as it is difficult to differentiate primary from secondary psychological disturbances. That is, whether the psychological problems were a cause of the chronicity, or a consequence.

PSYCHOSOCIAL FACTORS

In a number of studies, psychosocial risk factors have been reported to be associated with the development of chronic LBP, and have been defined as 'yellow flags'. The World Health Organisation defines psychosocial factors as any factor determining the way people "deal with the demands and challenges of everyday life, maintain a state of wellbeing while interacting with others, their cultures and the environment" in.[30] Gatchel and co-workers,[1] identified the presence of a 'robust psychosocial disability factor' associated with those injured workers who are likely to develop chronic LBP. In another publication, the same authors evaluated the predictive power of a comprehensive assessment of psychosocial and personality factors in identifying acute LBP patients who subsequently developed chronic LBP.[10] The data from that study revealed the importance of three psychosocial measures: self-reported pain and disability; scores on scale three of the Minnesota Multiphasic Personality Inventory (MMPI); and workers compensation and personal injury insurance status. Barnes and co-workers[31] examined a variety of psychological, socioeconomic and demographic factors and identified several instruments that had predictive power in progression to chronicity. These included: MMPI and Million Behavioural Health Inventory (MBHI) scale scores; prior surgical history; the level of workers compensation; and pain intensity ratings. These data are consistent with the importance of psycho-socioeconomic factors in chronicity of LBP. However, an interesting cross-cultural study of Dutch and Greek nursing staff has found that while Greek nurses were more likely to seek specialist care for their LBP, they were not more likely to progress to chronicity.[32] There is evidence that early identification of psychosocial problems is important in understanding, and possibly preventing, the progression to chronicity.[23] A recent study by Melloh and co-workers, found that depression and maladaptive cognitions (depression, somatisation, a resigned attitude towards the job, fear-avoidance, rumination, helplessness, catastrophising of pain, and negative expectations on return to work) were risk factors for the development of persistent LBP, 6 month following the onset of acute LBP in the primary care setting.[33] A recent systematic review of psychosocial risk factors for chronic LBP in primary care has found that the judgments of patients and care providers about the likely evolution of an episode of LBP had the most powerful and independent predictive power.[30]

PRACTITIONERS' BELIEFS AND PERCEPTIONS

The great costs and the poor outcomes in chronic LBP patients have given impetus to clinical and research efforts to better understand the transition of acute to chronic pain and to devise more effective management strategies for chronic LBP. Chiropractors, medical practitioners, health and clinical psychologists are part of the group of practitioners involved in the assessment and management of LBP. Each of these professions has with its own knowledge base and beliefs about the causes and treatment of chronic LBP that are based on training, group perceptions, clinical experience, and memory. However memory can be selective and inaccurate, and be influenced by factors other than factual experience in both patients and practitioners. For instance, a large prospective study has shown that over time the accuracy of recall of pain relief by LBP patients is increasingly dependent on their current levels of pain than the actual pain relief they had initially reported.[34] In addition, each profession's perception of current literature is partly related to the avenues that are used to gather the information. For example, the way in which a chiropractor and a psychologist approach the assessment and diagnosis of a case of chronic LBP would in all likelihood differ. The chiropractor would be likely to manage a presenting LBP problem from a neuromusculoskeletal perspective, whereas the psychologist would be equally likely to view behavioural/personality factors as being more important in the transition from acute to chronic LBP. These differences would also be reflected in the manner in which each profession would choose to treat the presenting complaint. The chiropractor would use a physical or manipulative technique; while the psychologist would use a cognitive or behavioural technique to address the same problem. Each intervention however, would be deemed entirely acceptable in the context of each profession's training and practice. It would be plausible therefore to infer that beliefs and perceptions could have a direct bearing on

the ultimate outcome of the effectiveness of the treatment and may also influence the transition from the acute to the chronic stage of disease.

The transition from acute to chronic LBP is complex and may be approached from many different perspectives including physical, psychosocial, and work related.[4,14] Similarly, the way in which practitioners approach their clinical work is based on a complex of beliefs, perceptions and influences that may have taken years to develop. The clinical behaviour of professionals of any discipline involved in the management of chronic pain syndromes is dependent upon: their beliefs in the factors associated with the transition from acute to chronic pain; and their perceptions of current research data about those factors. These beliefs and perceptions are based on: professional training; clinical experience; opinions of authority figures in their field; personal perspectives; and current research data. However, such beliefs, and the practices in which they result, may vary considerably from current research findings.[35] For instance, it has been reported, in as recently as 2004, that physiotherapists in the United Kingdom were able to identify psychosocial risk factors in LBP clinical scenarios. However the perceptions of the same physiotherapists towards LBP were still based on the biomedical model causing an inclination in them to advise their patients not to work.[36] A relatively recent qualitative study of general practitioners in New Zealand has reported that these practitioners' "worldview" and "orientation to the biopsychosocial model of pain" determined their detection and management of psychosocial yellow flags in cases of acute LBP.[37] A general practitioner with many years of clinical experience may believe that the only effective way to treat chronic pain is through analgesics, even though the literature would inform him/her that analgesic medications often produce drug dependence or lose their effectiveness over time. In this case, the beliefs are subjective, based on experience; while the research findings are objective, in the sense that they are available to all professionals involved in pain management regardless of their beliefs.

Theoretically, if all treating practitioners have the same objective information available to them, they can all be expected to come to the same logical conclusions. However, this does not seem to be the case. One reason for this is that practitioners may not read the information that is available in the scientific literature outside of their own discipline. Therefore, decisions that affect the well being of patients may simply be based on information that is readily available to each individual's profession, through a handful of professional journals or consultation with colleagues. Such information however, may not accurately represent the body of current available evidence. To overcome this challenge, various clinical guidelines and protocols have been, and are being developed by professional or government bodies for evidence-based management of LBP. However, the level of use of these guidelines by practitioners remains unknown at best. It was found for instance that general practitioners in New Zealand did not use the Accident Compensation Corporation's guideline on yellow flags in cases of LBP.[37] Similarly, approximately half of Australian chiropractors recently surveyed, have been reported not to comply with clinical guidelines, from the Australian Acute Musculoskeletal Pain Guidelines Group (AAMPGG), which recommend that LBP patients stay active.[38]

DECISION MAKING

The literature on decision-making processes over the last 4 decades has demonstrated that there are many factors that may bias a decision. For instance an accommodation bias in which information that is supportive of ones beliefs is utilised, while other information is discarded. Additional biases include past experience and cognitive biases which involve observations and generalisations that may lead to memory errors and inaccurate judgements.[35] The decision as to which strategy to use in the treatment of LBP may be similarly wrought with many biases and therefore subject to many influences. However, the major influence should be the current state of knowledge in the field. Taking medical practitioners as an example, research has shown that there are a number of avenues available to these professionals for gathering information relevant to decision making. A study by Slawson[39] stated that medical clinicians rely heavily on expert based systems: consultation with colleagues; journal reviews and textbooks; and continuing education. The usefulness of each source is dependent on the relevance and the validity of the information and the effort required for its acquisition.

Relevance depends on the type of information being presented and the prevalence of the condition within a given practice. The most relevant information is that which tells one how to help one's patient's live functional satisfying lives free from pain and symptoms. Validity of the information is the likelihood that the information is true. Conclusions based on results of well-designed clinical trials are more likely to be valid than those drawn from observations in clinical practice.[39] The amount of work required includes factors such as how long it takes to obtain the information, how much it costs, and the amount of mental energy required to analyse the information and draw proper conclusions. According to Slawson, having to work too hard to establish validity or relevance of the information lowers its usefulness.[39] There are both advantages and disadvantages in the use of this type of information gathering. Certainly an expert who is specialised in a particular area may be the best person to confirm a diagnosis, however this same person may be biased by many years of individual practice towards a certain diagnosis in specific clinical circumstances. There are other reasons why expert based information may not be accurate. Expert advice may not be based on current research. Many experts have been known to follow a particular procedure because it had always been done that way regardless of information from clinical trials.[39] A second problem with expert information is that there is a tendency for authors of review articles to begin with a conclusion and then find supporting evidence for that conclusion, an example of accommodation bias. A third problem with expert opinion is that knowledge is often developed through experience with a select patient population, and though this information may be applicable to a group that is similar to that of the select group, it may not be applicable to the general population.

CONCLUSION

According to much of the literature, chronicity in LBP is more closely related to demographic, psychosocial, and occupational factors than to the medical characteristics of the low back disorder itself. It is important therefore, to evaluate these dimensions of the disorder with the goal of identifying

those patients at risk for chronicity. In a similar vain, Valat and colleagues have suggested that the social and occupational environment should be carefully evaluated with the goal of identifying those patients at risk.[14] The increasing burden of LBP-related disability, together with its major social and economic costs, indicates a need for large prospective epidemiological studies aimed at identifying predictive factors amenable to management. The literature indicates the potential to identify those patients at risk of developing chronic LBP. There is, however, still a great deal more to be done, especially in understanding the beliefs and perceptions of those involved in the assessment and treatment of this condition. It is important to have an understanding of these factors, in order to manage LBP patients more effectively and prevent their transition to chronicity. It may also be instructive to examine the sources and content of continuing education that are available to chiropractors, general practitioners, and psychologists, in order to determine their potential contribution to prevention of chronicity in LBP.

REFERENCES

1. Gatchel RJ, Polatin PB, Kinney RK. Predicting outcome of chronic back pain using clinical predictors of psychopathology: a prospective analysis. Health psychology : official journal of the Division of Health Psychology, American Psychological Association. 1995 Sep;14(5):415-20. PubMed PMID: 7498112. Epub 1995/09/01. eng.
2. Andersson GB. Epidemiological features of chronic low-back pain. Lancet. 1999 Aug 14;354(9178):581-5. PubMed PMID: 10470716. Epub 1999/09/02. eng.
3. Heneweer H, Aufdemkampe G, van Tulder MW, Kiers H, Stappaerts KH, Vanhees L. Psychosocial Variables in Patients With (Sub)Acute Low Back Pain: An Inception Cohort in Primary Care Physical Therapy in the Netherlands. Spine. 2007;32(5):586-92 10.1097/01.brs.0000256447.72623.56.
4. Cats-Baril WL, Frymoyer JW. Identifying patients at risk of becoming disabled because of low-back pain. The Vermont Rehabilitation Engineering Center predictive model. Spine. 1991 Jun;16(6):605-7. PubMed PMID: 1830688. Epub 1991/06/01. eng.
5. Walker B, Muller R, Grant W. Low back pain in Australian adults. Health provider utilisation and care seeking. Journal of Manipulative & Physiological Therapeutics. 2004;27(4):327 - 5. PubMed PMID: doi:10.1016/j.jmpt.2004.04.006.
6. Andersson GBJ. Epidemiological features of chronic low-back pain. The Lancet. 1999;354(9178):581-5.
7. Walker BF, Muller R, Grant WD. Low Back Pain in Australian Adults. Prevalence and Associated Disability. Journal of Manipulative and Physiological Therapeutics. 2004;27(4):238-44.
8. Klenerman L, Slade PD, Stanley IM, Pennie B, Reilly JP, Atchison LE, *et al*. The prediction of chronicity in patients with an acute attack of low back pain in a general practice setting. Spine. 1995;20(4):478-84.
9. Merskey H, Bogduk N. Classification of chronic pain. Descriptions of chronic pain syndromes and definitions of pain terms. 2nd Edition ed: IASP Press; 1994.
10. Gatchel RJ, Polatin PB, Mayer TG. The Dominant Role of Psychosocial Risk Factors in the Development of Chronic Low Back Pain Disability. Spine. 1995;20(24):2702-9.
11. Polatin PB, Gatchel RJ, Barnes D, Mayer H, Arens C, Mayer TG. A psychosociomedical prediction model of response to treatment by chronically disabled workers with low-back pain. Spine. 1989 Sep;14(9):956-61. PubMed PMID: 2528825. Epub 1989/09/01. eng.
12. Fransen M, Woodward M, Norton R, Coggan C, Dawe M, Sheridan N. Risk Factors Associated With the Transition From Acute to Chronic Occupational Back Pain. Spine. 2002;27(1):92-8.
13. Nicholas MK, Linton SJ, Watson PJ, Main CJ, Group tDotFW. Early Identification and Management of Psychological Risk Factors ("Yellow Flags") in Patients With Low Back Pain: A Reappraisal. Physical therapy. 2011 May 1, 2011;91(5):737-53.
14. Valat JP, Goupille P, Vedere V. Low back pain: risk factors for chronicity. Revue du rhumatisme (English ed). 1997 Mar;64(3):189-94. PubMed PMID: 9090769. Epub 1997/03/01. eng
15. Frymoyer JW. Predicting disability from low back pain. Clinical orthopaedics and related research. 1992 Jun(279):101-9. PubMed PMID: 1534720. Epub 1992/06/01. eng.
16. Foster NE, Thomas E, Bishop A, Dunn KM, Main CJ. Distinctiveness of psychological obstacles to recovery in low back pain patients in primary care. Pain. 2010 Mar;148(3):398-406. PubMed PMID: 20022697. Pubmed Central PMCID: PMC2831173. Epub 2009/12/22. eng.
17. Lacroix JM, Powell J, Lloyd GJ, Doxey NC, Mitson GL, Aldam CF. Low-back pain. Factors of value in predicting outcome. Spine. 1990 Jun;15(6):495-9. PubMed PMID: 2144913. Epub 1990/06/01. eng.
18. Langworthy JM, Breen AC. Psychosocial factors and their predictive value in chiropractic patients with low back pain: a prospective inception cohort study. Chiropr Osteopat. 2007;15:5. PubMed PMID: 17394652. Pubmed Central PMCID: 1852566. Epub 2007/03/31. eng.
19. Alexopoulos EC, Tanagra D, Detorakis I, Gatsi P, Goroyia A, Michalopoulou M, *et al*. Knee and low back complaints in professional hospital nurses: occurrence, chronicity, care seeking and absenteeism. Work (Reading, Mass). 2011;38(4):329-35. PubMed PMID: 21508522. Epub 2011/04/22. eng.
20. Dionne C, Koepsell TD, Von Korff M, Deyo RA, Barlow WI, Checkoway H. Formal education and back-related disability. In search of an explanation. Spine. 1995 Dec 15;20(24):2721-30. PubMed PMID: 8747251. Epub 1995/12/15. eng.
21. Deyo RA, Diehl AK. Psychosocial predictors of disability in patients with low back pain. The Journal of rheumatology. 1988 Oct;15(10):1557-64. PubMed PMID: 2974489. Epub 1988/10/01. eng.
22. Soucy I, Truchon M, Cote D. Work-related factors contributing to chronic disability in low back pain. Work (Reading, Mass). 2006;26(3):313-26. PubMed PMID: 16720972. Epub 2006/05/25. eng.
23. Burton AK, Tillotson KM, Main CJ, Hollis S. Psychosocial predictors of outcome in acute and subchronic low back trouble. Spine. 1995;20(6):722-8.
24. Shaw WS, Means-Christensen AJ, Slater MA, Webster JS, Patterson TL, Grant I, et al. Psychiatric disorders and risk of transition to chronicity in men with first onset low back pain. Pain medicine (Malden, Mass). 2010 Sep;11(9):1391-400. PubMed PMID: 20735749. Epub 2010/08/26. eng.
25. Van der Windt DA, Kuijpers T, Jellema P, van der Heijden GJ, Bouter LM. Do psychological factors predict outcome in both low-back pain and shoulder pain? Annals of the rheumatic diseases. 2007 Mar;66(3):313-9. PubMed PMID: 16916857. Pubmed Central PMCID: 1856009. Epub 2006/08/19. eng.
26. McGuirk B, Bogduk N. Evidence-based care for low back pain in workers eligible for compensation. Occupational medicine (Oxford, England). 2007 Jan;57(1):36-42. PubMed PMID: 17046988. Epub 2006/10/19. eng.
27. Crombez G, Vlaeyen JWS, Heuts PHTG, Lysens R. Pain-related fear is more disabling than pain itself: evidence on the role of pain-related fear in chronic back pain disability. Pain. 1999;80(1–2):329-39.
28. Swinkels-Meewisse IEJ, Roelofs J, Schouten EGW, Verbeek ALM, Oostendorp RAB, Vlaeyen JWS. Fear of Movement/(Re) Injury Predicting Chronic Disabling Low Back Pain: A Prospective Inception Cohort Study. Spine. 2006;31(6):658-64 10.1097/01.brs.0000203709.65384.9d.

29. Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. Pain. 1993;52(2):157-68.

30. Ramond A, Bouton C, Richard I, Roquelaure Y, Baufreton C, Legrand E, *et al*. Psychosocial risk factors for chronic low back pain in primary care—a systematic review. Family Practice. 2011 February 1, 2011;28(1):12-21.

31. Barnes D, Smith D, Gatchel RJ, Mayer TG. Psychosocioeconomic predictors of treatment success/failure in chronic low-back pain patients. Spine. 1989 Apr;14(4):427-30. PubMed PMID: 2524113. Epub 1989/04/01. eng.

32. Alexopoulos EC, Burdorf A, Kalokerinou A. A comparative analysis on musculoskeletal disorders between Greek and Dutch nursing personnel. International archives of occupational and environmental health. 2006 Jan;79(1):82-8. PubMed PMID: 16133523. Epub 2005/09/01. eng.

33. Melloh M, Elfering A, Egli Presland C, Röder C, Hendrick P, Darlow B, *et al*. Predicting the transition from acute to persistent low back pain. Occupational Medicine. 2011 March 1, 2011;61(2):127-31.

34. Haas M, Nyiendo J, Aickin M. One-year trend in pain and disability relief recall in acute and chronic ambulatory low back pain patients. Pain. 2002 Jan;95(1-2):83-91. PubMed PMID: 11790470. Epub 2002/01/16. eng.

35. Matlin M. Cognition. 4th Edition ed. Sydney: Harcourt & Brace College Publishers; 1998.

36. Bishop A, Foster NE. Do physical therapists in the United kingdom recognize psychosocial factors in patients with acute low back pain? Spine. 2005 Jun 1;30(11):1316-22. PubMed PMID: 15928559. Epub 2005/06/02. eng.

37. Crawford C, Ryan K, Shipton E. Exploring general practitioner identification and management of psychosocial Yellow Flags in acute low back pain. The New Zealand medical journal. 2007;120(1254):U2536. PubMed PMID: 17515940. Epub 2007/05/23. eng.

38. Walker BF, French SD, Page MJ, O'Connor DA, McKenzie JE, Beringer K, *et al*. Management of people with acute low-back pain: a survey of Australian chiropractors. Chiropractic & manual therapies. 2011;19(1):29. PubMed PMID: 22171632. Pubmed Central PMCID: 3265419. Epub 2011/12/17. eng.

39. Slawson DC, Shaughnessy AF. Obtaining useful information from expert based sources. BMJ. 1997 Mar 29;314(7085):947-9. PubMed PMID: 9099121. Pubmed Central PMCID: 2126390. Epub 1997/03/29. eng.

Commentary: Clinical Uncertainty

BARRY DRAPER and DENNIS RICHARDS

'Medicine is a science of uncertainty and an art of probability.'[1]
Sir William Osler

INTRODUCTION

In 2003 the ear, nose and throat specialist Richard Rosenthal published a commentary in which he coined the term 'uncertainty based medicine' ('UBM'). With this tongue in cheek reference to the popular term 'evidence based medicine,' Rosenthal called for acknowledgment that clinical uncertainty is an essential component of any model of contemporary health care practice.[2] More recently, Jamison has noted that 'As clinical outcomes are increasingly recognized as being unpredictable, uncertainty becomes the norm in clinical care.'[3]

Such positions are in stark contrast to sentiments expressed in some accounts of the scope of evidence-based practice ('EBP'). For example, the mission of the British Medical Journal Evidence Centre is apparent in its internet mantra: 'Eliminating uncertainty from health care.'[4]

One might think that if, indeed, this was the potential of EBP, there would assumedly be no argument with the edict of Muney that '… physicians who violate its precepts should ultimately face license suspension.'[5] Challenges to the concept of EBP are, however, not uncommon in health care literature, and many attempts to categorise the pitfalls in or objections to practitioners adopting EBP have been advanced. Whilst it is by no means complete, this paper offers a brief compendium of some commonly cited critiques.

IMPEDIMENTS TO EBP

Some accounts focus on practical impediments to EBP, *eg*:

- EBP is too time consuming for practitioners; field practitioners do not have the time to search databases, read journals, or discuss EBP with colleagues.[6-8]
- Practitioners do not have the knowledge or skills to practice EBP.[9]
- EBM creates more work in an already hectic vocational practice environment.[10]
- EBP might expose practitioners to legal action if it is determined that therapies previously undertaken were ineffective or experimental.
- There may be financial ramifications to EBP. A striking example of this was the attempt to subject radical keratotomy (an operation to correct short sightedness) to a randomised controlled trial ('RCT') in the United States. The researchers were blocked by ophthalmologists who faced a loss of income if the procedure was declared 'experimental' because it would mean health insurance companies would no longer reimburse them. As a result of legal action, the researchers were forced to declare the operation safe and effective and abandon any attempt at evaluation.[11]

Others writers have examined and criticised the political dimensions of EBP, with some holding that EBP reduces practitioners' autonomy:

- Decisions based on patient care can be taken out of the hands of practitioners and placed in those of managers and bureaucrats who know nothing of the actual practice of health care, let alone the individual patient in question.[12]
- EBP only serves the cottage industry of those producing EBP guidelines.[13] The explosion of the EBP industry with its focus on implementation has essentially removed the basic assumptions of EBP from scrutiny.

THE PROBLEM OF UNCERTAINTY

Many other challenges to EBP introduce and imbue the notion of uncertainty. This is often manifest as it concerns the inability and inadequacy of formal research methodologies, which are intrinsic to many accounts of EBP, to provide a sufficiently robust epistemology upon which to base health care practice. Some objections find their basis in classical protestations to the positivism proposed by philosophers of science.

- The Problem of Induction

  Chiropractors have been exposed to Bertrand Russell's inductivist turkey by Charlton.[14] Prosaically, this equates with the position that whilst there may be certainty in what has occurred prior, there can never be certainty in what will occur in the future. An example of how this pertains to health care practice is to state that whilst we may observe that a particular number of patients may not have benefited from a therapy, it is logically impossible to predict with 100% certainty that the next person will not.[15]
- Underdetermination

  There is an infinite number of possible theoretical explanations to account for any particular empirical observation. Scientific theories are therefore 'under' determined, as any number of explanations may plausibly account for an observation. Our allegiance to any particular theory to explain a set of results is not determined by nature alone. Our conclusion that the cause of low back pain can be explained in terms of altered biomechanics may be just as plausibly explained by reference to alterations in vascular supply. In this sense allegiance to one particular theory to account for an observation is illogical.[16]
- Theory Ladenness and Social Constructivism

  According to this stream of analysis, it is impossible for a scientist or any observer to make a neutral empirical observation. All conclusions and assumptions we make are grounded in our previous experiences, which will

differ from one person to the next. Completely unbiased conclusions about, for example, the efficacy or lack of, of a particular therapeutic modality cannot occur.[17,18] Scientists are equally as prone to influence, to irrationality, to prejudice, as any other human being. All knowledge is therefore constructed, not certain and subject to interpretation and to change.[19,20] A telling example of the subjectivity of scientific method is evident in the manner in which scientific reports are constructed. The inherently human and political nature of statements such as 'is no better than' or 'is as effective as' in interpreting the same data set is an exemplar. Expert and peer review panels, which are mechanisms proposed to 'police' the expression of scientific results, are comprised of human beings, subject to all of the foibles of human beings, *i.e*. subject to influence or holding various levels of competence.

- Standards?

  The rules and standards utilized in statistical analysis are therefore also social constructions. On what basis are abstract determinations such as the 'need to treat' established? What determines a particular numerical figure to be 'statistically significant'? How many trials, systematic reviews or Cochrane reviews does it take to determine what is true and what is not and whether a particular treatment should be endorsed or abandoned?[21] RCTs are expensive and they often receive the financial support of groups who may have a vested interest in the outcome of the trial, rendering the results subject to inappropriate influence or sway.[22]

PRAGMATIC REALITIES

Other objections which imbue the notion of uncertainty are somewhat more pragmatic. Some modalities are impossible to investigate using double-blinded RCTs, the so-called 'gold standard' of evidence. Whilst double blinding may be possible when investigating the use of, for example, pharmaceutical agents, it is impossible to blind activities that involve more decisive practitioner involvement, such as manual therapy or surgery.[23] EBP does not capture the crucial role of tacit processes in clinical practice.[24] Knowledge acquired from formal research activities is always incomplete. Knowledge and skills derived from hands on exposure, from experience and practice are unquestionably required in order to fully apprehend clinical practice.[25,26] RCTs seek to maximise participant homogeneity and accordingly seek to hide from view the number of variables impacting upon the lives of participants. But life is not like this. The etiology of wellbeing, health and disease is multifactorial and complex. Such a reductionist perspective provides a limited understanding of clinical practice.[27]

Formal research activities cannot be used to account for medical knowledge derived from the basic sciences or on the basis of biological plausibility, yet much of medical practice relies on knowledge generated by such referents.[28,29] The findings of formal research activity, which EBP prioritises, are often limited to the evaluation of the efficacy of singular procedures *eg* a particular drug. Yet patients often require multiple forms of management with effects being linked and cumulative.[30] Formal research activities tell us little about the origin/s of disease and thus offer little insight in terms of prevention. Understanding why the patient became ill in the first place may not be suitable to this type of episteme.[31]

Trials are generally acknowledged as unnecessary in some circumstances, for example when the potential outcome is dramatic *eg* anaesthesia for a fractured femur; we rely on practitioner experience to inform us as to the worth of such intervention.[32] Where, however, is the dividing line separating interventions for which practitioner experience is considered as acceptable evidence and where it is not?[33]

There is a paucity of formal research evidence in some areas. If practitioners are to look to research evidence to guide their practice, how are they to deal with care in which little or no research has been done? The notion that EBP provides better care or better patient outcomes has also been brought into question. Proponents tell us EBP proves better outcomes, but where is the proof of this? Where is the evidence?[34-36]

DISCUSSION

So where does this leave us? The definition of EBP can be confusing, and we readily agree with Parker that descriptions as to the metaphysical basis and epistemological scope of EBP are on a spectrum.[37] Whether EBP is, however, presented as a process or a philosophy, whether the practice of EBP equates with the uncritical acceptance of RCTs and denigration or rejection of all other forms of evidence, or involves the integration of practitioner and patient experience with formal research findings, or whether EBP is considered the panacea to all our ills or a flash in the pan, we argue that the conclusion that the health care encounter is peppered with unavoidable intangibles is both inexorable and must not be hidden from view.

In clinical practice and in the training of our practitioners, clinical and methodological uncertainty must not be presented as an unacceptable impediment to be overcome, or as a troublesome reverse salient. We have an obligation to our patients to continually review and, when needed, refine what it is that we do.[38] In embedding the notion of uncertainty into our undertakings, we are liberated from the unfalsifiable stance of those who hold that *a priori* assumptions about chiropractic represent a sufficient and justifiable platform upon which to practice; that chiropractic is self evident and in no need of ongoing evaluation and review. But we are also liberated from the absurdity of the belief that certainty can and should be our objective at all costs.

Uncertainty in health care is intrinsic and inescapable. As Paul *et al* place this: 'Uncertainty pervades and motivates every activity related to health care.'[39] In addition to its presence in our research paradigms, uncertainty is characteristic in the vocational practice of chiropractic across such elements as:

- Our patients' perceptions of their bodies, their ailments, their motivations, desires, and needs for seeking care.
- The etiology, predisposing and contributing factors of and co-morbidities associated with patients' maladies.
- Our diagnosis and ordering of differentials, the validity of our procedures and interpretation of our results.

- Our management choice and likely efficacy, the patient's response and prognosis and our own knowledge, expertise, skills, motivation and competence.

'In complex systems, unpredictability and paradox are ever present, and some things will remain unknowable.'[40] Rather than sweeping it under the carpet, we should embrace uncertainty as simply part of what we do. Accepting that uncertainty exists differs from succumbing to or preferring ignorance. We do not propose that practitioners should not seek to inform themselves. Like Rosenthal, we do not contend ignorance to be preferable to knowledge, but rather for our perception of knowledge to be as dynamic, not static or set in stone.[2]

There are several benefits to this. Firstly, it means that we can approach each and every clinical encounter, from one patient to the next, with the knowledge that things may differ. This teaches us that our assessment and management must be entirely iterative - subject to review, to reconsideration, to interpretation, to exposure to new or changing information. As Chalmers places this, 'Whatever the basis for judgments about the likely effects of treatments in individual patients, there is no escape from the reality that every such judgment initiates a clinical trial in which there can be no certainty that an individual patient will benefit.'[41]

Uncertainty fuels critical reflection about our activities. Did the patient improve because of our intervention alone, natural history or placebo or what combination? Unreflective belief in our apparent successes can lead to complacency and overconfidence, resulting in an unwillingness to consider alternatives, rendering us more susceptible to error and to persisting with strategies that may be less beneficial than others.[42] We owe it to our patients to achieve the same outcomes with less rather than more. Uncertainty induces an epistemological humility that undermines self-congratulation when Mother Nature may well have done all of the work.

