



CARLoQUIUM 2022

Conference Program
March 1-3, 2022





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CARLoQUIUM 2022

The Chiropractic Academy for Research Leadership (CARL) Program is a grassroots initiative about positive, forward-looking, credible academic leadership within chiropractic. It aims to link promising early/mid stage career researchers who are dedicated to developing high-quality evidence regarding chiropractic as well as a global research network. CARL facilitates training on a range of mentoring, leadership, networking and research-specific skills relevant to early/mid-career researchers.

CARL is a core collaborative initiative of three senior research academics at three Universities (Professor Jon Adams, University of Technology Sydney, Australia, Professor Greg Kawchuk, University of Alberta, Canada and Professor Jan Hartvigsen, University of Southern Denmark). All three Professors have extensive experience and track records in health sciences research and mentoring and leadership and all three Universities have developed extensive programs and track records in chiropractic research.

As a result of the success of the first CARL cohort, organizations from Europe, North America, and Australia have supported a second cohort of 14 CARL fellows, who were competitively accepted into the program in early 2020. The CARL II fellows are proud to host the second edition of CARLoquium, a virtual conference for the chiropractic community to meet, chat, and share research.



**CHIROPRACTIC ACADEMY FOR
RESEARCH LEADERSHIP**

The CARL II fellows behind

CARL_OQUIUM 2022



SASHA ASPINALL

Murdoch University, Western Australia

Research Interests: Neurophysiological mechanisms associated with spinal manipulation, sham procedures and placebo effects



ANDRÉE-ANNE MARCHAND

UQTR, Canada

Research Interests: Conservative care to improve perioperative outcomes, risk factors of disability, impact of aging processes on functional capacities



CECILIE K. ØVERÅS

University of Southern Denmark, Denmark

Research Interests: Prognosis and prevention of spinal pain, physical behaviour, eHealth and self-management, research implementation



ARON DOWNIE

Macquarie University, Australia

Research Interests: Screening for pathology in back pain, patient-centered recovery, automated and manual methods of spinal assessment



DAVID McNAUGHTON

Macquarie University, Australia

Research Interests: Role of psychological and perceptual processes in persistent physical symptoms



LUANA NYIRÖ

Balgrist University Hospital, Zurich

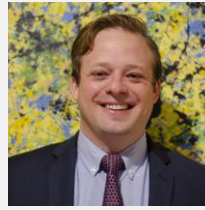
Research Interests: Specific and unspecific psychophysical and biomechanical effects of spinal manipulation



JESSICA WONG

University of Toronto, Canada

Research Interests: Chronic disease and clinical epidemiology, health services research, musculoskeletal health, spinal pain, and knowledge synthesis



ERIC ROSEEN

Boston University, USA

Research Interests: Improving the treatment of common musculoskeletal conditions in primary care settings, particularly in low-income and under-served communities.



STEEN HARSTED

University of Southern Denmark, Denmark

Research Interests: Aspects of biomechanics such as markerless motion capture, motion patterns and future risk of injury, and spinal stiffness



HAZEL JENKINS

Macquarie University, Australia

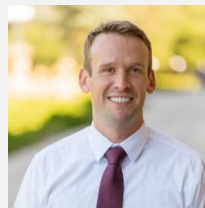
Research Interests: Use of imaging in the management of musculoskeletal pain and dysfunction, implementation of evidence into clinical practice



JAMES YOUNG

University of Southern Denmark, Denmark

Research Interests: Musculoskeletal multimorbidity, outcome measure science, health system strengthening for musculoskeletal disorders



KENNETH WEBER

Stanford University, USA

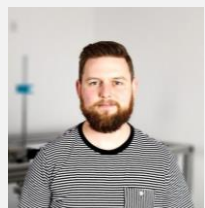
Research Interests: Develop markers of pain and physical function using machine-learning and advanced brain, spinal cord, and musculoskeletal magnetic resonance imaging



AMY MILLER

Bournemouth University, UK

Research Interests: Infant manual therapy, infant feeding, inter-professional education and collaborative practice, pragmatic mixed-methods research



CASPER GLISSMAN NIM

University of Southern Denmark, Denmark

Research Interests: Neurophysiological changes, and biomechanical effects of spinal manipulation, shift of pain trajectory pattern, vitalism in chiropractic students



JAN HARTVIGSEN



GREG KAWCHUK



JON ADAMS

<https://www.carlresearchfellows.org>

CARL OQUIUM 2022

- *New this year* -

Early Career Researcher Hour MAKING A DIFFERENCE

This **bonus hour** is focused on connecting with early career researchers (ECRs) or anyone who might be considering a research career. CARL wants to help build a global research community, and we hope to share our passion for making a difference through meaningful research.

While this session is ECR-focused, anyone is welcome!

The ECR Hour is **repeated on Day 1 and Day 2** to be accessible to people from as many different time zones as possible.

You can look forward to the following activities:

- *CARL Journeys* (20 min)

Listen to short stories from some CARL II Fellows and a CARL Mentor (different each day). Each presenter will be sharing some highlights about their research career pathway, where they are now, and some key lessons or challenges.

- *Let's chat!* (30 min)

An open-ended discussion where you can have your say, to inspire ideas for chiropractic and musculoskeletal research. Guided by the CARL II Fellows, and some big future-focused questions like "Where should chiropractic research go next?"

- Keynote Speakers -



Dr Sidney Rubinstein

Sidney Rubinstein DC, PhD is an associate professor at the Vrije Universiteit Amsterdam, and registered epidemiologist. His research focuses on effectiveness and cost-effectiveness of interventions for musculoskeletal disorders.

The projects that Sidney conducts and supervises are strongly embedded in clinical practice, such as the PTED Trial, Warrior Trial, IPD meta-analysis on spinal manipulative therapy (SMT), as well as the BACE-C cohort study. Sidney is perhaps best known in the chiropractic community for his systematic reviews, specifically the Cochrane reviews on the effect of SMT for low-back pain.

In addition to supervising PhD, MSc and BSc students, and teaching methodology of systematic reviews and meta-analyses, Sidney works concurrently in clinical practice. In doing so, he is determined to make an impact as to how chiropractors are viewed in society.



Dr Tammy Rubinstein-de Koekkoek

Tammy de Koekkoek is a chiropractor with almost 40 years' practice experience, with specialization in orthopaedics. She has taught at 3 chiropractic institutions, in undergraduate and masters' programmes, been invited speaker to multiple congresses, and has designed and conducted many workshops and masterclasses. She has served on (multidisciplinary) practice guideline commissions and chiropractic quality control bodies and is co-author and contributor to various research articles and textbooks.

Striving to implement the evidence for SMT in her practice while encountering the inherent deficiencies to this approach, she is an active participant in the current conversation in the research and educational communities on this issue. This discussion, she hopes, should go some way toward seeing the chiropractor positioned in health care delivery as spine specialist.



Dr Annemarie de Zoete

Annemarie de Zoete graduated from AECC in 1990 and in 2001, obtained a Master's degree in epidemiology at Vrije Universiteit in Amsterdam. She has been actively involved in research for the past thirty years and obtained her Ph.D. in 2020.

Annemarie currently works part-time as a postdoctoral researcher at the Vrije Universiteit in Amsterdam, and continues to work part-time in private practice.

- Keynote Speakers -



Dr Jill Hayden

Jill Hayden, DC, PhD is Associate Professor in the Dept. of Community Health & Epidemiology, Faculty of Medicine, Dalhousie University, and Nova Scotia Science Lead for the Maritime SPOR SUPPORT Unit (MSSU).

Dr. Hayden received her PhD in Clinical Epidemiology from the University of Toronto, Department of Health Policy, Management & Evaluation and joined Dalhousie faculty in 2008. Dr. Hayden leads a successful research program in evidence synthesis methods, knowledge translation and implementation science, prognostic research, and musculoskeletal health (<https://www.dal.ca/sites/backpain.html>).



Dr Simon French

Simon is a Professor of Musculoskeletal Disorders, Deputy Head of Department, and Director of Research at the Department of Chiropractic, Macquarie University. From 2013 to 2018 he was based at Queen's University in Ontario, Canada, and held the Canadian Chiropractic Research Foundation Professorship in the School of Rehabilitation Therapy. He is Co-Editor-in-Chief of the open access journal Chiropractic & Manual Therapies.

Simon conducts research in the area of knowledge translation in primary healthcare settings with a focus on the management of low back pain and osteoarthritis. His research aims to improve the quality of healthcare by understanding, informing and improving health practices, including care provided by chiropractors. He also undertakes randomised controlled trials and systematic reviews of interventions relevant to primary care settings.