An appreciation of uncertainty forces us to expand any stifling interpretation of what EBP really is, allowing us to take on face value the commonly-used description of evidence-based practice in medicine as requiring '… the integration of the best research evidence with our clinical expertise and our patient's unique values and circumstances.'[43] In the light that no one information source is unquestioningly privileged or infallible we may now openly acknowledge that practitioners have since the dawn of healing and will continue to draw upon various sources to inform their practice. Factors such as our own clinical experience, the collective knowledge of our herd or practitioner group and even intangibles such as a gut feeling do inform clinical practice and must be granted voice.[44] This reality, too often ridiculed as unsophisticated or anachronistic, allows us to admit to the fact that all of us at the coalface of vocational practice learn as much from our own mistakes or talking with colleagues as we do from databases and journals.

The retreat from scientism and positivism such an approach imbues also encourages a more humanistic model of practitioner-patient interaction. In over-emphasising the significance of knowledge generated by formal research methodologies above the word of a patient, an imbalance is set up in the relationship. Uncertainty exposes the myth of the impartial, all-knowing practitioner and facilitates a shift towards a model that sees a practitioner truly willing to listen to and learn from their patient through interaction and negotiation. Listening to a mother's view of what is ailing her child becomes an imperative and not an option to be exploited as to appear politically correct. The political and medico-legal benefits to this approach are also self-evident. Freed from the dangerous consequences of believing we are always right, practitioners are more inclined to be circumspective when explaining to patients diagnostic possibilities or potential outcomes of intervention. Early and prudent elucidation of possible adverse outcomes is a most sensible step in minimizing liability. This should not be seen as compromising the expertise of the practitioner but rather an unavoidable product of the humanity of the health care encounter.

CONCLUSION

In 2001 McNeil argued that the major hidden barriers to better health care are due to a lack of discussion of the impact of uncertainty in medicine.'[45] Ludemer has cited the failure to train doctors about clinical uncertainty as 'the greatest deficiency of medical education throughout the twentieth century.'[46] We contend all models of health care education and practice, including chiropractic, must be conducted with this deficiency in mind.

Barry Draper BAppSc, MSc.
Head, Discipline of Chiropractic, RMIT University, Bundoora, Vic.

Dennis Richards, BSc, DC, Grad Cert Phil Studies, ACP, FACC, FICC.
Private Practice of Chiropractic. Tweed Heads, NSW.

REFERENCES

1. Accessed at: http://www.brainyquote.com/quotes/quotes/w/williamosl159326.html
2. Rosenthal R. UBM. Uncertainty based medicine. Otolaryngol Head Neck Surg 2003;128(1):5-7.
3. Jamison J, Hawk C. Patient education and wellness. Edinburgh: Churchill Livingstone Elsevier; 2010. p. 47.
4. Accessed at: http://group.bmj.com/products/evidencecentre/BMJ%20Evidence%20Centre_brochure_1108.pdf
5. Muney AM. Evidence-based medicine needs to be promoted more vigorously. Managed Care 2002;11(2):10-2.
6. Callen JL, Fennell K, McIntosh JH. Attitudes to, and use of, evidence-based medicine in two Sydney divisions of general practice. Aust J Primary Health 2006;12(1):40-6.
7. Askew DA, Clavarino AM, Glasziou PP, Del Mar C. General practice research: attitudes and involvement of Queensland general practitioners. Med J Aust 2002;177:74-7.
8. Bennett S, Tooth L, McKenna K, Rodger S, Strong J, Ziviani J, Mickan S, Gibson L. Perceptions of evidence-based practice: A survey of Australian occupational therapists. Aust Occup Ther J 2001;50:13-22.
9. Oliveri RS, Gluud C, Wille-Jørgensen PA. Hospital doctors' self-rated skills in and use of evidence-based medicine – a questionnaire survey. J Evaluation Clin Pract 2004;10(2):219-26.
10. Heiwe S, Kajermo KN, Tyni-Lenné R, Guidetti S, Samuelsson M, Andersson IL, Wengström Y. Evidence based practice: attitudes, knowledge and behaviour among allied health care professionals. Int J Quality in Health Care 2011;23(2):198-209.
11. Norman C. Clinical trial stirs legal battles. Science 1985 Mar 15;227(4692):1316-8.

12. Hill GB. Archie Cochrane and his legacy. An internal challenge to physicians' autonomy? J Clin Epidem 2000;53(12):1189-92.

13. Manchikanti L, Benyamin RM, Falco FJ, Caraway DL, Datta S, Hirsch JA. Guidelines warfare over interventional techniques: is there a lack of discourse or straw man? Pain Physician 2012;Jan-Feb15(1):E1-E26.

14. Charlton KH. A Chiropracticness test. Chiropractic & Osteopathy 2005;w:24.

15. Indick W. Fight the power: the limits of empiricism and the costs of positivistic rigor. J Psychology 2000;136:21-37.

16. Tomlin G, Borgetto B. Research pyramid: a new evidence-based practice model for occupational therapy. AJOT 2011;65(2):189-96.

17. Tonelli MR. Integrating evidence into clinical practice: an alternative to evidence-based approaches. J Evaluation in Clinical Practice 2006;12:248-56.

18. Wilson H. The myth of objectivity: is medicine moving towards a social constructivist medical paradigm. Family Practice 2000;17:203-9.

19. Dollaghan C. The handbook for evidence-based practice in communication disorders. Baltimore, MD: Brookes; 2007.

20. Nelson N. Questions about certainty and uncertainty in clinical practice. Language, Speech, and Hearing Services in Schools 2011;42:81-7.

21. Rubinstein S. Translating practice into evidence: The contradictions between practice experience and the evidence. In: Proceedings of the European Chiropractors' Union Convention; 2012 May 17-19; Amsterdam, the Netherlands. Hampton Hill, Middlesex: European Chiropractors' Union 2012. p. 37-40.

22. Hjorland BJ. Evidence-based practice: an analysis based on the philosophy of science. J Am Society Information Science Technol 2011;62(7):1301-10.

23. Lutzer K. Moving from anecdote to evidence. J Can Chiropr Assoc 2006;50(4):235-7.

24. Saunders J. The practice of clinical medicine as an art and as a science. West J Med 2001 February;174(2):137-41.

25. Kamhi AG. Balancing certainty and uncertainty in clinical practice. Lang Speech Hear Serv Sch 2011;42:88-93.

26. Nevo I, Slonim-Nevo V. The myth of evidence-based practice: towards evidence-informed practice. Br J Soc Work 2011;41(6):1176.

27. Hampton J. Evidence-based medicine, opinion-based medicine, and real-world medicine. Perspectives in Biology and Medicine 2002;**45**:549-69.

28. Van de Luitgaarden GMJ. Evidence-based practice in social work: lessons from judgment and decision-making theory. J Soc Work 2011;41(6):1176-97.

29. Palisano RJ. Practice knowledge: the forgotten aspect of EBP. Physical and Occupational Therapy in Pediatrics 2011;30(4):261-3.

30. Mykhalovskiya E, Weirb L. The problem of evidence-based medicine: directions for social science. Social Science & Medicine 2004;59:1059-69.

31. Saarni SI, Gylling HA. Evidence based medicine guidelines: a solution to rationing or politics disguised as science? J Med Ethics 2004;30:171-5.

32. Black N. Evidence-based surgery: a passing fad? World J Surg 1999;23:789-93.

33. Dickenson D, Vineis P. Evidence based medicine and quality of care. Health Care Anal 2002;10:243-4.

34. Goodman NW: Who will challenge evidence-based medicine? J R Coll Physicians Lond 1999;33:249-51.

35. Chan JJ, Chan JE. Medicine for the millennium: the challenge of postmodernism *Med J Aust* 2000;172:332-4.

36. Sehon SR, Stanley DE. A philosophical analysis of the evidence-based medicine debate. BMC Health Services Research 2003;3(1):14.

37. Parker M. False dichotomies: EBM, clinical freedom, and the art of medicine. Medical Humanities 2005;31:23-30.

38. Illot I. Evidence-based practice: a critical appraisal. Occupational Therapy International: Special Issue: Evidence-Based Practice in Occupational Therapy 2011;19(1):1-6.

39. Han PKJ, Klein WMP, Arora NK. Varieties of uncertainty in health care: a conceptual taxonomy Med Decis Making 2011;31:828-38.

40. Greenhalgh T. Narrative based medicine in an evidence based world. BMJ 1999;318:323-5.

41. Chalmers I. Well informed uncertainties about the effects of treatments. How should clinicians and patients respond? BMJ 2004;328(7438):475-6.

42. Berner ES, Graber ML. Overconfidence as a cause of diagnostic error in medicine. Am J Med 2008;121(5A):S2-23.

43. Straus SE, Richardson WS, Glasziou P, Haynes RB. Evidence-based medicine: how to practice and teach EBM, 4th ed. Edinburgh: Churchill Livingstone Elsevier 2011. p. 1.

44. Van den Bruel A, Thompson M, Buntinx F, Mant D. Clinicians' gut feeling about serious infections in children: observational study. BMJ 2012;345:e6144. Accessed at: http://dx.doi.org/10.1136/bmj.e6144

45. McNeil BJ. Hidden barriers to improvement in the quality of care. N Eng J Med 2001;345:1612-20.

46. Ludmerer KM. Time to heal. New York: Oxford University Press; 1999. p. 378.

A Chiropractic Scholar Visits from Denmark: A Report on the Chiropractic Research Seminar

MICHEL S. SWAIN, ALICE KONGSTED, ARON DOWNIE and MARK J. HANCOCK

Abstract: This paper reports on the proceedings of the Chiropractic Research Seminar – Weekend Edition which formed part of a scholarly visit that explored potential research collaborations between Macquarie University and The Nordic Institute of Chiropractic and Clinical Biomechanics (NIKKB) / The Institute of Sports Science and Clinical Biomechanics at the University of Southern Denmark. All the seminar representatives from the Chiropractors' Association of Australia and the Chiropractic and Osteopathic College of Australasia presented their initiatives to further chiropractic research capacity in Australia. A visiting fellow from Denmark presented an overview of the Danish chiropractic research model and a collaborative forum discussed ways to further chiropractic research in Australia. Observations and reflections from the seminar are presented.

INDEX TERMS (MeSH): RESEARCH REPORT; CHIROPRACTIC; AUSTRALIA; DENMARK.

Chiropr J Aust 2013;43: 103-6.

INTRODUCTION

One of the main reasons for the Sydney College of Chiropractic's amalgamation with Macquarie University in 1990 was to engage the chiropractic profession in appropriate research.[1] The Department of Chiropractic at Macquarie University serves the profession and the community by promoting research of chiropractic practice and other areas of biomedical science. An important step in implementing evidence-based care into clinical practice is knowledge of recent advances in the discipline and correct interpretation of evidence.[2] Research seminars keep clinicians abreast of research findings that advance patient care, and enable participants to interact with worked examples of practical problems to develop a deeper understanding of how recent research relates to daily clinical practice. Taking this into consideration as well as the desire to engage with the wider community, a Chiropractic Research Seminar – Weekend Edition (hereafter *the seminar*) was organised at Macquarie University and took place on the 25th of May 2013. The objective of *the seminar* was to enhance research culture, to facilitate dissemination of knowledge and to encourage research collaboration within the Australian chiropractic community.

[1,2]Michael S Swain MChiroprac, ICSSD, MPhil
[3,4]Alice Kongsted MSc (Clin Biomech), PhD
[1,2]Aron Downie MChiroprac, MPhil
[5]Mark J Hancock BAppSc(Phty), MAppSc, PhD

[1]Department of Chiropractic, Faculty of Science, Macquarie University
[2]Musculoskeletal Division, The George Institute for Global Health, Sydney, Australia
[3]Nordic Institute of Chiropractic and Clinical Biomechanics, Odense, Denmark
[4]Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark
[5]Faculty of Human Sciences, Macquarie University

Conflict of interest notification: The authors declare no conflicts of interest with this work

Received: 6 July 2013, accepted with revisions: 15 July 2013

The seminar formed part of a scholarly visit that explored potential research collaborations between Macquarie University and The Nordic Institute of Chiropractic and Clinical Biomechanics (NIKKB) / The Institute of Sports Science and Clinical Biomechanics at the University of Southern Denmark. Danish chiropractor and senior research fellow, Alice Kongsted, PhD, was appointed as a visiting fellow for the purpose of exploring research opportunities, which was the first visit of its type to be facilitated by the Department of Chiropractic at Macquarie University.

PROCEEDINGS

The seminar was opened by Rosemary Giuriato, Head of the Department of Chiropractic. It was divided into two sessions. The first session was opened and chaired by Roger Engel, PhD, who spoke of the Department of Chiropractic's current and future research activities. This session consisted of presentations by: (1) Andrew McNamara, CEO of the Chiropractors' Association of Australia (CAA), who presented "The challenges of embedding an evidence based research culture in a clinically driven small profession;" (2) Peter Tuchin, PhD, President of the Chiropractic and Osteopathic College of Australasia (COCA), who reported on "Supporting chiropractic research in Australia - the COCA model," and; (3) Alice Kongsted, PhD, who presented "An introduction to the Danish Chiropractic Research Model." Session two was opened and chaired by Mark Hancock, PhD, Senior Lecturer and physiotherapist from the Department of Health Professions at Macquarie University. It consisted of four research presentations followed by an interactive discussion forum. The four research presentations were: (1) Roger Engel, PhD, "Medium term effects of including manual therapy in a pulmonary rehabilitation program for chronic obstructive pulmonary disease (COPD) – a randomised controlled pilot trial;" (2) Michael Swain, MPhil, on "Pain in adolescents;" (3) Aron Downie, MPhil, on "Red flags to screen for malignancy and fracture in patients with low-back pain: A systematic review," and; (4) Alice Kongsted, PhD, on "Prognostic implications of back-related leg pain

subgroups: An analysis of longitudinal routine clinical data." The interactive discussion forum provided a platform for attendees to discuss issues surrounding chiropractic research in Australia. Guided by Mark Hancock, a diverse panel of chiropractors (Roger Engel, Peter Tuchin of COCA, Alice Kongsted and Bryce Conrad, chiropractor and member of the CAA Executive) provided their perspective on two forum questions: (1) How does the chiropractic profession facilitate research in Australian chiropractic institutions? and; (2) How can community chiropractors facilitate chiropractic research in Australia?