CARLoQUIUM 2022

Conference program at a glance

Day 1

- ✧ **Opening keynote presentation - Auditorium** (25 minute session)
– Dr Jill Hayden
Speaking on: Exercise treatment for chronic low back pain
 - ✧ **Keynote presentation - Auditorium** (35 minute session)
– Drs Sidney Rubinstein, Annemarie de Zoete & Tammy Rubinstein-de Koekkoek
Speaking on: Spinal manipulative therapy: here to stay?
 - ✧ **Scientific posters SESSION 1 – Exposition hall** (60 minute session)
- End of Day 1** - **Bonus ECR Hour** → Go to ECR Session

Day 2

- Preconference** - **Bonus ECR Hour** → Go to ECR Session
- ✧ **Keynote presentation - Auditorium** (25 minute session)
– Dr Simon French
Speaking on: Implementation science and musculoskeletal conditions
 - ✧ **Awards presentation - Auditorium** (10 minute session)
 - ✧ **Poster winners podium presentations - Auditorium** (25 minute session)
- Closing remarks**
- ✧ **Scientific posters SESSION 2 – Exposition hall** (60 minute session)
- End of Day 2** - **Beach gathering**

Conference detailed timetable

Day 1

START TIME		AEDT, Wed March 2 nd	DURATION	ACTIVITY	LOCATION
EST, Tue March 1 st	CET, Tue March 1 st				
3:00 PM	9:00 PM	7:00 AM	1 hour	Virbela Support Staff on site for assistance	-
4:00 PM	10:00 PM	8:00 AM	5 min	Conference Opening	Auditorium
4:05 PM	10:05 PM	8:05 AM	25 min	Keynote Presentation Dr Jill Hayden <i>Exercise treatment for chronic low back pain</i>	Auditorium
4:30 PM	10:30 PM	8:30 AM	35 min	Keynote Presentation Dr Sidney Rubinstein, Dr Annemarie de Zoete, & Dr Tammy de Koekoek <i>Spinal manipulative therapy: here to stay?</i>	Auditorium
5:10 PM	11:10 PM	9:10 AM	1 hour	Poster Session 1	Expo Hall
6:10 PM	(+1 day) 12:10 AM	10:10 AM	20 min	ECR Activity CARL Journeys	ECR Session
6:30 PM	(+1 day) 12:30 AM	10:30 AM	30 min	ECR Activity Let's chat!	ECR Session

Day 2

START TIME		AEDT, Thu March 3 rd	DURATION	ACTIVITY	LOCATION
EST, Wed March 2 nd	CET, Wed March 2 nd				
3:00 PM	9:00 PM	7:00 AM	20 min	ECR Activity CARL Journeys	ECR Session
3:20 PM	9:20 PM	7:20 AM	30 min	ECR Activity Let's chat!	ECR Session
4:00 PM	10:00 PM	8:00 AM	25 min	Keynote Presentation Dr Simon French <i>Implementation science and musculoskeletal conditions</i>	Auditorium
4:25 PM	10:25 PM	8:25 AM	10 min	Poster Award Presentations	Auditorium
4:35 PM	10:35 PM	8:35 AM	25 min	Podium Presentations (poster winners)	Auditorium
5:00 PM	11:00 PM	9:00 AM	5 min	Conference Closing	Auditorium
5:10 PM	11:10 PM	9:10 AM	1 hour	Poster Session 2	Expo Hall
6:10 PM	(+1 day) 12:10 AM	10:10 AM	-	Social Activities Join us at the beach for a party!	Beach

*You can view the posters at any time in the Expo Hall between the main session times.

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CARLOQUIUM 2022

Conference program – Day 1

Auditorium (25 minute session)

– Opening keynote presentation

Dr Jill Hayden

Speaking on: **Exercise treatment for chronic low back pain**

The presentation will discuss the results of the recent Cochrane review and network meta-analysis, integrity issues, and the ongoing update of the review using a collaborative network review model.



Auditorium (35 minute session)

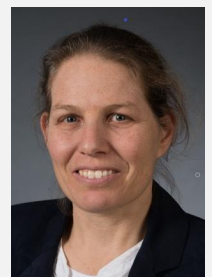
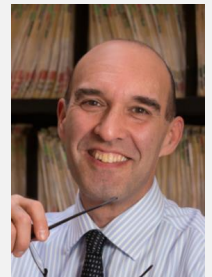
– Keynote presentation

Drs Sidney Rubinstein, Annemarie de Zoete & Tammy de Koekkoek

Speaking on: **Spinal manipulation research**

Spinal manipulation has been around since ancient times. While recent evidence from a systematic review of ours suggests that spinal manipulative therapy (SMT) is equally effective as other recommended therapies (e.g. exercise) for chronic low-back pain, there is evidence to suggest that it is no more useful than non-recommended therapies (e.g. electrotherapies) or sham SMT. What do we make of this? How do we resolve the conundrum between the evidence and the continuing practice of SMT? Can we resolve this?

This presentation will be given by three chiropractors with years of clinical and diverse research experience. They will present both evidence and opinion on this question: Sidney will present an overview of the evidence from the recently updated Cochrane review; Annemarie will present the results of her recent IPD meta-analysis and will discuss why it remains difficult to demonstrate a difference in effect when SMT is compared with other therapies; and Tammy will provide a clinician's perspective on some problems with the current scientific approach.



Exposition hall (60 minute session)

– Scientific posters **SESSION 1**

All scientific posters are displayed for the full duration of the conference.

For a map of the poster booths, please refer to page 13.

For a description of the poster presentations, please refer to pages 14-16.

End of Day 1

CARLoQUIUM 2022

Conference program – Day 2

Auditorium (25 minute session) – **Keynote presentation**

Dr Simon French

Speaking on: Implementation science and musculoskeletal conditions

Translation of research into practice is complex and does not happen automatically. For musculoskeletal conditions, there are many instances where current practice does not align with recommendations from high quality clinical practice guidelines. Implementation research is a field of research focused on the methods used for promoting the uptake of research evidence into routine practice in clinical, community and policy contexts. There is limited implementation research in the chiropractic setting and for musculoskeletal conditions more broadly. In Simon’s talk he will give an overview of implementation research for musculoskeletal conditions and provide some future directions for implementation research for the chiropractic profession and the management of musculoskeletal conditions.



Auditorium (35 minute session) – **Awards presentation**

Best Student Poster
Best Early Career Research Poster
Best Published Work Poster
Best Unpublished Work Poster
Best Protocol/Idea Poster