THE DANISH RESEARCH MODEL

The Foundation for Chiropractic Research and Post Graduate Education (*The chiropractic fund*) was established in 1990 as part of the contract between the Danish Health Insurance and the Danish Chiropractors' Association with the purpose of advancing chiropractic research and postgraduate education in Denmark.[3] The Foundation provides funding for The Nordic Institute of Chiropractic and Clinical Biomechanics and scientific positions such as professorships at the University of Southern Denmark (SDU), PhD projects, and individual initiatives for research projects and quality development. The chiropractic fund constitutes a source of continuous financial support that has been arguably the single most important factor for developing a successful chiropractic research environment in Denmark, with chiropractors being central players in musculoskeletal research and teaching of musculoskeletal medicine at a university level. Since the fund was established 17 Danish chiropractors have completed a PhD degree and 14 chiropractors are currently PhD candidates at Danish universities. A strong evidence based approach to chiropractic has led to Danish chiropractic education being integrated with medicine in a Faculty of Health at a comprehensive state university, and Danish chiropractors achieving leading academic positions within the chiropractic profession internationally. Furthermore, this academic development has strongly contributed to ensuring that chiropractors are highly integrated into the Danish healthcare system and are recognised as trustworthy contributors to primary health care. The Danish chiropractic fund constitutes the financial foundation for the academic development of chiropractic in Denmark and has made an important contribution to establishing a multidisciplinary musculoskeletal research environment in Denmark with chiropractors as key stakeholders.

OBSERVATIONS AND REFLECTIONS

The interactive discussion forum, as well as question time following dialogues and research presentations, provided all attendees (chiropractors, students, academics and members of the public) an opportunity to express their opinion on issues surrounding chiropractic research in Australia. The following discussion offers observations and reflections on the key themes that were discussed.

Defining the Professional Identity

There is noticeable diversity in the way individual Australian chiropractors view their core purpose. Subsequently the role of the chiropractic profession in Australia is poorly established. This may lead to the lack of a clearly defined research direction and could be one barrier to increased research output in Australia. Also, there are only a very small number of appropriately qualified academics in Australia with the ability to drive a research oriented culture into the professional Identity.

In contrast, this is not the case for chiropractors in Denmark, who have developed a clear identity as healthcare providers who diagnose, treat, and prevent musculoskeletal pain.[4] Danish chiropractors primarily see themselves as musculoskeletal experts and practitioners. This is also how the Danish Chiropractors' Association brand chiropractic. Danish chiropractors have a clear role as primary care clinicians, who embrace the biopsychosocial approach and take responsibility for diagnosing and managing musculoskeletal problems. The research direction taken by Danish chiropractors aligns well with the professional identity and the practitioner function. Indeed research now clarifies the chiropractic identity in Denmark, as a musculoskeletal expert.

If the Australian chiropractic profession wants to take on responsibility as expert musculoskeletal health care providers there is clearly a need to be engaged in research to enhance knowledge about musculoskeletal conditions. If, on the other hand, chiropractors want to be only manipulative therapists who function in an undefined health/wellbeing role that is outside of the established healthcare system, the need for broad musculoskeletal research is limited. The first step is a firm decision on professional identify.

Separation of Politics and Professional/Academic Issues

Chiropractors in Australia have become increasingly aware that having more than one association is damaging for the profession. It would appear that the CAA and COCA (and also the Australian Spinal Research Foundation) each deal with similar political and professional issues, but often without a united position. One strategy towards easing inter-body tension and increasing effectiveness for the profession is to separate the political and professional domains. Using Denmark as a case example, this system has a highly organised, single chiropractic association, The Danish Chiropractic Association[5] (DCA). This organisation evolved into a sophisticated corporate structure that ensures that political issues (roughly spoken what is best for the chiropractors) are dealt with by the DCA whereas professional issues (what is best for the patients and for society) to a large extent are handled by the Nordic Institute for Chiropractic and Clinical Biomechanics. This is funded by both the profession and the Danish national health insurance and therefore it operates in the interests of both chiropractors and society. Its functions include postgraduate education, high-quality research, and the management of the mandatory professional internship. Denmark has one Chiropractic Association that covers all chiropractors and speaks for chiropractic on all political issues. Speaking with one voice makes it clearer for stakeholders to know what chiropractic is.

In Australia it does appear that the CAA and COCA have occupied both political and professional (education/professional development, research, evidence base) domains in years gone by. At *the seminar* prior tensions were acknowledged and commitment to a future alliance was indicated. Moving forward, opportunity exists for Australian chiropractic groups to unite in the formation of one political and professional entity, mitigating the risk of any further divergent actions in the future.

Multidisciplinary Research Collaboration

It was suggested that chiropractic researchers in Australia have been guilty of operating in silos[6] and not being adequately involved in multidisciplinary research. Collaborative multidisciplinary research networks aim to enhance the scale of research, benefit from the varied expertise and stimulate innovation to generate new knowledge. Current research projects within the Department of Chiropractic at Macquarie University involve internal collaboration with Medicine, Physiotherapy, Cognitive Science, Chemistry and Biomolecular Sciences, and external institutions such as the University of Sydney Medical School – the George Institute for Global Health, the Children's Hospital Institute of Sports Medicine Health, Westmead Centre for Oral Health, Marcs Institute for Brain and Behaviour and Sutherland Shire Hospital and region health. The recent growth in research networks outside the chiropractic discipline is of strategic importance and better positions the Department to investigate multidisciplinary solutions to complex healthcare problems. Inter-disciplinary collaborations are essential to advance the profile of chiropractic research and chiropractors in Australia. Danish chiropractors started their involvement with research mainly in epidemiology and with hindsight it was a very fruitful strategy to address general musculoskeletal topics and make strong alliances with existing research environments rather than having a very chiropractic focus. Now, Danish chiropractors are recognised researchers and experience no resistance to approaching any research topic as long as the methodology is sound.

Professional Commitment to Research Development

Lack of funding was identified as one limitation to chiropractic research in Australia. As highlighted by Mr Andrew McNamarra, CEO CAA, "*if chiropractic is to survive in the mainstream of health care in Australia in the long term, it must find a way to leverage sufficient research dollars to sustain a viable research community*". In addition to the efforts of the CAA and the funding body the Australian Spinal Research Foundation, COCA has established a research fund (COCA Research Fund Ltd) to foster further research by chiropractors and osteopaths in Australia as well as to help establish early career researchers.[7] A similar tool exists in Denmark to stimulate early career research and international collaboration called the Danish Chiropractic Research Stipend.[8] However, the magnitude of funding that is required to stimulate chiropractic research in Australia is substantial.[9] Immediately following *the seminar* a Chiropractic Leadership Summit was held in Melbourne on the 26th May 2013. Announced in a joint communique, the summit resolved that the profession would move towards raising research funds with a goal of $5million dollars annually from the profession.[10] *The chiropractic fund* of Denmark could provide one such model, modified to serve the requirements of the Australian chiropractic community. An important feature of any Australian model, given the paucity of level E academics (full professors) at this time, is that the board and in turn subsequent funding decisions be made by a multidisciplinary group with an established track record at gaining large and nationally competitive funding.

Academic Pursuit of Large Nationally Competitive Funding

While the funding goal set forth at the chiropractic leadership summit is commendable, profession-originated funding should only act as seed money on the progression towards larger publicly funded research supported by bodies such as the National Health and Medical Research Council and Australian Research Council. Success in gaining funding from these highly competitive schemes is important to the profile of chiropractic researchers and the chiropractic profession. Physiotherapy in Australia provides an excellent case example. The Australian Physiotherapy Association's Physiotherapy Research Foundation (PRF) has been an important catalyst for change in physiotherapy. The PRF model of providing seed funding and supporting early career researchers is largely responsible for the physiotherapy profession's success in gaining nationally competitive funding. Up to 2008, physiotherapy researchers had acquired a total of $595million in NHMRC funding,[11] and today enjoy in excess of $10million per annum in large nationally competitive funding.

Chiropractic professional funding could be effectively used to establish a similarly tiered system of scholarships for young researchers, associated post-doctoral fellowships and research chair positions as well as accompanying tier-matched grants, all of which build track records that are required to be competitive for large external funding bodies. As per the Danish model, an independent centre for research excellence could be established, allowing an apolitical team the agility to embrace interdisciplinary collaborators. Once established, chiropractic researchers and research teams should become self-funded and sustainable through the publicly funded competitive granting system.

CONCLUSIONS

This paper reports Macquarie University's Chiropractic Research Seminar – Weekend Edition, held on the 25 May 2013, which formed part of an international scholarly visit. As an important step in moving towards evidence-based practice, chiropractic research seminars provide a forum for chiropractors to communicate their results and discuss issues surrounding chiropractic research. It has become clear that the chiropractic profession in Australia needs to increase its research output and profile to maintain and further its legitimacy in Australian health-care. A clear professional identity and an appropriately constructed research funding model which meets the unique needs of the profession are perhaps the two most important steps to securing significant and sustainable research into the future. There are many well established research models such as the Danish chiropractic model and the Australian physiotherapy model. A greater synergy must exist between Australian chiropractic institutions, academics and political/professional stakeholders in order to develop a viable Australian chiropractic research community moving forward.

ACKNOWLEDGEMENTS

We thank Macquarie University's Department of Chiropractic and the Faculty of Science for their financial support. We thank the Nordic Institute of Chiropractic and Clinical Biomechanics and the Institute of Sports Science and Clinical Biomechanics for endorsing the international visit. The seminar and international visit would not have been possible without the logistical support of Louella Almeida.

REFERENCES

1. Devereaux E. Current chiropractic status in Australia 2012: Manpower and research needs. Chiropr J Aust. 2012;42(2):68-71.
2. Haneline M. A primer on evidence-based practice for chiropractors. Chiropr J Aust. 2011;41(3):78-80.
3. DCA: Chiropractic in Denmark [Internet] København; Danish Chiropractic Association; ®1995; Chiropractor fund. Available from: http://www.danskkiropraktorforening.dk/Forskning--kvalitet/Kiropraktorfonden/ [accessed 18 June 2013].
4. Myburgh C, Mouton J. The development of contemporary chiropractic education in Denmark: An exploratory study. J Manipulative Physiol Ther. 2008;31(8):583-92.
5. Myburgh C, Hartvigsen J, Grunnet-Nilsson N. Secondary legitimacy: A key mainstream health care inclusion strategy for the Danish chiropractic profession? J Manipulative Physiol Ther. 2008;31(5):392-5.
6. Richards D. A report on the outcomes of the consensus session held at the 2010 Australasian College of Chiropractors research summit. Chiropr J Aust. 2011;41(1):3-4.
7. COCA: Research fund [Internet] Victoria; Chiropractic and Osteopathic College of Australasia; ©2013; About COCA Research Limited. Available from: http://www.coca.com.au/research-fund/ [accessed 18 June 2013].
8. DCA: Chiropractic in Denmark [Internet] København; Danish Chiropractic Association; ®1995; Danish chiropractic research stipend. Available from: http://www.danskkiropraktorforening.dk/English/Danish-Chiropractic-Research-Stipend/ [accessed 18 June 2013].
9. Swain M, Downie A, Brown B, Lsytad R. A commentary to address the state of chiropractic research in Australia. Chiropr J Aust. 2013;43(2):73-4.
10. CAAN: Chiropractic leadership summit [Internet] Sydney; Chiropractors' Association of Australia (National) Limited; ©31 May 2013; Joint communique - 26th May 2013. Available from: http://www.chiropractors.asn.au/index.php?option=com_k2&view=item&layout=item&id=346&Itemid=440 [accessed 18 June 2013].
11. Hodges P. Growth of physiotherapy research funding in Australia. Aust J Physiother. 2009;55(3):149-150.

Menopause, Chiropractic Examination and Treatment, and Salivary Hormone Levels: Correlations and Outcomes

SCOTT CUTHBERT and ANTHONY ROSNER

Abstract: *Introduction*: Fluctuating hormone levels in women at the time of menopause is a common and potentially disabling problem that is frequently confronted in chiropractic clinical practice. Although this problem is well recognized, it is often misdiagnosed and poorly treated. *Methods:* Correlations between a chiropractic physical examination procedure and salivary hormone tests for 10 women experiencing peri-menopausal and post-menopausal discomforts are reported here. Chiropractic treatment for disturbances associated with menopause in these patients was evaluated with the Menopause Rating Scale, a validated outcome measure used in the treatment of menopause. *Results:* As part of this approach we have observed that a significant subset of patients with peri- and post-menopausal disorders and abnormal hormone levels demonstrate distinct neuromuscular impairments that can be detected using the manual muscle test (MMT) employed in applied kinesiology (AK). *Discussion:* The MMT findings revealed strong correlations with the salivary hormone tests. Treatment based upon these findings led to substantial improvements of the menopausal symptoms reported.

INDEX TERMS: (MeSH): MENOPAUSE; APPLIED KINESIOLOGY; CHIROPRACTIC.

Chiropr J Aust 2013;43: 107-20.

INTRODUCTION

In the years prior to menopause, most women's menstrual cycles become irregular, and many women experience disturbing and even disabling symptoms. Menopause is the cessation of the monthly female menstrual cycle, and normally occurs between 46 and 54 years of age.[1-2] Generally, women who have not had a menstrual period for a year are considered postmenopausal. The numerous distressing symptoms women face going through symptomatic menopause include hot flashes, night sweats, vaginal dryness, feelings of anxiety or panic, depression, insomnia, stress, irritability, brain fog, forgetfulness, fatigue, and a worsening or hyperalgesia of existing conditions.[3]

To make matters worse, the cessation of menstruation and the development of climacteric symptoms can occur only a few years after menarche in younger women. The causes for this premature ovarian failure are not fully known, but are thought to be most frequently idiopathic and due to autoimmune disorders, genetic causes, infections, vitamin and mineral and enzyme deficiencies, or the common metabolic syndromes.[2,3] Frequently, we have seen women in our practice experiencing menopausal symptoms five years or more before menstruation ends and lasting for one to as many as ten years.

As women approach menopause, their ovaries gradually become less active and produce reduced amounts of the sexual hormones estrogen and progesterone. At this time, the adrenal glands take over hormone production. Given today's circumstances, because the adrenal glands are often in a weakened state by the time a woman reaches menopause, the adrenals are often not up to the task.[4,5] For this reason, supporting the adrenal glands and the stress response generally (alleviating stress regardless of its cause) could be justified as an integral part of the management of peri-menopausal and menopausal syndromes in women. Hormone synthesis also requires DHEA, the primary source of which is the adrenal glands. Many patients suffer from low DHEA due to chronic stress.[6]

Evidence that chiropractors are needed in the management of this problem has been provided by van der Sluijs *et al*.[7] Between July 2003 and July 2004 these authors surveyed the extent of complementary and alternative medicine (CAM) use among 1,296 women in Sydney, Australia and whether it had helped them. 53.8% had visited a CAM practitioner and/or used a CAM product during the past year, with chiropractic, massage and nutrition rated as the most effective therapies, including phytoestrogen tablets, evening primrose oil, and black cohosh as the most effective nutritional products. In 2002, Newton *et al* surveyed 886 women aged 45-65 years in Washington State (USA) to ascertain which alternative therapies they had used to treat their menopausal symptoms which appeared to be helpful. 31.6% of these women had consulted a chiropractor and 29.5% had massage. More than

Scott C. Cuthbert, BA, DC
Private practice of chiropractic
Pueblo, Colorado
Conflict of Interest Statement: The author is a Board Member of the International College of Applied Kinesiology (ICAK-USA)
Anthony Rosner, PhD
Brookline, Massachusetts
Research Director
International College of Applied Kinesiology (ICAK-USA)

Received: 30 June 2013, accepted with revisions: 15 July 2013

Chiropractic Health Center

Menopause Rating Scale (MRS)

Which of the following symptoms apply to you at this time? Please, mark the appropriate box for each symptom. For symptoms that do not apply, please mark 'none'.