+ **Poster winners podium presentations**

Award funding provided by



for best in each category

Closing remarks

Exposition hall (60 minute session) – **Scientific posters SESSION 2**

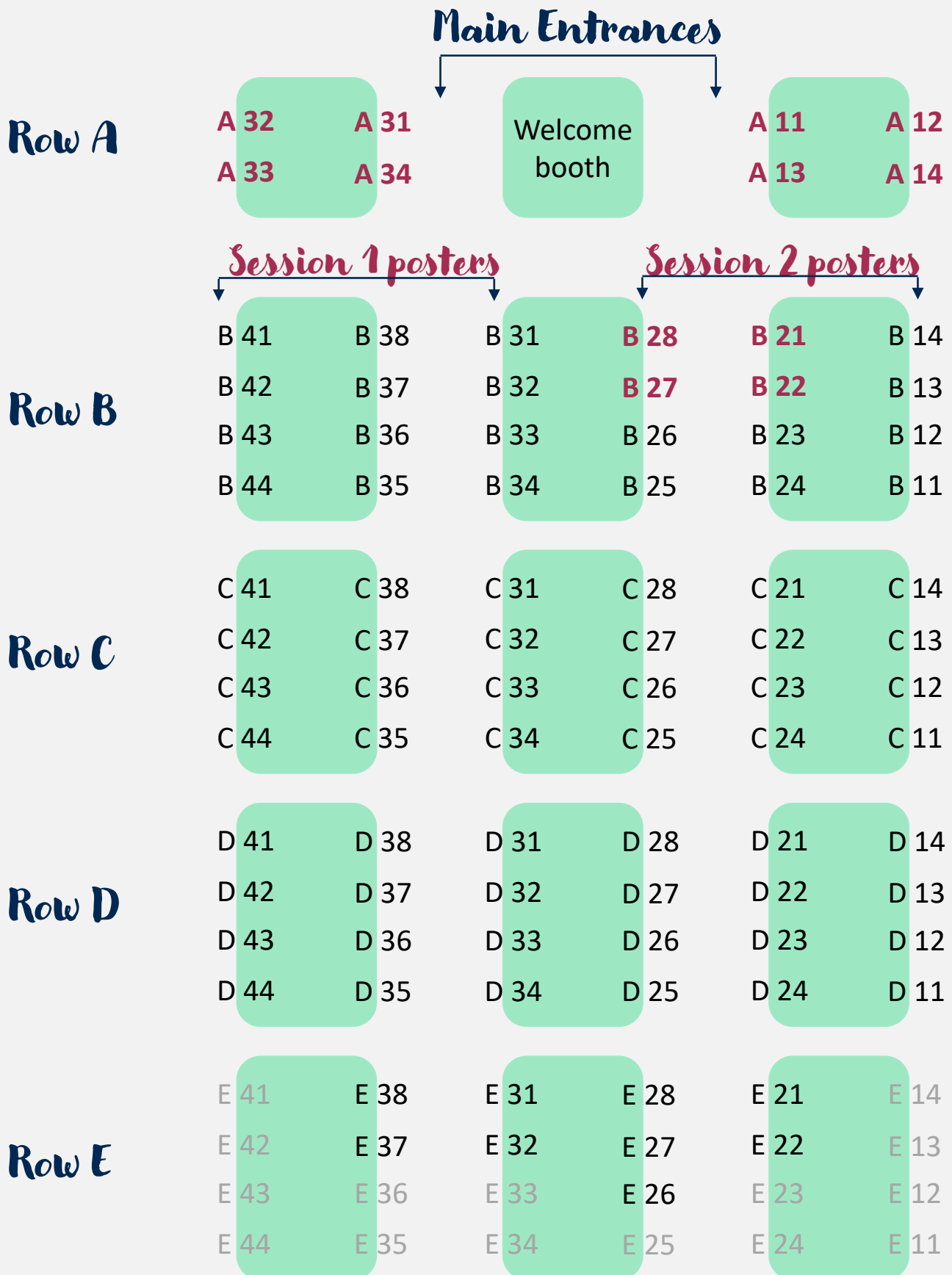
All scientific posters are displayed for the full duration of the conference.

For a map of the poster booths, please refer to page 13.

For a description of the poster presentations, please refer to pages 17-19.

End of Day 2 - Beach gathering

-Exposition Hall Floor Map-



*Scientific posters session 1***Row - Booth #**

- B-31** Derick Luu DC - McMaster University, Hamilton, Canada
Exercise Rehabilitation For Neurogenic Thoracic Outlet Syndrome: A Scoping Review
- B-32** Omar Y Al-Ryati DC - Miami VA Healthcare System, Miami, USA
Clinically integrated educational opportunities offered through United States Doctor of Chiropractic programs
- B-33** Matt Fernandez PhD - CQU, Brisbane, Australia
GLA:D Back Australia: a mixed methods feasibility study for implementation
- B-34** Evan Eindhoven DC - Canadian Memorial Chiropractic College, Toronto, Canada
I expected to be pain free - A Qualitative Study Exploring Athletes' Expectations and Experiences of Care Received by Sports Chiropractors
- B-35** Peter C. Emary DC, PhD(c) - McMaster University, Hamilton, Canada
Association of chiropractic integration in a Canadian community health centre with prescription of opioids for non-cancer spinal pain: a mixed methods analysis
- B-36** Daphne To DC, FCCS(C) - Memorial University of Newfoundland, St. John's, Canada
Fidelity of interventions designed to reduce non-indicated imaging for low back pain: a systematic review
- B-37** Arnold YL Wong PT, MPhil, PhD - The Hong Kong Polytechnic University, Hong Kong, Hong Kong
Understanding experiences or opinions of Twitter users regarding spinal stenosis
- B-38** Arnold YL Wong PT, MPhil, PhD - The Hong Kong Polytechnic University, Hong Kong, Hong Kong
A qualitative study on the concerns, needs and lived experiences of community-dwelling older adults with chronic low back pain
- B-41** Javier Muñoz Laguna DC- Universidad Autónoma de Madrid, Madrid, Spain
Fusion versus decompression surgery alone for lumbar degenerative spondylolisthesis: a Bayesian cost-utility analysis protocol
- B-42** Zhou Zhixing MSc - The Hong Kong Polytechnic University, Hong Kong SAR, China
A state-of-the-art review on potential mechanisms underlying poor cognitive performance in people with chronic low back pain
- B-43** Gregory R Roytman DC - Yale Center for Medical Informatics, New Haven, USA
Musculoskeletal Comorbidities of Chronic Low Back Pain Participants Presenting to U.S. Veterans Health Administration Chiropractic Clinics Enrolled in a Randomized Clinical Trial
- B-44** Kristina Boe Dissing PhD – Chiropractic Knowledge Hub, Odense, Denmark
Description and classification of recurrent headaches in 7 to 14-year-old children. Baseline data from a randomized clinical trial
- C-31** Leticia Amaral Corrêa PhD(c) - Macquarie University, Sydney, Australia
Knowledge and beliefs questionnaires for musculoskeletal pain conditions: a systematic review protocol.
- C-32** David T McNaughton - Macquarie University, Sydney, Australia
Perceptual Sensory attenuation in chronic pain subjects and health controls
- C-33** Alan Jenks DC - Vrije Universiteit, Amsterdam, Netherlands
Roland Morris Disability Questionnaire, Oswestry Disability Index, and Quebec Back Pain Disability Scale: Which has Superior Measurement Properties in Older Adults with Low Back Pain?
- C-34** Iben Axén PhD - Karolinska Institutet, Stockholm, Sweden
Corona and Manual Professions: the impact of the pandemic on chiropractors and naprapaths in Sweden.

*Scientific posters session 1***Row - Booth #**

- C-35** Cassie M Argenbright - The University of Texas at Arlington, Arlington, USA
Comparison of Student Provider and Patient Perceptions of Care Utilizing the Biopsychosocial Model of Pain
- C-36** Kenneth Young DC, PhD - University of Central Lancashire, Preston, United Kingdom
A comprehensive set of systematic reviews of the literature on mechanisms of spinal manipulation, specifically on: i) objectively measured anatomical/biomechanical changes related to spinal manipulation, ii) objectively measured physiological changes related to spinal manipulation and iii) clinical effects related to spinal manipulation
- C-37** Katie de Luca PhD - CQUniversity, Brisbane, Australia
Emergency department care for older adults diagnosed with low back pain
- C-38** Katie de Luca PhD - CQUniversity, Brisbane, Australia
Preliminary results from the BACK Complaints in the Elderly: Chiropractic - Australia study. A cohort profile
- C-41** Isabelle Pagé DC, MSc, PhD - Université du Québec à Trois-Rivières, Trois-Rivières, Canada
Use of a pressure-sensing glove system to measure manual therapies biomechanical parameters: development of an acquisition interface and prevalidation
- C-42** Ava McGrath - Memorial University of Newfoundland and Labrador, St. John's, Canada
Reliability of a novel pneumatic perceived pain meter
- C-43** Henrik Hein Lauridsen PhD - University of Southern Denmark, Odense, Denmark
Trajectories of disability in low back pain
- C-44** Inge Strøh Hvidkær - University Hospital of Southern Denmark, Middelfart, Denmark
The effect of social interaction on conditioned pain modulation in patients with chronic low back pain. A randomised trial
- D-31** Katherine A Pohlman DC, MS, PhD - Parker University, Dallas, USA
Exploration of chiropractic students' motivation toward the incorporation of new evidence on chiropractic maintenance care
- D-32** Tanja T Glucina PhD(c) - New Zealand College of Chiropractic, Auckland, New Zealand
Defining Chiropractic Professional Identity: A Concept Analysis
- D-33** Dale M Thompson DC - Private Practice, Glendale, USA
Are Menstrual Migraines Associated with Vertebral Artery Dissection and Cervical Spinal Manipulation? A Research Proposal
- D-34** Jessica J Wong DC, MPH, FCCS(C) - Ontario Tech University, Oshawa, Canada
The association between chiropractors' view of practice and patient encounter level characteristics in Ontario, Canada: a cross sectional study
- D-35** Martha Funabashi PhD - Canadian Memorial Chiropractic College, Toronto, Canada
Force distribution within spinal tissues during posterior to anterior spinal manipulative therapy: a secondary analysis
- D-36** Brian S Budgell DC, PhD - Canadian Memorial Chiropractic College, Toronto, Canada
Social Network and Lexical Analysis of CARLoquium 2021
- D-37** Luke M Ross Master of Chiropractic - Macquarie University, North Ryde, Australia
Descriptive comparison of force-time profiles of diversified and terminal point technique measured with a novel hand-held force sensing load cell: a protocol design
- D-38** Sasha L Aspinall - Murdoch University, Perth, Australia
CIRCUIT: Recruiting for a new international chiropractic practice-based research network