Symptoms:	none	mild	moderate	severe	very severe
Score =	**0**	**1**	**2**	**3**	**4**
1. Hot flushes, sweating (episodes of sweating)	☐	☐	☐	☐	☐
2. Heart discomfort (unusual awareness of heart beat, heart skipping, heart racing, tightness)	☐	☐	☐	☐	☐
3. Sleep problems (difficulty in falling asleep, difficulty in sleeping through, waking up early)	☐	☐	☐	☐	☐
4. Depressive mood (feeling down, sad, on the verge of tears, lack of drive, mood swings)	☐	☐	☐	☐	☐
5. Irritability (feeling nervous, inner tension, feeling aggressive)	☐	☐	☐	☐	☐
6. Anxiety (inner restlessness, feeling panicky)	☐	☐	☐	☐	☐
7. Physical and mental exhaustion (general decrease in performance, impaired memory, decrease in concentration, forgetfulness)	☐	☐	☐	☐	☐
8. Sexual problems (change in sexual desire, in sexual activity and satisfaction)	☐	☐	☐	☐	☐
9. Bladder problems (difficulty in urinating, increased need to urinate, bladder incontinence)	☐	☐	☐	☐	☐
10. Dryness of vagina (sensation of dryness or burning in the vagina, difficulty with sexual intercourse)	☐	☐	☐	☐	☐
11. Joint and muscular discomfort (pain in the joints, rheumatoid complaints)	☐	☐	☐	☐	☐

Figure 1
Menopause Rating Scale

89% of the women reported that they found the treatment "somewhat or very" helpful. The authors concluded that "the use of alternative therapies for menopause symptoms is common, and women who use them generally find them to be beneficial." [8]

In today's environment of evidence-based medicine, it is appropriate that chiropractors provide meaningful clinical evidence to support the profession's treatment of Type-O disorders. This would specifically apply to peri- and post-menopause, giving scientific strength to what has been suspected clinically for decades. Accordingly, we evaluated the correlation between chiropractic physical findings and salivary hormone findings in patients with menopausal symptoms, recording whether treatments based upon the chiropractic findings were successful for these women, using the validated Menopause Rating Scale.[9]

Menopause Rating Scale for assessment of severity of menopausal symptoms and responsiveness to AK treatment

The Menopause Rating Scale (MRS) is a Quality of Life scale developed in the early 1990s. (Figure 1) The scale was created so that women could easily complete it rather than their physician.[9] It has been investigated and validated since that time as an outcomes measure for hormone therapy for women with menopausal symptoms.[10] The MRS has the capacity to measure treatment effects on quality of life across the full range of severity of complaints before and after treatment. Because it is a standardised test, it allows the comparison of treatments across the healing professions. Like the Visual Analog Scale (VAS), the MRS does not require any interpretation by the investigator, because patients assess the severity of their menopause symptoms in terms of their own personal judgment. These types of tools are held to possess sensitivity (correct prediction of the positive assessment) and specificity (correct prediction of a negative assessment) and are thus useful in both clinical practice and research studies.[11]

The MRS lists 11 symptoms to be evaluated by the patient. For each, the respondent has a choice among 5 categories: no symptom, mild, moderate, severe, and very severe, employing a range from 0 (no symptom) up to 4 (severe symptom). The total score of the MRS therefore ranges from 0 (asymptomatic) and 44 (highest degree of complaints).

Salivary Hormone Testing for assessment of biochemical causes of menopausal symptoms

We found that testing hormones in saliva was convenient, painless, less expensive than blood tests, and (apparently) accurate. More importantly, saliva contains the free, "bioavailable" fraction of steroid hormones that have moved out of the bloodstream and into the tissues. (Blood and urine measure total levels instead. In cases of hypothyroidism – not uncommon – the urinary excretion of several adrenal hormones is decreased). Furthermore, the stress caused by a conventional blood draw can alter test results. For salivary hormone determinations, the home collection kit routinely given to patients allows for optimal collection times. It is worth noting that the World Health Organization uses saliva testing to study human hormone levels around the world. The steroid hormones most readily measured in saliva are: estrogens (estradiol, estrone, and estriol), progesterone, androgens (DHEA, testosterone), and cortisol.[5, 12]

Our approach in this case-series has been to determine the concurrent validity of the AK MMT diagnostic method compared to an established, "gold-standard" biochemical testing method, the salivary hormone test. Were the AK sensorimotor tests of the biochemical component of menopausal disorders consistent with the findings of this "gold-standard" laboratory test?

The association between the muscles and organs or glands has become well-defined in applied kinesiology. As more knowledge has been gained, there have been few modifications necessary to Goodheart's original observations. An early AK study was performed at the Anglo-European College of Chiropractic[13] to evaluate the muscle-organ-gland association. An organ was irritated, and the muscle associated with that organ was tested with a spring scale. Then a control muscle was tested. Four muscle-organ-gland associations were evaluated: the eye, ear, stomach, and lung. The stomach was irritated by placing cold water into it; the eye was bathed with chlorinated water; the ear with sound of a controlled frequency and decibel rate; and the lung with cigarette smoke. In all cases, the associated muscle weakened significantly after the irritation. The control muscle also weakened, but to a much lesser degree. The control muscle weakening parallels the applied kinesiology finding that general muscles of the body weaken when an irritation ("sensorimotor challenge") is placed into the nervous system or other controlling factory of the body as well.

Viscero-somatic reflex phenomena of this type have been extensively explored in AK and chiropractic research generally.[14-25] It has long been established that visceral disturbances can be referred not only to skeletal muscles but also to the skin, ligaments, and bone.[26] Travell & Rinzler[27] have shown that pain in the pectoralis muscle can accompany coronary infarction, and this finding has been confirmed.[28] This finding is further supported by research that has shown stress to an internal organ can result in a viscero-somatic reflex inhibiting both motor and sensory nerves in AK practice.[29-34] Visceral inflammation has also been shown to produce reflex cutaneous leukocyte extravasation.[35] Korr presciently observes that viscerosomatic reflex activity may be observed before any symptoms of visceral change are evident and that this phenomenon therefore is of important diagnostic value.[36] Finally Beal[37] elegantly summarises the research about the "body language" of visceral disease by stating that "somatic manifestation is an integral part of visceral disease." Neural control of visceral and neurohormonal function is a unique coordination of somatic and autonomic motor nervous systems; sensory information and motor control are supplied by both visceral and somatic sensory and motor fiber systems.[38]

This mechanism may account for the clinical observation that muscle weakness, tenderness and pain often develop in association with visceral disorders. A broader review of the basic science and outcomes research published over the past 50 years in chiropractic and AK relating to viscerosomatic disorders is available elsewhere.[14-16]

METHODS

Subjects

Subjects were 16 female patients between the ages of 36 and 71who met the following inclusion criteria: experiencing self-reported menopausal symptoms and willing and able to undergo both AK chiropractic physical examination and to conduct salivary hormone testing (for which the patient paid approximately $300). The subjects also had to be available for re-assessment 6-months after their initial care for menopause-specific problems began. (Six subjects could not be reached, bringing the final patient cohort to 10.) Subjects were not included in this study if they had any contraindications to chiropractic treatment, or if they were currently on any steroid or hormone medication. Subjects then were educated on the protocol of the study, the possible benefits and risks of treatment, and both verbal and written informed consent was obtained before entry into the study.

Intervention

The protocol in this study was as follows:

1) Following the taking of the patient's history, the Menopause Rating Scale was completed by the patient.

2) The patient was physically examined with the focus upon the symptom history, particularly upon the function of muscles and related joints and reflexes related in applied kinesiology to the organs most likely to be involved in menopausal dysfunctions.[14-20]

3) These muscles are the pectoralis major (sternal division), related to the liver; the sartorius, gracilis, and posterior tibialis, related to the adrenal glands; the adductors, gluteus medius and minimus, piriformis, and gluteus maximus, related to the sexual organs.[14-20]

4) If these muscles were initially strong, then the sensorimotor stimulation ("therapy localization" in AK) of their associated viscerosomatic reflexes (i.e., Chapman's neurolymphatic and acupuncture meridian points) was implemented. If inhibition of the previously strong muscle occurred, this was noted. (Table 1) Therapy localisation is a diagnostic tool in AK that is combined with the other diagnostic findings to arrive at a diagnosis.[14-20]

5) In each patient's initial examination, their blood pressure was tested in three positions, in addition to the subject's pupillary reflexes, Rogoff's sign, and ligament stretch reaction. (The latter three indicators are physical signs in AKs examination regimen related to adrenal gland dysfunctions) (Figures 2-7)

6) All factors (structural, biochemical, psychosocial) that strengthened the manual muscle tests (in addition to the viscerosomatic reflexes for the inhibited muscles) were addressed. Multi-modal chiropractic treatment included spinal adjustments, cranial treatments, nutritional interventions, Traditional Chinese Medicine reflex stimulation, and soft tissue work. One or all of these methods may have been necessary to restore strength to these muscles and to correct therapy localisation to their associated viscerosomatic reflex.

7) After the initial visit, the patient was instructed on how to perform the salivary hormone test.

8) Once the patient was believed to have reached MMI, subjects provided their assessment of their status in relationship to their menopausal symptoms. (Table 1, far-right column)

9) The MRS was completed by each participant 6 months later to evaluate the extent to which changes in the initial symptom pattern had occurred. (Table 3)

For patients who were suspected to have adrenal stress disorder as a major factor in their condition (10 of 10 patients provided evidence of this) we advised them on stress reduction by explaining the four areas of cumulative stress (thermal, chemical, physical, and emotional) and how they might reduce these. To this effect, patients were given a "Stress" brochure to help them understand and overcome the problem.[19]

We explained how blood sugar levels stimulated increased adrenal dysfunction and how eating low glycemic foods at frequent intervals could reduce this problem. Accordingly, we provided patients with the glycemic index (and how to understand it), and a Blood Sugar Handling pamphlet recommending the appropriate nutrients. We treated any other areas that the patient displayed using the AK approach to structural, biochemical and psychosocial disorders. This included cranial work, treating the emotional reflexes found to be related to muscular dysfunctions, spinal adjustments, and any other AK treatment modality necessary. Frequently, the viscerosomatic reflexes (causing inhibition of the specific organ-related muscle in AK) involved in insulin resistance were treated with chromium or vanadium or alpha-lipoic acid or other nutrients found to strengthen the inhibited muscles in AK examination.

For each of the physical, biochemical, or psychosocial disturbances found, patient education in the form pamphlets and guidance was undertaken by the author (SC). Hormonal imbalances due to liver dysfunctions, thyroid disorders, digestive or gut issues – and the treatment approaches given (manipulative, nutritional, lifestyle, etc.) -- were explained to the patient at the time of diagnosis. Liver phase 1 or phase 2 detoxification procedures were used when necessary to help the body normalize abnormal hormone levels.[15,16,20]

RESULTS

The correlations between the patient's primary physical findings relating to the menopausal symptomatology are described in Table 1 (3rd column). Additionally, the salivary hormone findings that were abnormal are listed (Table 1, 4th column). The signs and symptoms that related to the patients menopausal pattern are described as well (Table 1, 5th column). Finally, their change in symptomatology is described (Table 1, 6th column).

At the time maximum medical improvement (MMI) was reached (when the chiropractic and AK examination findings were minimal or absent, and need for continuing treatment of menopausal syndromes was lacking), a judgment by the patient and the author/physician was made about the amount of improvement these treatments achieved. The self-reported symptom change described by the patients at the time of

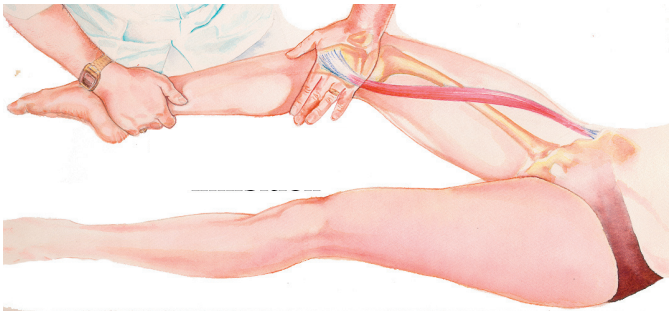

Figure 2: Sartorius Muscle Inhibition

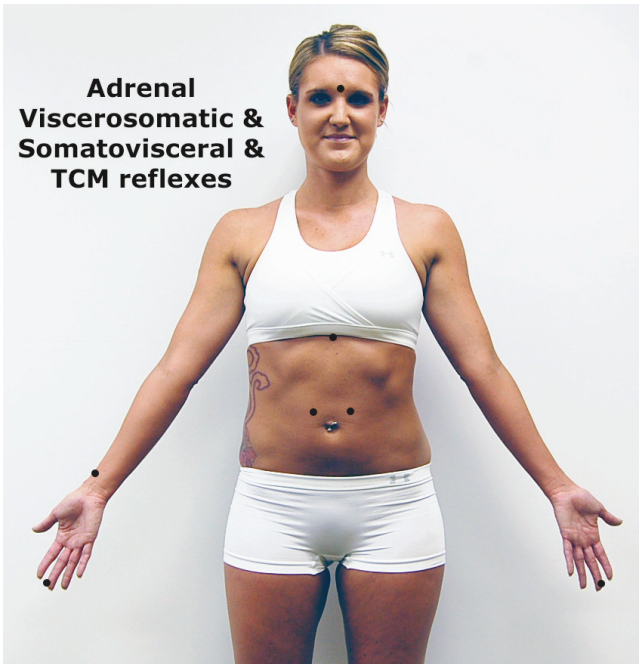

Figure 4: Adrenal Visceromatic & Somatovisceral & TCM Reflexes

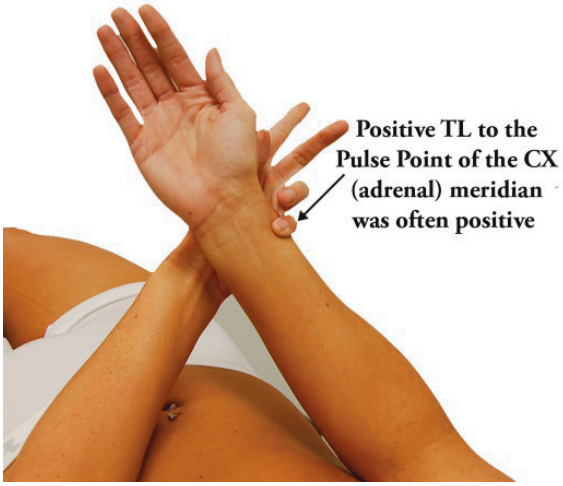

Figure 6

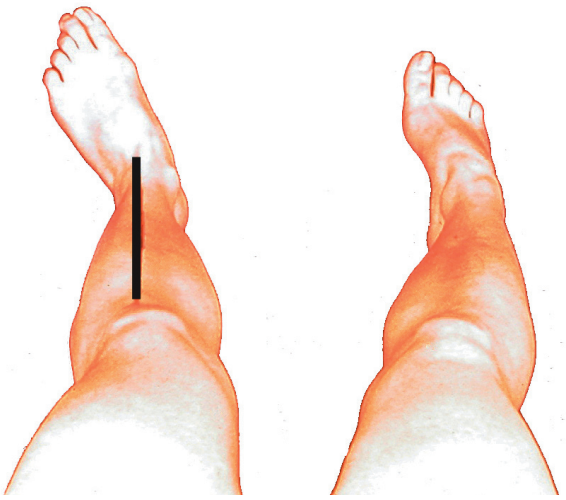

Figure 3: Tibialis Posterior Inhibition

Figure 5: Therapy localization to adrenal neurolymphatic (Chapman's) Reflex

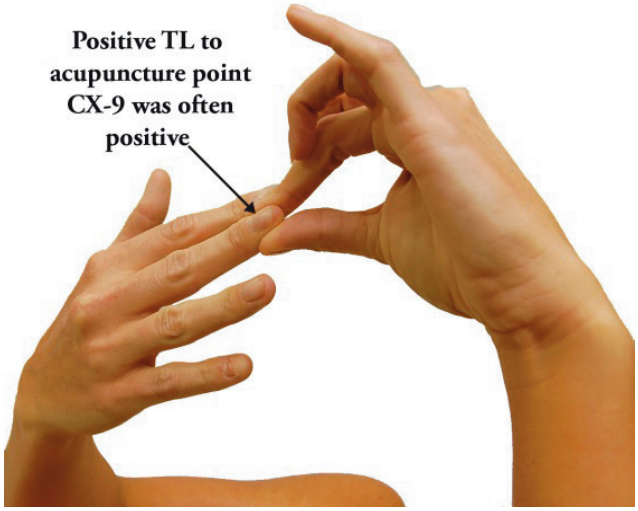

Figure 7

Therapy localization to these reflexes in patients with adrenal gland dysfunction (suggested by symptomatology, history, and AK physical assessments, and confirmed by the salivary hormone tests), producing immediate inhibition of these muscles during MMT

Table 3

SUMMARY OF MRS SCORES BY INDIVIDUAL CATEGORY, PRE- AND POST-TREATMENT

Patient	Hot flashes/ Sweating Pre & Post	Heart discomfort Pre & Post	Sleep problems Pre & Post	Depression Pre & Post
1	3 to 1	2 to 0	2 to 1	1 to 1
2	2 to 0	1 to 1	1 to 1	2 to 0
3	4 to 2	1 to 1	2 to 0	1 to 1
4	4 to 1	1 to 1	3 to 1	2 to 1
5	3 to 0	1 to 0	2 to 0	2 to 0
6	3 to 1	1 to 1	2 to 1	4 to 2
7	3 to 0	0 to 0	3 to 1	2 to 0
8	3 to 1	1 to 0	1 to 0	2 to 0
9	4 to 2	2 to 2	2 to 1	2 to 1
10	4 to 0	1 to 1	2 to 1	3 to 1

Patient	Irritability Pre & Post	Anxiety Pre & Post	Physical & Mental Exhaustion Pre & Post	Libido problems Pre & Post
1	2 to 0	2 to 1	3 to1	3 to 1
2	1 to 0	2 to 0	1 to 1	3 to 2
3	1 to 1	1 to 1	3 to 0	1 to 1
4	2 to 1	1 to 1	2 to 1	2 to 1
5	2 to 1	3 to 1	3 to 1	3 to 3
6	2 to 1	3 to 2	3 to 1	3 to 1
7	1 to 0	1 to 0	2 to 1	4 to 0
8	1 to 0	1 to 0	3 to 0	2 to 1
9	1 to 1	3 to 2	4 to 1	1 to 2
10	3 to 1	3 to 1	3 to 1	2 to 2

Patient	Bladder problems Pre & Post	Vaginal dryness Pre & Post	Joint and muscle discomfort Pre & Post
1	1 to 0	3 to 1	3 to 1
2	2 to 1	2 to 2	3 to 1
3	1 to 1	1 to 1	2 to 0
4	2 to 1	2 to 0	1 to 1
5	0 to 0	3 to 0	1 to 1
6	1 to 1	3 to 3	1 to 0
7	2 to 0	4 to 0	2 to 1
8	1 to 0	3 to 1	2 to 0
9	1 to 1	2to 2	3 to 2
10	0 to 0	4 to 2	3 to 1

Table 1

TABLE OF PATIENT FINDINGS

	Age	Chiropractic Physical Correlations	Salivary Hormone Findings	Signs and Symptoms	
1	36	Reproductive System Physical Sign Piriformis inhibited (TL to NL reflex strengthens) Adrenal Physical Sign TL to Adrenal NL and CX-9 (adrenal associated acupuncture point) Ragland's sign Paradoxical pupillary reaction Thyroid Physical Sign Inhibited teres minor strengthened by iodine, zinc, tyrosine	Reproductive Hormones Increased Estradiol Decreased Progesterone Decreased Testosterone Adrenal Hormones Cortisol out of rhythm Decreased DHEA Thyroid Hormones Increased TSH and TPO	Menopausal Symptom Decreased libido Hot flashes Vaginitis Weight gain waist and hips Infertility Other Fatigue Stress Sugar craving Low blood pressure	SI CI
2	71	Adrenal Physical Sign Sartorius inhibited (TL to adrenal NL and CX-9 strengthens) Ragland's sign Paradoxical pupillary reaction Liver Physical Sign Pectoralis major (sternal division) weak and previously strong indicator muscles weaken with TL of the NL reflexes for the liver	Reproductive Hormones Decreased Estradiol and Progesterone and Pg/E2 ratio Adrenal Hormones Increased morning cortisol	Menopausal Symptom Foggy thinking Hot flashes Vaginitis Other Adrenal and liver nutrition and dietary guidance helps	CI
3	50	Reproductive System Physical Sign Gluteus medius inhibited (TL to NL reflex strengthens) Adrenal Physical Sign Adrenal muscle inhibited with TL to CX-9 Liver Physical Sign Pectoralis major (sternal division) weak (strengthens with insalivation of liver nutritional support)	Reproductive Hormones Decreased Progesterone, PG/E2 Adrenal Hormones Increased morning cortisol Decreased DHEA	Menopausal Symptom Progesterone stopped hot flashes temporarily DHEA stops it again Livaplex(TM) corrects hot flashes and increases energy Other Pineal and cranial treatment help sleep	MI SI
4	44	Adrenal Physical Sign Sartorius, gracilis and posterior tibialis muscles strength bilaterally with TL to adrenal NL and CX-9 and Pulse Point (adrenal associated acupuncture points)	Reproductive Hormones Decreased Progesterone, Testosterone, Estradiol Adrenal Hormones	Menopausal Symptom Severe hot flashes Put on adrenal nutritional support and progesterone cream	SI

5	54	Adrenal Physical Sign Sartorius – NL reflex strengthens CX-9 weakens indicator Drenamin strengthens and helps Emotional NVs Ragland's sign Paradoxical pupillary reaction	Reproductive Hormones Decreased Pg/E2 ratio Decreased testosterone Adrenal Hormones Decreased morning cortisol	Menopausal Symptom Hot flashes, night sweats Foggy thinking, memory lapse Decreased libido Weight gain waist	CI
				Other Sleep disturbed Fatigue Sensitivity to chemicals Sugar craving Constipation Brittle nails Migraines improved after 5 cranial-cervical treatments	CI
6	51	Reproductive System Physical Sign Piriformis muscle inhibition (strengthens with TL to NL) Adrenal Physical Sign Adrenal muscles inhibited with TL to CX-9 (adrenal associated acupuncture point) Thyroid Physical Sign Teres minor inhibited (TL to NL and TW-1 strengthens) Prolamine iodine corrects	Reproductive Hormones Decreased Progesterone and Pg/E2 ratio Adrenal Hormones Increased morning cortisol	Menopausal Symptom Estrogen and progesterone cream really help Low libido Hot flashes	SI
				Other Depression Teariness	CI
7	50	Adrenal Physical Sign Sartorius inhibited with TL to NL and CX-9 (associated acupuncture point) Thyroid Physical Sign Teres Minor inhibited with TL to NL and TW-1 (associated acupuncture point)	Reproductive Hormones Low Pg/E2 ratio Decreased testosterone Estrogen dominance producing low thyroid	Menopausal Symptom Hot flashes Vaginal dryness Bone loss Sugar craving Decreased libido Nutrition associated with adrenal and thyroid glands help	CI
8	53	Reproductive System Physical Sign Gluteus Medius inhibition (strengthens with TL to NL) Adrenal Physical Sign Sartorius inhibited with TL to adrenal NL and CX-9 and Alarm Point (associated acupuncture points)	Reproductive Hormones Decreased testosterone and progesterone Adrenal Hormones Decreased morning cortisol and increased DHEA Uses thyroid medicine	Menopausal Symptom Hot flashes Low Energy	CI

9	52	Reproductive System Physical Sign Pituitary NL Adrenal Physical Sign Adrenal NL and CX-9 Thyroid Physical Sign Teres minor strengthens with TL to thyroid NL	Reproductive Hormones Decreased progesterone, Pg/E2 ratio imbalanced Adrenal Hormones Decreased morning cortisol	Menopausal Symptom Hot flashes Night sweats	CI
				Other Stress Loss of scalp hair Nervous Brittle nails Iodine and thytrophin PMG helps	SI
10	43	Reproductive System Physical Sign Gluteus medius, minimus, piriformis, and gluteus maximus strengthen with TL to NL reflex Pituitary NL produces positive MMT Adrenal Physical Sign Adrenal NL and CX-9 Thyroid Physical Sign Teres minor strengthens with TL to thyroid NL Liver Physical Sign Pectoralis major (sternal division) weak (strengthens with insalivation of liver nutritional support)	Reproductive Hormones All are decreased Adrenal Hormones Increased morning cortisol	Menopausal Symptom Severe hot flash, night sweats, vaginitis, moodiness Drenamin and Iodine help significantly	CI

Table 2

SUMMARY OF AK MMT AND SALIVARY HORMONE TEST CORRELATIONS (N = 10)

Number of patients showing muscle inhibitions (without reflex stimulation) associated with an organ showing abnormal hormone levels	Number of patients with MMT correlations when TL to organ's viscerosomatic reflexes was performed	Number of patients with abnormal reproductive hormone values	Outcomes of AK treatment (n = 10)
6 of 10	10 of 10	10 of 10	CI = 7 SI = 2 MI = 1

Complete improvement (CI); Significant improvement (SI); Moderate improvement (MI)

MMI was of three types: Complete Improvement, Significant Improvement, and Moderate Improvement.The number of treatments required To reach MMI was between 3 and 13 visits, with an average of 6 visits. The length of time to reach MMI was between 1 and 9 weeks, with an average of 4 weeks. Each of the patients in this cohort were contacted or seen as part of their normal chiropractic maintenance care at 6 months after their initial evaluation and treatment, and the Menopause Rating Scale was given. (Figure 1)

The correlations noted in Table 2 can be determined by comparing the third and fourth columns in Table 1 above, *i.e.* comparing the muscle inhibitions in the third column with the hormone imbalances in the fourth column.

Six of ten patients showed a correlation between their salivary hormone abnormalities and the classic muscle inhibition patterns associated with these organs as described in AK. However 10 out of 10 patients showed correlations

between the muscle-organ inhibition patterns described in AK when the viscerosomatic reflexes for these organs were simultaneously therapy localised. Importantly, the salivary hormone test results for abnormalities in the reproductive system hormones showed a 10 out of 10 patient correlation with inhibited muscles related to the reproductive system in AK. It should be pointed out that every patient in this cohort of symptomatic menopausal women had abnormal progesterone and/or estrogen values as well as adrenal hormone values.

Based on the self-report of the patients and the changes in MRS findings, 7 of the 10 patients had complete resolution of their menopausal symptomatology. Two patients showed significant improvements, and one showed moderate improvement.

DISCUSSION

Muscle dysfunction and viscerosomatic phenomena [14,15]

A visceral problem can display itself in a specific dermatomal segment via a cutaneovisceral reflex,[39] and stimulation of the skin can have a distinct effect on a related visceral area via the same cutaneous reflex. This can best be understood by means of Head's Law.[40-42] Head's Law states that when a painful stimulus is applied to a body part of low sensitivity such as an organ that is in close central connection (the same segmental supply) with an area of higher sensitivity (such as a muscle), pain will be felt at the point of higher sensitivity rather than where the stimulus was applied. This means that input from low-threshold nociceptors in an organ can modulate ongoing activity in muscles. Based upon this law and supporting EMG studies, we can assume that dermatomes are neurologically integrated with myotomes and sclerotomes producing associated sensory and motor dysfunction. Should there be an organic or biomechanical encroachment or compression affecting the ventral nerve root, for instance, we can anticipate autonomic impairment in the associated viscerotomes and dermatomes. This is demonstrated in chiropractic and applied kinesiology examination every day.

When afferent pain fibers innervating a visceral organ and those innervating a muscle enter the spinal cord at the same segmental level, they converge on the same dorsal horn neurons.[43,44] Gillette *et al*[45] show how commonly inputs from many associated tissues (facet joints, periosteum, ligaments, intervertebral disc, spinal dura, low back, hip, proximal leg muscles, tendons and skin) converge into one sensory lumbar spinal neuron. The overwhelming majority of dorsal horn cells that receive visceral input also have a somatic input that is nociceptive.[46] The brain-- which has no way of distinguishing from which of these two sites the pain stimulus has arisen and because the transmission neurons are more frequently activated by muscular afferents than by visceral ones -- tends to misjudge the location and source of pain of visceral origin and erroneously perceives it as coming from muscle. This convergence of visceral and somatic afferent fibers has been described in the low back[47] and thoracic regions.[48] The convergence of nociceptive input from internal organs appears to augment the neurons primarily concerned with receiving inputs from muscle nociceptors.