Scientific posters session 1

Row - Booth

- D-41** Andrée-Anne Marchand DC,PhD - Université du Québec à Trois-Rivières, Trois-Rivières, Canada
The moderating role of depressive symptoms on the association between symptoms severity and time to recovery in individuals with grade I-II whiplash-associated disorders
- D-42** Anika Young M Res - Macquarie University, Sydney, Australia
Reassurance for low back pain in primary healthcare: a scoping review protocol
- D-43** Isaac Searant Master of Chiropractic - Macquarie University, Sydney, Australia
Clinical indications or rationales for the use of diagnostic imaging for spinal disorders by chiropractors: a scoping review protocol
- D-44** Melker S. Johansson PhD - University of Southern Denmark, Odense, Denmark Chronic opioid use before and after exercise therapy and patient education among patients with knee or hip osteoarthritis
- E-31** Alex Pucciarelli MChiroprac - Macquarie University, Sydney, Australia
Subsequent and recurrent injuries in elite Australian football players
- E-32** Melanie Häusler DCM - Balgrist University Hospital and University of Zurich, Zurich, Switzerland
Association of a clinical journal club with knowledge, attitudes, and behaviour of evidence-based practice among chiropractic students: a before-and-after pilot study
- E-37** Simon Paul Vella PhD(c) - Macquarie University, Sydney, Australia
The relationship between induced leg length inequality and pelvis orientation: a pre and post measurement study.
- E-38** Lisanne Guérin B.sc - Université du Québec à Trois-Rivières, Trois-Rivières, Canada
Who are the Quebecers who consult in chiropractic or physiotherapy in Quebec? : a secondary analysis of the CCHS

*Scientific posters session 2***Row - Booth #**

- B-11** Cheryl L Lyon ND - University of Bridgeport, Bridgeport, USA
Characteristics of chronic musculoskeletal pain sufferers treated in a university-affiliated complementary and integrative health care clinic
- B-12** Jay S Greenstein DC - Kaizo Health Clinical Research Institute, Washington DC, USA
Effect of a Mobile Health App on Adherence to Physical Health Treatment: Retrospective Analysis
- B-13** Steen Harsted PhD - University of Southern Denmark, Odense, Denmark
Early proof of concept – automated qualitative scoring of movement patterns using joint center positions collected using motion capture.
- B-14** Joel Carmichael PhD, DC - University of Colorado, Denver, USA
Assessment of a Downloadable Application with Avatar Guidance for PT-prescribed Home Exercise after Total Knee Arthroplasty: a 30-day Feasibility Study
- B-23** Aron S Downie PhD - Macquarie University, Sydney, Australia
Cancer in people presenting with back pain in primary care: a prevalence and diagnostic accuracy study protocol
- B-24** Brian Anderson DC, MPH, MS, PhD - Palmer College of Chiropractic, Davenport, USA
Dosing of lumbar spinal manipulative therapy and its association with care escalation: An analysis of insurance claims
- B-25** Casper G Nim PhD - University Hospital of Southern Denmark, Middelfart, Denmark
Pressure pain thresholds in a real-world chiropractic setting – topography, changes after treatment, and clinical relevance?
- B-26** Casper Glissmann Nim PhD - Spine Centre of Southern Denmark, Middelfart, Denmark
What does spinal manipulative therapy specificity mean to you? An international survey of chiropractors
- C-11** Kenneth A Weber DC, PhD - Stanford University, Palo Alto, USA
Automating the Segmentation of Lumbar Paraspinal Muscles from T₂-Weighted MRI
- C-12** Mette H. M. Gregersen - University of Southern Denmark, Odense, Denmark
Value-based goals for people with back pain - Categorisation using ICF, SMART assessment, and evaluation of goal achievement
- C-13** Élisa Dubuc DC - Université du Québec à Trois-Rivières, Trois-Rivières, Canada
Chiropractic pediatrics patient management and interdisciplinary collaboration: a descriptive cross-sectional study of Quebec chiropractors
- C-14** Élisa Dubuc DC - Université du Québec à Trois-Rivières, Trois-Rivières, Canada
Chiropractic techniques and treatment modalities included in academic programs: a survey of chiropractic educational institutions
- C-21** Alexander Breen PhD - Bournemouth University, Bournemouth, United Kingdom
Sensitivity analysis of different low-pass filter cut-off frequencies on lumbar spine kinematic data and its impact on the agreement between accelerometers and a motion capture system
- C-22** Mona Frey BKin - Memorial University of Newfoundland, St. John's, Canada
Do two trunk endurance tests within the same session risk carry-over effects? – A pilot study
- C-23** Hazel J Jenkins PhD - Macquarie University, Sydney, Australia
Patients with low back pain presenting for chiropractic care who want diagnostic imaging are more likely to receive referral for imaging. A prospective cohort study.
- C-24** Allyson Summers - Memorial University of Newfoundland and Labrador, St. John's, Canada
Validation of a novel pneumatic perceived pain meter

*Scientific posters session 2***Row - Booth #**

- C-25** Rikke K. Jensen - Chiropractic Knowledge Hub and University of Southern Denmark, Odense, Denmark
The utilisation of regulated standardised care packages by Danish chiropractors: A mixed methods study
- C-26** Diana De Carvalho DC, PhD - Memorial University of Newfoundland, St. John's, Canada
Effect of a 'Spine Offloading' Chair Design on Seated Height and Posture
- C-27** Amber Beynon - Macquarie University, Sydney, Australia
Trajectories, prevalence, and diagnosis of spinal pain in children 6-17 years of age (CHAMPS Study-DK)
- C-28** Amber Beynon PhD - Macquarie University, Sydney, Australia
Association between cardiovascular disease risk factors and future spinal pain with the potential moderating role of health-related physical activity in children and adolescents (CHAMPS Study-DK)
- D-11** Andrew J Wilkie Bachelor of Kinesiology - Memorial University, St. Johns, Canada
The Impact of Participant Instructions on Lumbopelvic Rhythm Outcome Variables During a Spine Flexion and Return Task
- D-12** Steven R Passmore DC, PhD - University of Manitoba, Winnipeg, Canada
A retrospective analysis of pain changes and opioid use patterns temporally associated with a course of chiropractic care at a publicly funded inner-city facility
- D-13** Danielle Southerst DC - Ontario Tech University, Oshawa, Canada
Diversity of the chiropractic profession in Canada: A cross-sectional survey of Canadian Chiropractic Association members
- D-14** Cecilie K. Øverås PhD Fellow, MSc Chiropractic - SDU, Odense, Denmark
The influence of multimorbidity and co-occurring pain on low back pain-related disability: secondary analyses of longitudinal data from the selfBACK trial
- D-21** James J Young DC, MSc - University of Southern Denmark, Odense, Denmark
Intervention usage for the management of low back pain in a chiropractic teaching clinic
- D-22** Dawn Harrell - Texas Chiropractic College, Pasadena, USA.
Manual Therapy by Chiropractors for Infants with Musculoskeletal-Related Suboptimal Infant Breastfeeding: a Pilot Study
- D-23** Rahim Lalji MSc, DC - Balgrist University Hospital and the University of Zurich, Zurich, Switzerland
The Swiss chiropractic practice-based research network: a cross-sectional analysis of participating clinicians and primary-care practices to inform future research
- D-24** Janny Mathieu DC, MSc - Université du Québec à Trois-Rivières, Trois-Rivières, Canada
Conservative interventions and clinical outcome measures used in the perioperative rehabilitation of breast cancer patients undergoing mastectomy: a scoping review
- D-25** Gregory N Kawchuk DC PhD - University of Alberta, Edmonton, Canada
Can we compare spinal stiffness between subjects?
- D-26** Brandyn Powelske MScPT - University of Alberta, Edmonton, Canada
The Alberta Back Care Pathway: Implementation of a novel care pathway to improve LBP management in primary care settings – protocol for a hybrid effectiveness-implementation study
- D-27** Søren F.D. O'Neill Ph.D, M.Sc - University Hospital of Southern Denmark, Middelfart, Denmark
Digging deeper - exploring chiropractors' online claims about non-musculoskeletal disorders
- D-28** Amy S Miller PhD - AECC University College, Bournemouth, United Kingdom
Development of a Practice-Based Research Network: The Collaborative Research UK Network for Chiropractic (CRUNCH)

Scientific posters session 2

Row - Booth

- E-21** Andreas Eklund PhD - Karolinska Institutet, Stockholm, Sweden
Selecting patients suitable for Chiropractic Maintenance Care: Development and evaluation of the MAINTAIN instrument – The Nordic Maintenance Care program
- E-22** Kajsa G Nordboe BSc - AECC, Bournemouth, United Kingdom
Association of pain neurophysiology knowledge and application amongst UK chiropractic students: a cross-sectional study
- E-26** Simon Dyrlov Madsen Chiropractor, PhD Student - University of Southern Denmark, Odense, Denmark
Low Back Pain Visits Seen From the Patient and Clinician Perspective: A Protocol For a Field Study in Chiropractic, Physiotherapy and General Practice
- E-27** Ryan D. Muller BA, DC(s) - Parker University, Dallas, USA
Attitudes, Beliefs, and Recommendations for Chronic Low Back Pain Patients: Cross-Sectional Surveys of a Chiropractic Teaching Clinic
- E-28** Keith Walker BSc DC PGCAP - University of Bath, Bath, United Kingdom
'There's a dance to be had': Exploring the interface between UK chiropractors and evidence-based practice. A reflexive thematic analysis.



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Abstracts of scientific posters

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Booth # B-11

Characteristics of chronic musculoskeletal pain sufferers treated in a university-affiliated complementary and integrative health care clinic

Cheryl L Lyon ND¹, Kena A McDermott DC¹, Kimberly M Sanders ND¹, Tina M Freilicher PhD², Mark H Pitcher PhD²

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Abstract

Background and Objective: Chronic pain is a substantial driver of high health care costs and disability, especially among certain demographic and socio-economic groups. Indeed, disparities in the experience and treatment of pain based on age, sex and race are significant. A host of factors, including nutrition and inherited genetic polymorphisms may contribute to these disparities. Considering that patients seeking complementary and integrative health (CIH) approaches for chronic pain are dramatically under-studied, we assessed the role of nutritional, genetic and other factors in a sample of chronic musculoskeletal (MSK) pain sufferers from a unique patient population seeking complementary and integrative health (CIH) care at an urban university-affiliated clinic.

Methods: A total of 99 eligible participants were recruited from the University of Bridgeport (UB) Clinics. We assessed participant demographics, medical histories, pain frequency and severity, and administered a validated food frequency questionnaire assessing omega-3 polyunsaturated fatty acid (PUFA) intake. Whole blood fatty acids and fatty acid desaturase (FADS) rs174537 polymorphism status were also measured.

Results: Participants with chronic pain were significantly older, and more likely to report White race and use of omega-3 fatty acid supplements. Women reported significantly greater pain severity and exhibited higher levels of linoleic acid (LA) and lower levels of arachidonic acid (AA). Additionally, cervicalgia was approximately twice as prevalent in women, whereas low back pain was approximately twice as prevalent in men. Blood saturated fatty acids (SFA) were significantly lower and monounsaturated fatty acids (MUFA) were significantly higher in the chronic pain group. Supplement users reported significantly less pain interference with life enjoyment and had higher levels of total and individual omega-3 PUFA, SFA and trans-fatty acids (TFA), and lower levels of total and individual omega-6 PUFA. FADS rs174537 genotypes were not associated with pain status.

Conclusion: To our knowledge, we are the first to describe characteristics of chronic MSK pain sufferers in an urban, university-affiliated CIH population. Our findings indicate pain disparities based on age, sex and race, and alterations in blood fatty acids in this unique population. Additionally, while usage of omega-3 fatty acid supplements did not appear to affect pain frequency or overall pain severity, it may have beneficial impact on perception of chronic pain with quality of life, however; concerns of supplement contamination require further study.

Booth # B-12

Effect of a Mobile Health App on Adherence to Physical Health Treatment: Retrospective Analysis

Dr. Jay S Greenstein DC¹, Dr Robert V Topp PhD, RN², Ms Jena Etnoyer-Slaski ATC¹, Mr. Michael Staelgraeve BS², Mr John McNulty M.Sc¹

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Abstract

Background: Adherence to prescribed medical interventions can predict the efficacy of the treatment. In physical health clinics, not adhering to prescribed therapy can take the form of not attending a scheduled clinic visit (no-show appointment) or prematurely terminating treatment against the advice of the provider (self-discharge). A variety of interventions, including mobile phone apps, have been introduced for patients to increase their adherence to attending scheduled clinic visits. Limited research has examined the impact of a mobile phone app among patients attending chiropractic and rehabilitation clinic visits.

Objective: This study aims to compare adherence to prescribed physical health treatment among patients attending a chiropractic and rehabilitation clinic who did and did not choose to adopt a phone-based app to complement their treatment.

Methods: The medical records of new patients who presented for care during 2019 and 2020 at 5 community-based chiropractic and rehabilitation clinics were reviewed for the number of kept and no-show appointments and to determine whether the patient was provider-discharged or self-discharged. During this 24-month study, 36.28% (1497/4126) of patients seen in the targeted clinics had downloaded the Kanvas app on their mobile phone, whereas the remaining patients chose not to download the app (usual care group). The gamification component of the Kanvas app provided the patient with a point every time they attended their visits, which could be redeemed as an incentive.

Results: During both 2019 and 2020, the Kanvas app group was provider-discharged at a greater rate than the usual care group. The Kanvas app group kept a similar number of appointments compared with the usual care group in 2019 but kept significantly more appointments than the usual care group in 2020. During 2019, both groups exhibited a similar number of no-show appointments; however, in 2020, the Kanvas app group demonstrated more no-show appointments than the usual care group. When collapsed across years and self-discharged, the Kanvas app group had a greater number of kept appointments compared with the usual care group. When provider-discharged, both groups exhibited a similar number of kept appointments. The Kanvas app group and the usual care group were similar in the number of no-show appointments when provider-discharged, and when self-discharged, the Kanvas app group had more no-show appointments compared with the usual care group.

Conclusions: Patients who did or did not have access to the Kanvas app and were provider-discharged exhibited a similar number of kept appointments and no-show appointments. When patients who self-discharged and received the Kanvas app, they exhibited 3.2 more kept appointments and 0.94 more no-show appointments than the self-discharged usual care group.

Booth # B-13

Early proof of concept – automated qualitative scoring of movement patterns using joint center positions collected using motion capture.

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Abstract

Background: Qualitative scoring of movement patterns is a common element in gross motor test batteries for children and adults. The typical procedure in these tests is to have a subject perform a given movement while an examiner observes and subsequently scores the movement by evaluating subject-posture at or between key events (e.g., in forward jumping: +1 point if “Arms are extended in front of the body and above the head at toe-off”). Markerless motion capture makes it possible to easily capture and accurately quantify human locomotion without disturbing the natural movements of the subject being evaluated. Furthermore, most systems can describe subject posture as 3D joint-center positions on a frame-by-frame basis. This makes it possible to create software algorithms that automatically identify key events and evaluate postures for most movements evaluated in popular movement screening batteries.

The present work proves the concept of automating the qualitative scoring of standing broad jumps. The work shows how the identification of key events and the subsequent postural evaluation of subjects performing standing broad jumps can be automated using joint center positions and simple algorithms.

Discussion: The proposed method makes it possible to quickly and reliably evaluate large quantities of motion-capture data. However, the technique needs to be fine-tuned and validated before applying it in cohort studies or clinical practice. Furthermore, the accuracy of the automated qualitative scoring algorithm will be limited by the quality of the motion capture data it is applied to.

Perspectives: Primary proposed research: The Motor Skills in PreSchools (MiPS) cohort contains motion capture data of +600 children performing standing broad jumps at the ages of 3, 4, 5, and 6 years. If the proposed method proves valid, future research can use it to describe the early locomotor development of jumps in typically developing children.

Other potential research: The proposed method of using joint-center positions to break a movement down to key events and evaluate posture can be applied to a wide range of activities. Therefore, automated scoring of other popular screening tests, such as the Functional Movement Screen, are obvious targets for future development of the method.