In the process of healing from a disturbing organic and/or neurohormonal condition, the improvement in the physical area of visceral referred pain goes from the surface downwards; the skin is the first to normalize, but the muscle maintains some residual hyperalgesia for a long period of time.[42] It is for this reason that, in chiropractic, it is recognised that viscerosomatic reflex activity occurring in a patient's musculoskeletal system may be detected before (and after) symptoms of visceral change are evident, and that this phenomenon (the muscle inhibitions resulting from viscerosomatic reflexes) has potential prognostic and diagnostic value.[14-20, 49]

The claim that spinal disorders have no effect upon visceral function appears to be weakening, with evidence emerging from neuroscience research involving both human[33-39] and animal studies.[50-54] This research confirms and partially validates what has been suspected clinically among chiropractic, osteopathic, manual medical, naturopathic, homeopathic, acupuncture and applied kinesiology clinicians for decades.[14-25, 50-57]

The neurosciences are adding evidence of manual therapies having distinct and clinically meaningful effects on visceral functions through somato-visceral reflexes. A more extensive review of this research has been provided elsewhere.[21-23, 50, 51]

Emerging evidence supports the long-term clinical observations of the chiropractic and osteopathic professions that aberrant spinal mechanics can have an adverse effect on autonomic and visceral function, and that chiropractic treatment has a modulating effect upon autonomic and visceral function. This phenomenon appears to have a neurophysiological basis.[54,55]

According to Rome[50, 51] "There appears to be extensive if not overwhelming evidence as to the potential for a manual model for positively influencing the autonomic nervous system and through that, internal pathophysiology and symptoms". The vasomotor manifestation known as "hot flashes" is a commonly recognised and very disturbing symptom associated with autonomic imbalance and menopause, and it afflicted each of the women in this study. One does not have to look far to see the prevalence of menopausal discomforts in the population, as an estimated 10-60% of American women suffer night sweats alone.[58]

Concurrent validity research: AK MMT examinations and Laboratory Tests

Members of the International College of Applied Kinesiology have published outcomes research on adrenal gland dysfunctions since Goodheart published an article in *Chiropractic Economics* titled "Urinary Testing Methods" in 1964.[14, 15, 59]

In 1998, Schmitt and Leisman[60] conducted a controlled clinical trial in an attempt to determine whether subjective muscle testing employed by AK practitioners could identify those individuals with specific hyperallergenic responses. Seventeen subjects were found positive on AK muscle testing screening procedures indicating food hypersensitivity (allergy) reactions. Each subject showed muscle weakening (inhibition) reactions to oral provocative testing of one or two foods for a total of 21 positive food reactions. The lab tests performed were both a radio-allergosorbent test (RAST) and immune complex test for IgE and IgG against all 21

of the foods that tested positive with AK muscle screening procedures. These serum tests confirmed 19 of the 21 food allergies (90.5%) suspected based on the AK screening procedures. This study represented a conceptual expansion of the standard neurological examination process for food allergies

As in the present study and the one by Schmitt and Leisman, Jacobs and a research team from Northwestern College of Chiropractic[61] conducted a multi-center clinical trial in 1984 involving 65 patients who were independently evaluated for thyroid dysfunction by AK and laboratory testing. They found that therapy localisation of the neurolymphatic and neurovascular reflexes for the teres minor muscle (associated in AK with the thyroid gland), tended to correlate with standard clinical assessments of thyroid function. Each patient was rated on a scale of 1 (unquestionably hypothyroid) to 7 (unquestionably hyperthyroid). AK ratings correlated with clinical ratings ($r_s = .36$, $p < .002$) and with laboratory ratings ($r_s = .32$, $p < .005$). Correlation between clinical and laboratory diagnosis was .47, $p < 0.000$. Three AK therapy localisations had a significant correlation with the laboratory diagnosis ($p < .05$).

In a fascinating study by Gregory *et al* at the Hedley Atkins Breast Unit, Guy's Hospital in London (UK),[62] 88 women with self-rated moderate or severe mastalgia (breast pain) were treated using applied kinesiology neurolymphatic (Chapman's) reflexes for the tensor fascia lata muscle. The women were predominantly pre-menopausal, and patients with both cyclical and non-cyclical pain were included in the study. Patients' self-rated pain scores, both before and immediately after applied kinesiology were compared, together with a further score 2 months later. Immediately after treatment there was considerable reduction in breast pain in 60% of patients with complete resolution in 18%. At the visit after 2 months, there was a reduction in severity, duration and frequency of pain of 50% or more in about 60% of cases ($P<0.0001$). The authors concluded "this preliminary study suggests that applied kinesiology may be an effective treatment for mastalgia, without side-effects and merits testing against standard drug therapies."

Case and case-series reports (n = 1-50) have been published about the AK treatment of other female conditions, including infertility,[63-66] menstrual headaches,[67] low back pain and nausea associated with pregnancy,[68,69] endometriosis,[70] and pre-menstrual syndrome.[71]

Chiropractic research on menopause

The published research on the chiropractic treatment for menopausal women specifically is surprisingly small. However, in 2004, Jamison presented a survey of 781 chiropractic patients in Australia showing that one in three chiropractic patients were interested in obtaining information on managing menopause and avoiding the complications of osteoporosis from their chiropractors.[72]

Weber and Masarsky (who employ AK methods in their practices and reports) performed a time-series study of a woman with a four-year history of hot flashes related to peri-menopause. A downward trend in the frequency of hot flashes (based on entries from the patient's diary and clinical records) was noted following intervention with cervical and upper thoracic adjusting.[73] Another case study was published by these authors regarding a 31 year old female experiencing hot flashes following injections of leuprolide acetate which artificially induces menopause. In this case, adjustments to the upper cervical and cervicothoracic spine resulted in resolution of both hot flashes and concomitant neck pain.[74] Porthoff also describes a multi-modal chiropractic approach to support symptomatic and asymptomatic women through menopause.[75]

Masarsky and Weber in their two case reports on the chiropractic treatment of menopause speculate about how upper cervical and cervicothoracic subluxations of the spine could be related to hot flashes, by describing how the superior cervical sympathetic ganglion is responsible the sympathetic innervation to the blood vessels of the inner cranium, including those of the hypothalamus and pituitary gland, and how this neuro-endocrine junction is the primary locus of control over the physiology of menopause. They also describe how the stellate ganglion is responsible for cutaneous vasomotor control of the face, the primary zone of disturbances in hot flash. Finally, the authors discuss the influence of cranial disturbances upon the mechanics, vasomotor tone, and neurology of the head and neck. The neuroendocrine aspect of cranial dysfunctions has been discussed in detail in the chiropractic and osteopathic worlds.[76-80]

In this report, the MRS proved to be an effective tool during the course of care. The physiological disturbances that might be responsible for each of the menopausal disturbances described in the scale pointed the clinician toward potential underlying causes. Additionally, as the case progressed, the complex cluster of symptoms associated with symptomatic menopause in the patient could be monitored and therapeutically targeted. However, not until each of these areas of disturbance was addressed, was the chiropractic treatment of menopause in the particular case halted or the patient considered to have reached MMI.

The resolution of a number of the specific physical findings at the time of the MMI assessment (the absence of inhibited muscles and sensorimotor provocations that could inhibit strong muscles or strengthen weak muscles – "negative challenge" in AK nomenclature – to the spine, pelvis and cranium, and viscerosomatic reflexes associated with menopausal symptoms) suggests that the treatment regime may have been effective. This indicates that the physiological changes associated with the improvements in menopausal symptomatology may be at least partially attributed to the AK chiropractic treatments. Additionally, since the correlation between the salivary hormone findings and the manual muscle tests and other physical findings were significant, the effect of the AK treatments upon the hormone dysfunctions related to the menopausal symptoms may support this correlation as well.

Goldman suggests that, when patients with musculoskeletal complaints only temporarily respond to manipulative treatment (in spite of correctly treating physical dysfunctions), it may be useful to specifically consider abnormal adrenal hormone levels, nutritional assessments and interventions, and endocrine dysfunctions.[81]

Table 4

SUMMARY OF TOTAL MRS SCORES, PRE- AND POST-TREATMENT
(CHANGE OF VALUES IN PARENTHESES)

Patient	Pre-Treatment Total MRS Score	Post-Treatment Total MRS Score	(Δ, Change in Values) (% Improvement)
1	25	8	(17) 68%
2	20	9	(11) 55%
3	18	9	(9) 50%
4	22	10	(12) 55%
5	23	7	(16) 70%
6	26	14	(12) 46%
7	24	3	(21) 87%
8	20	3	(17) 85%
9	25	16	(9) 36%
10	27	10	(17) 63%

Based upon the findings of this case series report and the outcomes of treatment, the basic disturbances in these menopausal women appeared to involve spinal subluxations, cranial disturbances, stress physiology, adrenal gland imbalances, thyroid dysfunction, compromised liver biotransformation of hormones, and nutritional deficiencies. Each of these impairments was detected with the AK physical examination system and confirmed with salivary hormone tests, with subsequent conservative interventions apparently being helpful to these women.

Limitations

Although the small number of subjects warrant a cautious interpretation, these data could set the stage for future investigations on the prognostic value of the MMT in patients with menopausal disorders.

The next steps of objectifying possible measurable muscle impairments associated with menopausal disorders are to increase the sample size, to study women in other situations involving physical, biochemical and psychosocial imbalances resulting in menopausal symptoms, to develop an appropriate control intervention, to solve the problem of blinding and double blinding, to find additional steroid hormone disturbances that may be assessed by the AK MMT, and to compare the treatment effects of AK with other methods that reduce menopausal symptoms.

Finally, the effectiveness of the manual muscle test for diagnosis in this arena can only be established following a full-scale, randomised, controlled clinical trial with adequate follow-up and homogenized samples.

CONCLUSION

Based upon the results of this case series report, a significant improvement in the symptoms of peri- and post-menopause was associated with the chiropractic regimen given, including broad-scope and multi-modal treatments involving spinal and cranial adjustments, viscerosomatic reflex stimulation, and nutritional support based upon the diagnostic techniques developed in AK.

The combination of spinal, cranial and extremity adjustments in combination with laboratory analysis, lifestyle modification, dietary guidance, psychological awareness, and the repertoire of nutritional modalities that chiropractors employ in the treatment of Type-O disorders may have a plausible biological rationale for patients with menopausal disorders.

REFERENCES

1. Guyton AC, Hall JE. Textbook of Medical Physiology, 11th ed. WB Saunders Co: Philadelphia; 2005:987-96.
2. Laughlin D, Thorney Croft IH. Amenorrhea. In: DeCherney AH, Nathan L, editors. Current obstetric and gynecologic diagnosis and treatment. 9th edition. New York: McGraw Hill Companies; 2003:991–1000.
3. Thurston RC, Joffe H. Vasomotor symptoms and menopause: findings from the Study of Women's Health across the Nation. Obstet Gynecol Clin North Am. 2011;38(3):489-501.
4. Wilson JL. Adrenal Fatigue: The 21st Century Stress Syndrome. Smart Publications: Petaluma, CA; 2001:252.
5. McEwen B, Lasley EN. The End of Stress As We Know It. Joseph Henry Press: Washington, DC; 2002.
6. Maninger N, Wolkowitz OM, Reus VI, Epel ES, Mellon SH. Neurobiological and neuropsychiatric effects of dehydroepiandrosterone (DHEA) and DHEA sulfate (DHEA). Front Neuroendocrinol. 2009;30(1):65-91.
7. van der Sluijs CP, Bensoussan A, Liyanage L, Shah S. Women's health during mid-life survey: the use of complementary and alternative medicine by symptomatic women transitioning through menopause in Sydney. Menopause. 2007;14(3 Pt 1):397-403.
8. Newton KM, Buist DS, Keenan NL, Anderson LA, LaCroix AZ. Use of alternative therapies for menopause symptoms: results of a population-based survey. Obstet Gynecol. 2002;100(1):18-25.

9. Hauser GA, Huber IC, Keller PJ, Lauritzen C, Schneider HP.] Evaluation of climacteric symptoms (Menopause Rating Scale). Zentralbl Gynakol. 1994;116(1):16-23.

10. Dinger J, Zimmermann T, Heinemann LA, Stoehr D. Quality of life and hormone use: new validation results of MRS scale. Health Qual Life Outcomes. 2006 ;31(4):32.

11. Reading AE. Testing pain mechanisms in persons in pain. In: Textbook of Pain, Ch. 17. Edited by Wall PD, Melzack R. Edinhurgh: Churchill Livingstone;1989:269-80.

12. Kharrazian D. Why do I still have thyroid symptoms when my lab tests are normal? Morgan James Publishing, LLC: Garden City, NY; 2010:133-54.

13. Carpenter SA, Hoffmann, J, Mendel R. Evaluation of Muscle-Organ Association, Part I and II. J Clin Chiro. 1977; II(6):22-33, III(1):42-60.

14. Cuthbert S. Applied Kinesiology Essentials: The Missing Link in Health Care. The Gangasas Press: Pueblo, CO; 2013:150-68. https://www.thegangasaspress.com/

15. Cuthbert S. Applied Kinesiology: Clinical Techniques for Lower Body Dysfunctions. The Gangasas Press: Pueblo, CO; 2013:261-99. https://www.thegangasaspress.com/

16. Goodheart GJ. Applied Kinesiology research manuals, 1964-1998. International College of Applied Kinesiology-USA: Shawnee Mission, KS; 1964-1998. https://www.icakusa.com.

17. Leaf D. Applied Kinesiology Flowchart Manual, 4th Ed. Privately Published: David W. Leaf: Plymouth, MA; 2010.

18. Walther DS: Applied Kinesiology Synopsis, 2nd ed. Pueblo, CO, Systems DC, 2000. http://www.icakusa.com.

19. ICAKUSA, 2013; Triad of Health Publishing. https://triadofhealthpub.com/.

20. Schmitt W, McCord K. Quintessential Applications: A(K) Clinical Protocol. AKSP LLC; 2012.

21. Chaitow L, Blake E, Orrock P, Wallden M. Naturopathic Physical Medicine. Elsevier: Edinburgh; 2008:525.

22. Chaitow L. Soft-Tissue Manipulation. Healing Arts Press: Rochester, VT; 1987:41-74.

23. Masarsky CS, Masarsky MT. Somatovisceral Aspects of Chiropractic: An Evidence-Based Approach. Churchill-Livingstone: Philadelphia; 2001:187-98.

24. Pollard HP, Bablis P, Bonello R. Can the Ileocecal Valve Point Predict Low Back Pain Using Manual Muscle Testing? Chiropr Aust. 2006;36:58-62.

25. Pollard HP. The Somatovisceral Reflex: How Important for the "Type O" Condition? Chiropr J Aust. 2004;34:93-102.

26. Sinclair DC, Weddell G, Feindel WH. Referred pain and associated phenomena. Brain. 1948;71(2):184-211.

27. Travell J, Rinzler SH. The myofascial genesis of pain. Postgrad Med. 1952;11(5):425-34.

28. Nicholas AS, DeBias DA, Ehrenfeuchter W, England KM, England RW, *et al*. A somatic component to myocardial infarction. J Am Osteopath Assoc. 1987;87(2):123-9.