Booth # B-14

Assessment of a Downloadable Application with Avatar Guidance for PT-prescribed Home Exercise after Total Knee Arthroplasty: a 30-day Feasibility Study

Dr. Joel Carmichael PhD, DC¹, Dr. Sheryl Flynn PhD, PT², Dr. Tamara Struessel PT, DPT¹, Dr. Stefano Bini MD³, Dr. Michael Bade PhD, PT¹, Dr. Jennifer Stevens-Lapsley PhD, PT¹

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Abstract

Objective: To investigate the feasibility, usability, and comparative functional outcomes using app-based (APP) versus paper handouts (CONTROL) to guide home exercises after total knee arthroplasty (TKA).

Design: Prospective feasibility study. **Setting:** Rehabilitation laboratories at two regional medical centers

Participants: Individuals with knee osteoarthritis undergoing unilateral TKA (APP group: N = 26; mean age, 67.0 ± 8.2y; CONTROL group: N = 31; mean age, 64.7 ± 7.7y)

Interventions: This study compared the user experience of a downloadable app-based to guide postoperative home exercises and instruction compared to the same/similar information delivered by paper handouts. All participants used home exercises for 30 days after TKA.

Main Outcome Measures: The System Usability Scale (SUS) score was used to assess patient experience. SUS scores were dichotomized (≥ 72 or < 72) to determine app usability against a 75% *a priori* criterion for mean APP group score. Feasibility was evaluated by personal computing device ownership and study use, technology-based barriers to participation, and completion of app-based testing after 30 days. Exploratory measures compared change from baseline to 30 days for functional and patient-reported outcomes between groups to further examine the feasibility of the app in guiding clinical assessments.

Results: The APP group's mean System Usability Scale (SUS) score of 79.2% at 30 days exceeded the 75% threshold for acceptable usability. The app met two of three predetermined *a priori* criteria for feasibility in the TKA population. Personal computing device use in this study failed to meet the feasibility criterion. No differences between the APP and CONTROL groups were observed for functional or patient-reported outcomes.

Conclusions: The app-based platform met the *a priori* criteria for usability for 79% of APP participants. Our findings suggest that app-based home exercise and education after TKA has acceptable feasibility and usability. The app-guided patient assessment capability also demonstrates preliminary feasibility for guiding and administering functional and self-reported outcomes assessments.

Booth # B-23

Cancer in people presenting with back pain in primary care: a prevalence and diagnostic accuracy study protocol

Dr Aron S Downie PhD¹, Prof Chris Maher DMedSc², Prof Mark Hancock PhD¹, Prof Simon French PhD¹, Prof Arianne Verhagen PhD³, Dr Gustavo Machado PhD², Dr Hazel Jenkins PhD¹, Dr Michael Swain PhD¹, Dr Peter Stubbs PhD³, Dr Brian Nicholson PhD⁴, Prof Richard Hobbs PhD⁴, A/Prof Clare Bankhead PhD⁴

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Abstract

Background: Patients often seek care from primary care clinicians for back pain. Occasionally, the pain may be a symptom of undiagnosed cancer. To reduce waste and improve outcomes, clinicians need an evidence-based screening tool to help decide if the patient requires further investigation. No informative screening tool exists to raise suspicion of cancer in people who seek care for back pain. Large scale studies are needed to measure the prevalence of cancer but are logistically difficult and costly to conduct due to the need to recruit and follow many thousands of patients for an extended period.

Aims: We aim to estimate the proportion of patients in primary care who have cancer as the probable underlying cause of their back pain; and develop a diagnostic screening model to identify patients at greater risk of cancer.

Methods: We will link routine data from a UK primary care registry for new episodes of back pain (2013–2017), with linkage to the national cancer registry. Clinical features will be collected from the primary care registry, with detailed information on any history of cancer (previous 10 years) from linkage with the cancer registry. Diagnosis of cancer as a cause of back pain will be ascertained by cancer diagnosis in the registry within 3 months of the index visit. The proportion of patients with a cancer diagnosis will be estimated. A multivariable diagnostic model to estimate the probability of cancer as the cause of back pain will be developed using baseline features as predictors. Model validation will use data sampled from a previous 5-year period.

Results (PROTOCOL): From preliminary code counts relating to back pain, we estimate up to one million patients will meet inclusion criteria for each 5-year period of the development and validation datasets.

Discussion: This study will overcome the limitations of previous studies (small sample size, lack of long-term follow-up) to provide robust estimates for prevalence of cancer presenting as back pain using a nationally representative dataset from primary care. Our findings will advance understanding of the relationship between back pain, other clinical features, and cancer. The results of this study have potential to inform screening strategies in the early assessment of back pain.

Booth # B-24

Dosing of lumbar spinal manipulative therapy and its association with care escalation: An analysis of insurance claims

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Abstract

Background: Dose-response for chiropractic care has been studied clinically in relation to low back pain (LBP), neck pain and headache. However, the relationship between dose of spinal manipulative therapy (SMT) and healthcare utilization from a health services perspective has yet to be investigated.

Methods: Our cohort consisted of LBP related episodes from an insurance claims database representing the covered members (≥ 18 years) of a large fortune-500 company (2012-2018). Episodes of care were identified by 90 day claim free periods, and only the initial episode of care was included. Procedure codes 98940-98942 were used as markers for SMT. Care escalation was defined as the presence of one or more of the following: Imaging (x-ray, MRI, CT scan); Injection procedure; Emergency Department (ED) visit; Opioid medication fill; Surgical procedure. Escalation included the presence of any of these procedures. Age, gender, allowed insurance reimbursement, claim count and risk score were collected for each episode and included as covariates in modified Poisson regression models to estimate relative risk (RR) of care escalation based on SMT dose.

Results: A total of 11,114 low back episodes were identified and included in our analysis. Four SMT dosing groups were identified: (1) no SMT (n= 8,137); (2) one SMT visit (n=404); (3) 2-12 SMT visits (n=1,763); (4) 13 (+) SMT visits (n=810). After adjusting for covariates, and using group 1 as the reference: SMT group 2 was associated with the lowest risk of imaging (RR 0.56, 95% CI 0.45-0.69), ED visits (RR 0.06, 95% CI 0.01-0.23), Opioid medication fills (RR 0.39, 95% CI 0.23-0.66) and any escalation (RR 0.46, 95% CI 0.38-0.55); SMT group 3 was associated with the lowest risk of injections (RR 0.32, 95% CI 0.26-0.40) and surgery (RR 0.45, 95% CI 0.33-0.62); SMT group 4 was associated with an increased risk of imaging utilization (RR 1.39, 95% CI 1.27-1.52).

Conclusions: With few exceptions, SMT dose ≥ 1 showed a protective effect against the use of imaging studies, injections, ED visits, surgery, opioid medications, and any escalation when compared to no SMT. These results provide important information to practitioners and policymakers regarding the impact of SMT dose on healthcare utilization.

Booth # B-25

Pressure pain thresholds in a real-world chiropractic setting – topography, changes after treatment, and clinical relevance?

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Abstract

Background: Changes in pain sensitivity, as indicated by pressure pain thresholds (PPT), are a commonly suggested mechanism for the pain relief often experienced following spinal manipulative therapy (SMT). While there is agreement that PPT increases systemically, and more so at the SMT site, the research has primarily been conducted in highly experimental setups and often using an asymptomatic population. The clinical relevance of PPT changes following SMT is unclear, as many important factors differ between experimental and clinical setups. Therefore, we investigated PPT before and after chiropractic care in a clinical setting (in which we expected patients to receive SMT) and investigated relationships with various potentially clinically-relevant factors.

Methods: We recruited participants from four Danish chiropractic practices between May and August of 2021. A total of 129 participants (72% of the invited) were included. We measured PPT at eight pre-determined test sites (six spinal and two extra-spinal) immediately before the chiropractic consultation (pre-session) and immediately after (post-session). We used linear regression approaches to investigate the PPT changes in relation to the following factors: i) segmental distance to the nearest SMT site, ii) rapid clinical response, and iii) number of SMTs performed.

Results: All participants received one or more SMT treatments (range 1 to 12) as we expected. The mean before/after PPT change was 0.14 Kg (95% confidence intervals = -0.01 to 0.29). No significant associations were found in relation to distance between the PPT test site and nearest SMT site, the clinical response of participants to treatment, or the total number of SMTs performed.

Discussion: This real-world trial of private practice chiropractic patients receiving SMT failed to demonstrate a substantial systemic increase in PPT following the clinical encounter. None of our selected a-priori factors were correlated with PPT changes. This is not in line with previous publications and questions the generalizability of using highly experimental setups to determine the neurophysiological mechanism of SMT in a clinical setting.

Booth # B-26

What does spinal manipulative therapy specificity mean to you? An international survey of chiropractors

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Abstract

Introduction: Chiropractors often use spinal manipulative therapy (SMT) to manage spinal pain. In order to apply SMT, chiropractors may undertake several steps, starting with attempting to locate a clinically relevant site to provide SMT. This is followed by applying a specific force to that site, often in a precise direction (i.e., the thrust vector), and finally inducing a specific local force to the site (e.g., movement in the vertebral motion segment). It is believed that these steps are indicators for the clinical effect of SMT and could be labeled as providing “specific” SMT.

However, recent research has called the validity of the specific identification and application of SMT into question. Nevertheless, chiropractors appear to value specificity in SMT but the term may mean different things to different people as it has not been explored previously by research. We aim to understand what SMT specificity means for chiropractors globally and how the chiropractic profession values concepts of SMT specificity

Methods (preliminary): We will develop a survey that examines both the meaning and perceived importance of SMT specificity for chiropractors as a function of their role in healthcare. The survey will be developed as follows:

i) We will search the literature for systematic reviews relating to SMT and SMT procedures in PubMed and Epistemonikos. The results will be manually screened according to the inclusion and exclusion criteria. Inclusion criteria are systematic reviews of trials investigating “specificity terms” or “effects” of SMT. We will then extract information regarding SMT procedures, application site, technique, and clinical effects from included studies. These items will provide the initial framework for the items included in the survey. Next, a consensus of relevant items to include will be decided by a team of SMT experts (chiropractors, researchers, and the author team). The survey will be piloted on volunteer chiropractors. We will translate it to relevant languages using Beaton’s cross-cultural adaptation technique modified version. This survey will also include items related to chiropractors’ perceived role in the health care system and provider characteristics according to the Institute for Alternative Futures grouping.

We expect to invite Chiropractors from registered National Associations in including Denmark, Norway, Sweden, Canada, the United States, Australia, and Switzerland.

Data will be reported descriptively and will report on how SMT specificity can be defined and what it means to clinicians and regressions models will be used to determine if the perceived role in healthcare is associated with the importance of SMT specificity.

Discussion: This will be the first study to assess chiropractors’ perceptions of SMT specificity. The results will illustrate what clinicians consider SMT specificity to represent and its importance. The outcomes from this study could inform future trials relating to providing specific SMT and how this should adequately be designed.

Booth # B-31

Exercise Rehabilitation For Neurogenic Thoracic Outlet Syndrome: A Scoping Review

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Abstract

Background: Exercise rehabilitation has been proposed for the management of Neurogenic Thoracic Outlet Syndrome (NTOS). To date, there have been no reviews of the literature regarding exercise rehabilitation for NTOS and their proposed clinical rationale. Understanding various exercise protocols and their clinical rationale may help guide rehabilitation clinicians in their exercise selection when managing NTOS.

Objective: The aim of this study was to provide a broad and comprehensive overview of the literature regarding exercise protocols for the management of NTOS and their proposed clinical rationales.

Methods: A scoping review of exercise rehabilitation and NTOS was conducted from inception to March 2021 in the PubMed database using the framework of Levac et al. which included five stages: (1) identifying the research question, (2) identifying relevant studies, (3) study selection (4) charting the data and (5) collating, summarizing, and reporting the results. Our search strategy yielded one thousand five hundred and fifty-eight articles which were further screened based on our inclusion/exclusion criteria by two independent reviewers.

Results: Forty-seven articles were included in this scoping review which consisted of literature reviews, non-randomized control trials, prospective and retrospective cohort studies, case series, case studies and clinical commentaries. The most common types of exercises used in the management of NTOS included stretching and strengthening of the surrounding thoracic outlet musculature, postural training, nerve gliding, scapular focused exercises, aerobic conditioning and breathing exercises. The clinical rationales purported were from a biomechanical paradigm which included: i) postural correction, ii) “decompression” of the thoracic outlet by strengthening the muscles responsible for shoulder girdle elevation, iii) establishing normal scapular control, iv) facilitation of weak or inhibited muscles, v) decreasing pressure on the neurovascular bundle by lengthening the surrounding musculature to restore proper muscular balance, vi) decreasing intraneural pressure, vii) “re-energizing” tissues and “reprogramming” the central engram to normalize muscle length, viii) enlarging the costoclavicular passage by improving muscular flexibility and joint stability, ix) restoring normal joint motion, and x) decreasing the shortening of muscles to prevent recurrence of trigger points.

Discussion: Due to the lack of randomized controlled trials found in this review, clinicians remain limited to utilizing clinical opinion when formulating and prescribing exercise protocols for the management of NTOS. This scoping review provides a broad overview of the most common exercise protocols that have been published and critically examines the purported clinical rationale and their exercise dosage utilized in the management of NTOS.

Booth # B-32

Clinically integrated educational opportunities offered through United States Doctor of Chiropractic programs

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Abstract

Background: In the United States (U.S.), there is a growing trend toward chiropractors pursuing opportunities to practice within integrated health care systems. As opportunities for chiropractors within integrative health care systems become more prevalent, future generations of chiropractors will benefit from appropriate training in such clinical settings. To our knowledge, no prior studies have investigated the availability of integrative clinical training within Doctor of Chiropractic programs (DCPs).

Objective: The primary objective of this study is to assess, summarize and compare the current integrative clinical learning opportunities offered for students within United States (U.S.) Doctor of Chiropractic programs (DCPs).

Methods: Two authors independently searched all accredited U.S. DCP handbooks and websites for clinical training opportunities within integrated settings. The two data sets were then compared, with any discrepancies resolved through discussion. We extracted for preceptorships, clerkships, and/or rotations within Department of Defense (DoD), Federally Qualified Health Centers (FQHC), multi/inter/transdisciplinary clinics, private/public hospitals, and Veterans Health Administration (VHA). Following data extraction, officials from each DCP were contacted with a request to verify collected information.

Results: Information on clinical opportunities was primarily located on program websites and not all DCP contacts responded. After DCP confirmations, all but three DCPs of the DC programs offered at least 1 integrated clinical experience, while 41 was the most available. There was a mean of 9.2 (median 3.0) opportunities per school, in a mean of 2.5 (median 2.0) different types of settings. Over half (57%) of integrative opportunities were within VHA, followed by multidisciplinary clinic sites (19%).

Discussion: A spectrum of available integrative training opportunities exist for DC students.

Booth # B-33

GLA:D Back Australia: a mixed methods feasibility study for implementation

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Abstract

Background: Practice-based guidelines recommend patient education and exercise as first-line care for low back pain (LBP); however, these recommendations are not routinely delivered in practice. GLA:D® Back, developed in Denmark to assist clinicians to implement guideline recommendations, offers a structured education and supervised exercise program for people with LBP in addition to a clinical registry to evaluate patient outcomes. In this study we evaluated the feasibility of implementing the GLA:D® Back program in Australia. We considered clinician and patient recruitment and retention, program fidelity, exploring clinicians' and patients' experiences with the program, and participant outcome data collection.

Methods: Clinicians (chiropractors and physiotherapists) were recruited and participated in a two-day GLA:D® Back training course. Patients were eligible to participate if they had persistent or recurrent LBP. Feasibility domains included the ability to: (1) recruit clinicians to undergo training; (2) recruit and retain patients in the program; (3) observe program fidelity; and (4) perceive barriers and facilitators for GLA:D® Back implementation. We also collected data related to: (5) clinician confidence, attitudes, and behaviour; and (6) patient self-reported outcomes related to pain, disability, and performance tests.

Results: Twenty clinicians (8 chiropractors, 12 physiotherapists) participated in the training, with 55% (11/20) offering GLA:D® Back to their patients. Fifty-seven patients were enrolled in the program, with 67% (38/57) attending the final follow-up assessment. Loss to follow up was mainly due to the effects of the COVID-19 pandemic. We observed program fidelity, with clinicians generally delivering the program as intended. Interviews revealed two clinician themes related to: (i) intervention acceptability; and (ii) barriers and facilitators to implementation. Patient interviews revealed themes related to: (i) intervention acceptability; and (ii) program efficacy. At 3 months follow-up, clinicians demonstrated high treatment confidence and biomedical orientation. Patient outcomes trended towards improvement.