29. Cuthbert SC, Rosner AL. Conservative management of post-surgical urinary incontinence in an adolescent using applied kinesiology: a case report. Altern Med Rev. 2011;16(2):164-71.

30. Cuthbert S, Rosner A. Applied Kinesiology Management of Candidiasis and Chronic Ear Infections: A Case History. J. Pediatric, Maternal & Family Health. August 3, 2010.

31. Cuthbert SC, Barras M. Developmental delay syndromes: psychometric testing before and after chiropractic treatment of 157 children. J Manipulative Physiol Ther. 2009;32(8):660-9.

32. Cuthbert SC. A Multi-Modal Chiropractic Treatment Approach for Asthma: a 10-Patient Retrospective Case Series. Chiropr J Aust 2008;38:17-27.

33. Shafton, A.D., *et al* 2006. The visceromotor responses to colorectal distension and skin pinch are inhibited by simultaneous jejunal distension. Pain. Jul;123(1-2):127-36.

34. Palomar, J. Visceral Parietal Pain (VPP). Collected Papers International College of Applied Kinesiology. 2007:73-7.

35. Wesselmann, U., Lai J.. Mechanisms of referred visceral pain: uterine inflammation in the adult virgin rat results in neurogenic plasma extravasation in the skin. Pain. 1997;73(3):309-17.

36. Korr IM. Spinal cord as organizer of disease process: some preliminary perspectives. Academy of applied osteopathy yearbook: Newark, OH; 1976(1):35-45.

37. Beal MC. Viscerosomatic reflexes: a review. J Am Osteopath Assoc. 1985;85(12):786-801.

38. Enck P, Vodusek DB. Electromyography of pelvic floor muscles. J Electromyogr Kinesiol. 2006;16(6):568-77.

39. Zimlichman E, Lahad A, Aron-Maor A, Kanevsky A, Shoenfeld Y. Measurement of electrical skin impedance of dermal-visceral zones as a diagnostic tool for inner organ pathologies: a blinded preliminary evaluation of a new technique. Isr Med Assoc J. 2005;7(10):631-4.

40. Chaitow L, DeLany J. Clinical Application of Neuromuscular Techniques: The Upper Body, Vol. 1. Elsevier: Churchill-Livingstone. 2006:3, 50.

41. Schafer R. Clinical Biomechanics, 2nd Ed. Williams & Wilkins, Baltimore; 1987.

42. Giamberardino MA, Cervero F. The neural basis of referred visceral pain. In: Chronic abdominal and visceral pain: theory and practice. Eds. Parischa PJ, *et al*. Informa Healthcare: New York. 2007:177-92.

43. Melzack R, Wall PD. Pain mechanisms. Science. 1965;150:974.

44. Foreman RD, Giesler GJ Jr, Willis WD. Convergence of cutaneous and pelvic visceral nociceptive inputs onto primate spinothalamic neurons. Pain. 1981;11:163.

45. Gillette RG, Kramis RC, Roberts WJ. Characterization of spinal somatosensory neurons having receptive fields in lumbar tissues of cats. Pain. 1993;54:85-98.

46. Cervero F. Visceral nociception: peripheral and central aspects of visceral nociceptive systems. Trans R Soc Lon. 1985;308:325-7.

47. Smith MD, Russell A, Hodges PW. How common is back pain in women with gastrointestinal problems? Clin J Pain. 2008;24(3):199-203.

48. Garrison DW, Chandler MJ, Foreman RD. Viscerosomatic convergence onto feline spinal neurons from esophagus, heart and somatic fields: effects of inflammation. Pain. 1992;49(3):373-82.

49. Applied Kinesiology Research.Blogspot, 2013. http://www.appliedkinesiologyresearch.blogspot.com/.

50. Rome PL. Neurovertebral influence on visceral and ANS function: some of the evidence to date, Part 2: Somatovisceral. Chiropr J Aust. 2010;40:9-33.

51. Rome PL. Neurovertebral influence upon autonomic nervous system: some of the somato-autonomic evidence to date. Chiropr J Aust. 2009;39:2-17.

52. Henderson CN, Cramer GD, Zhang Q, DeVocht JW, Fournier JT. Introducing the external link model for studying spine fixation and misalignment: part 1--need, rationale, and applications. J Manipulative Physiol Ther. 2007;30(3):239-45.

53. Budgell, B.S. J. 2000. Reflex effects of subluxation: the autonomic nervous system. J Manipulative Physiol Ther. 23(2):104-6.

54. Sato A, Swenson RS. Sympathetic nervous system response to mechanical stress of the spinal column in rats. J Manipulative Physiol Ther. 1984;7(3):141-7.

55. Budgell B, Sato A. Modulations of autonomic functions by somatic nociceptive inputs. Prog Brain Res. 1996;113:525-39.

56. Fujimoto T, Budgell B, Uchida S, Suzuki A, Meguro K. Arterial tonometry in the measurement of the effects of innocuous mechanical stimulation of the neck on heart rate and blood pressure. J Auton Nerv Syst. 1999;75(2-3):109-15.

57. Karason, A.B., Drysdale, I.P.. Somatovisceral response following osteopathic HVLAT: A pilot study on the effect of unilateral lumbosacral high-velocity low-amplitude thrust technique on the cutaneous blood flow in the lower limb. J Manipulative Physiol Ther. 2003;26(4):220-5.

58. Mold JW, Holtzclaw BJ, McCarthy L. Night sweats: a systematic review of the literature. J Am Board Fam Med. 2012;25(6):878-93.

59. Goodheart GJ, Jr. Urinary Testing Methods. Chiropractic Economics, 1964;7(1):14.

60. Schmitt WS, Jr. Leisman G. Correlation of Applied Kinesiology Muscle Testing Findings with Serum Immunoglobulin Levels for Food Allergies. Int J Neurosci.. 1998;96:237-44.

61. Jacobs G, Franks T, Gilman G. Diagnosis of thyroid dysfunction: applied kinesiology compared to clinical observations and laboratory tests. J Manipulative Physiol Ther. 1984;7(2):99-104.

62. Gregory WM, Mills SP, Hamed HH, Fentiman IS. Applied kinesiology for treatment of women with mastalgia. Breast. 2001;10(1):15-9.

63. Hickey B. Infertility. Collected Papers International College of Applied Kinesiology. 2007-2008:115-6.

64. Heidrich J. Female Infertility: Case Histories Of Applied Kinesiology Response. Collected Papers International College of Applied Kinesiology. 1991-1992;1:47-9.

65. Duffy D. Chiropractic Cost Effectiveness In The Treatment Of Infertility: A Case Study. Collected Papers International College of Applied Kinesiology. 1994:45-8.

66. Kaufman S. Infertility: Successful Management By Applied Kinesiology After Failure Of Medical Treatment. Collected Papers International College of Applied Kinesiology. 1997;1:59-60.

67. Calhoon, J. Applied Kinesiology Management Of Menstrual Headaches; A Case History. Collected Papers International College of Applied Kinesiology.2004-2005;1:3-4.

68. Arcadi VC. Thoracolumbar fixations during pregnancy contributing to lower back pain - A chiropractic study of 25 cases. Collected Papers International College of Applied Kinesiology. Summer 1996;21.

69. Duffy DH. Nausea of pregnancy responds to chiropractic care. Collected Papers International College of Applied Kinesiology. 1994;1:52-3.

70. Alis GP, Alis S. Endometriosis: a case study. Collected Papers International College of Applied Kinesiology. 2004;1:1-2.

71. Roselle T. P.M.S. Collected Papers International College of Applied Kinesiology. Winter 1984:87.

72. Jamison J. Menopause: A case study of chiropractic patients' information interests. Journal Chiropr J Aust. 2004;34(1):2-10.

73. Weber M, Masarsky CS. Cervicothoracic subluxation and hot flashes in a perimenopausal subject: A time series case report. 1996;1(2):1-6.

74. Masarsky CS, Weber M. Cervicalgia with hot flashes. ICA International Review of Chiropractic. 1993:33-5.

75. Porthoff E. Supporting symptomatic and asymptomatic women through menopause. JNMS. 1996;4(2):67-72.

76. Blum C, Cuthbert S. Cranial Therapeutic Care: Is There any Evidence? Chiropractic & Osteopathy 2006, 14:10. http://www.chiromt.com/content/14/1/10/comments#237535

77. DeJarnette MB. Cranial Technique: 1979-1980. Self-Published: Nebraska City, NE; 1979.

78. Walther DS. Applied Kinesiology, Volume II Head, Neck, and Jaw Pain and Dysfunction The Stomatognathic System. Pueblo, CO, Systems DC, 1983.

79. Chaitow L, Comeaux Z, McPartland JM, Laughlin JD, Pederick F, Skinner E. Cranial manipulation: theory and practice. Osseous and soft tissue approaches. Elsevier: Edinburgh;2005.

80. Magoun HI. Osteopathy in the Cranial Field, 3rd Ed. The Journal Printing Company: Kirksville, MI; 1976.

81. Goldman L, Ausiello D. (Eds.) Cecil's Textbook of Internal Medicine, 23rd Ed. Elsevier: Philadelphia; 2008:2078-83.

Book Review

Applied Kinesiology Essentials: The Missing Link in Healthcare. Co-Author and Editor Scott Cuthbert DC. Contributors: David S. Walther, DC, DIBAK.; Anthony Rosner, PhD, LLD, LLC; John L. Stump DC, EdD, OMD, PhD; Barton A. Stark DC, DIBAK, DIAMA. Publisher: The Gangasas Press, Pueblo, Colorado, USA. Language: English. ISBN-10 0988745216, ISBN-13: 978-0988745216. No of pages: 213, RRP: US$79.99

This book is in medical textbook style. It describes the basis and practice of applied kinesiology. This is the third in a projected series of 5 volumes which aims to offer the most up-to-date literature reviews of the evidence for applied kinesiology methods in relationship to most functional illnesses including best practice diagnostic procedures.

The intended audience includes health academics, clinicians, therapists and body workers.

The author has a BA in Liberal Arts, a Doctor of Chiropractic degree. He is a member of the board of directors of ICAK-USA and chair of its research committee. Cuthbert was mentored, shared clinical practice, and bequeathed Walther's research material. Cuthbert has published over 50 research studies on applied kinesiology methods including 10 papers indexed in PubMed. He is well qualified to write this continuation of Walther's texts.

This softcover edition begins with reviews. The table of contents includes 11 chapters with topics and subtopics, each acknowledging contributing authors. Photographs, illustrations and tables occupy almost every page. References are identified through the text by name and are listed at the end of each chapter. Relevant quotations are sprinkled throughout.

The topics are discussed relevant to controversy, peer critique, historical perspective and current knowledge. The author's theme: "The missing Link in Healthcare" rings throughout his discussion of current rehabilitation inefficiency.

The author uses the older style of long sentences and paragraphs which can require a more focused read. His grammar is of a more academic style of 3 or more syllables interspersed with novelesque discussions useful for the novice reader of AK methods.

Applied Kinesiology Essentials has arrived at the right time in modern clinical structural care. It updates the evidence for the validation of Goodheart's original research from the 1960's. Updating the referencing of AK methods that Walther published in the 1970-80's and now pushes AK methods ahead of current rehabilitation trends while at the same time consolidating the value of traditional chiropractic methods.

I enjoyed the discussion in Chapter 1 where Drs. Janet Travell (of Trigger Point therapy fame) and Goodheart co treated a patient on stage to resolve his difficult TMJ pain. Chapter 3 has a great discussion how AK improves the efficiency of chiropractic neurology methods. Chapter 6 discusses how AK methods help emotional conditions and are now used by mental health workers. Chapter 10 describes the research contributions of Goodheart, Thie and Diamond to the ancient system of Chinese medicine. The impact of applied kinesiology through Thie's patient program of Touch for Health continues to help millions of people around the world.

Hopefully, clinicians will adopt this new information to help diagnose their patients quicker, get them better faster and keep them better longer.

Amazon.com lists 649 books with the search topic "Applied Kinesiology". This book is unique, in that it provides the current evidence for logic and application of the basic AK methods, thus providing data that can be used to answer the current complaints by skeptic societies attempting to denigrate the work of any allied or complementary therapist.

The price of US$79.99 hardly reflects the years of work creating this book. It's value far exceeds its cost.

Traditional AK methods got locked into the research, terminology and style of clinical practice of the 1960-70's. Dr. Cuthbert has broken that mold with *Applied Kinesiology Essentials-The Missing Link in Healthcare* and shows the modern relevance of the original observations of the pioneers of Applied Kinesiology.

Add this book, as well as the next in the series, to your library or iPad. This book achieves its aim and needs quite reflection and time to impress its theme on the reader.

Donald McDowall, DC, MAppSc, DIBAK, FACC
President International College of Applied Kinesiology Australasia.

CONTINUING CALL FOR PAPERS

Chiropractic Journal of Australia is dedicated to the advancement of chiropractic health care principles and practice, and seeks to fulfil this purpose by the critical review and publication of research and scholarly work relating to its scientific bases and clinical applications, including supportive presentations of an educational and/or professional nature; education of its practitioners; its history; contemporary issues affecting its practice; ethics; interprofessional relationships; and trends in health care. 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 assessment 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 politico-legal 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 a counter-response.)

BOOK REVIEWS: Honest evaluation of the contents of recently-published books and new editions of standard texts, and their relative value to the practising chiropractor.

Manuscript requirements and detailed instructions for preparation and transmittal are published in *Information for Authors*, available at *www.chiropractors.asn.au*.

Direct submissions to:

Chiropractic Journal of Australia
P.O. Box 748
Wagga Wagga NSW 2650
journal@caa.asn.au

CHIROPRACTIC JOURNAL OF AUSTRALIA

Contents

Editorial: Dance in the Rubbish and you will go to Broken Hill: Karma in Pyjama
Phillip Ebrall 83

Chiropractic in Australia: Survey of the General Public
Benjamin T. Brown, Rod Bonello, Ramon Fernandez-Caamano, Petra L.Graham, Sharyn Eaton and Hilary Green 85

Transition fom Acute to Chronic Low Back Pain: A Biopsychosocial Perspective
Frank Donnoli and Michael F. Azari 93

Commentary: Clinical Uncertainty
Barry Draper and Dennis Richards 99

A Chiropractic Scholar Visits from Denmark: A Report on the Chiropractic Research Seminar
Michael Swain, Alice Kongsted, Aron Downie and Mark J. Hancock 103

Menopause, Chiropractic Examination and Treatment, and Salivary Hormone Levels: Correlations and Outcomes
Scott Cuthbert and Anthony Rosner 107

Book Review 121

Oxford Printery, Wagga Wagga