Conclusion: GLA:D® Back implementation in Australia appears feasible based on clinician recruitment, program acceptability and potential benefits for patient outcomes from the small sample of participating clinicians and patients. However, COVID-19 impacted patient recruitment, retention, and data collection. To scale-up GLA:D® Back in private and public settings, further work is warranted to address associated barriers, and to leverage facilitators.

Booth # B-34

I expected to be pain free - A Qualitative Study Exploring Athletes' Expectations and Experiences of Care Received by Sports Chiropractors

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Abstract

Background: Knowledge about patient satisfaction and experience with the care they receive can guide practitioners in establishing doctor-patient relationships and improve health outcomes. Although evidence suggests high patient satisfaction with chiropractic care in general, there is limited understanding of the expectations and experiences of athletes receiving sports chiropractic care.

Objective: To explore the athletes' expectations and experiences with care received from sports chiropractors, and their perceptions of relevant areas of future research.

Methods: A qualitative study was conducted through an interpretivist lens exploring the perspectives of elite and competitive athletes receiving care from sports chiropractors in Canada. Athletes were purposively recruited and interviewed until saturation was reached. Two research team members independently analyzed the interview transcripts using a conventional approach to content analysis. Content was inductively coded and discussed by the research team to generate categories.

Results: We interviewed 18 athletes, 14 were national level athletes participating in sports ranging from paddling to combat sports. Reported reasons for seeking care included acute care, injury prevention, enhancing performance and maintenance care. Generated categories were organized under topics of experience with care, expectations of care, and research agenda. Athletes experienced a variety of interventions, reassurance, varying treatment times, and reported positive impact on their athletic performance. They expected whole body assessment including at and beyond their injury site, symptom improvement, good communication and expertise from the chiropractor. Some athletes suggested interpersonal and interprofessional communication can be improved, in particular the level of collaboration with other members of their health care team. Overall, athletes reported a high level of trust and satisfaction with care received from sports chiropractors. From the athletes' perspective, suggested areas of research should focus on injury mechanics and prevention, impact of care on performance, and interprofessional collaboration.

Conclusions: In general, athletes were very satisfied with care. Overall athletes' expectations and experiences aligned but changed over time. Addressing the findings of this study can be used to enhance the quality of care provided to athletes from sports chiropractors, as well as inform future research agendas. Further work assessing if athletes in other competitive levels have similar experiences and expectations is needed.

Booth # B-35

Association of chiropractic integration in a Canadian community health centre with prescription of opioids for non-cancer spinal pain: a mixed methods analysis

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Abstract

Background: Opioids are commonly prescribed in North America to relieve musculoskeletal pain and improve function. However, opioids provide only modest benefits and are associated with important harms including addiction, overdose and death.

Objective: We undertook a mixed methods analysis to examine the association between receipt of chiropractic services in a Canadian community health centre (CHC) and opioid prescriptions among adult patients with non-cancer spinal pain.

Methods: We used a sequential explanatory mixed methods design. In the quantitative phase, we conducted a retrospective cohort study of all electronic medical records of recipients and non-recipients of chiropractic services at the Langs CHC in Ontario, Canada between January 1, 2014 and December 31, 2020. We used Cox proportional hazards regression analyses to evaluate the association between receipt of chiropractic care and time to opioid prescription, adjusted for patient demographics, co-morbidities, visit frequency, and calendar year. In the qualitative phase, we conducted one-on-one interviews with patients and general practitioners (GPs) to explore perceptions of chiropractic integration and its impact on opioid prescribing. Qualitative data were coded and analyzed using content and thematic analysis and integrated with our quantitative findings.

Results: We extracted data from 945 eligible patient records and completed 23 interviews (14 patients, 9 GPs). Over our 7-year study period, 24% of patients (227 of 945) with non-cancer spinal pain received an opioid prescription. The risk of receiving opioids was 52% lower in chiropractic recipients versus non-recipients (adjusted hazard ratio [aHR] = 0.48; 99% confidence interval [CI], 0.29 to 0.77) and 71% lower in patients who received chiropractic services within 30 days of their index visit (aHR = 0.29; 99% CI, 0.13 to 0.68). Patients whose index visit date was in a more recent calendar year were less likely to receive opioids (aHR = 0.86; 99% CI, 0.76 to 0.97). Higher frequency of visits (aHR = 1.02; 99% CI, 1.02 to 1.03), older age (aHR = 1.02; 99% CI, 1.01 to 1.04), smoking (aHR = 1.62; 99% CI, 1.12 to 2.35) and depression (aHR = 1.77; 99% CI, 1.20 to 2.61) were positively associated with receipt of opioids. Follow-up interviews suggested that self-efficacy, access to chiropractic services, opioid stigma, and desire for pain relief were important influencing factors.

Conclusion: Our analysis found that patients with spine pain who received chiropractic care were less likely to receive opioids than patients who did not receive chiropractic care. Four themes emerged in our qualitative interviews to help provide a richer understanding of this association. A multi-stage, mixed methods randomized controlled trial is needed to verify our findings and establish causality between these variables.

Booth # B-36

Fidelity of interventions designed to reduce non-indicated imaging for low back pain: a systematic review

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Abstract

Background: Many interventions aimed at reducing non-indicated imaging for low back pain (LBP) have been developed, but evidence of effectiveness has been variable. The extent to which intervention fidelity has been reported or assessed within studies of such interventions is unknown. Intervention fidelity refers to the methodological strategies used to enhance and assess the reliability and validity of behavioural interventions. Intervention fidelity impacts both the internal and external validity of studies looking at the implementation of an intervention and as such should be considered in the design and assessment of behaviour change interventions.

Objectives: To examine the strategies that have been reported by authors to enhance and assess intervention fidelity for interventions designed to reduce general practitioners' ordering of non-indicated imaging for LBP. For studies that have reported assessing intervention fidelity, the psychometric properties of assessment tools and intervention fidelity results will be presented.

Methods: This review updated the search from a recent review that identified all interventions used to reduce non-indicated imaging for LBP. The National Institutes of Health Behaviour Change Consortium (NIHBCC) 40-item fidelity checklist, which includes five domains (design, training, delivery, receipt, enactment), will be used to identify which types of strategies have been used to enhance and assess fidelity within each study. A quantitative synthesis will be used to describe the frequency of reporting strategies within each of the fidelity domains. Since various strategies could be used to enhance or assess fidelity depending on the type of intervention components used, the characteristics of the identified strategies will be narratively synthesised. Further, for all assessment strategies used, data on the psychometric properties (e.g., validity, reliability) of the tools used will be described and the results of the intervention fidelity assessments will be reported and described.

Results (anticipated): Currently, 32 studies are included, with 84% conducted in primary care and 16% in emergency settings. Most studies were conducted in the United States (n=15) followed by the United Kingdom (n=6). The most common study design was randomised controlled trials (RCTs)/cluster RCTs (n=12). 47% of studies included single-component interventions, while 53% included multi-component interventions. Data extraction of fidelity strategies is underway. From preliminary data extraction, at least four studies explicitly measured intervention fidelity as an outcome, all within the intervention delivery domain; however, only one study reported psychometric property data. Further results will be presented at CARLoquium once data extraction is completed.

Discussion: To our knowledge, no comprehensive assessment of intervention fidelity within the context of imaging for LBP has been conducted. Without knowledge of intervention fidelity, it is unknown whether previous interventions were truly ineffective or if they were ineffective due to poor intervention fidelity. Our review will provide insight into whether or not previous interventions for reducing non-indicated imaging for LBP have been implemented as intended, allowing for better interpretation of study results. It will also provide considerations for the use of strategies to enhance and assess intervention fidelity in the development of future interventions to reduce non-indicated imaging for LBP.

Booth # B-37

Understanding experiences or opinions of Twitter users regarding spinal stenosis

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Abstract

Background: Spinal stenosis is a narrowing of the spinal canal that may press against neurological tissues leading different extents of pain and disability. Since many people (including people with chronic diseases) like to share information and interact with others on Twitter. The analysis of tweets on Twitter may reveal people's thoughts and attitudes toward spinal stenosis.

Objectives: This study aimed to summarise tweets that are related to spinal stenosis on Twitter, and to group them into themes using content analysis.

Methods: TalkWalker (a social media monitoring and analysis software program) was used to search relevant tweets using the keywords 'spinal stenosis' and 'stenosis' between May 2019 and June 2020. Two independent reviewers screened the tweets and conducted content analysis to classified relevant tweets into several themes.

Results: A total of 510 tweets were identified. Three hundred and sixty-two tweets were included. Five themes were identified: (1) negatively affected physical, psychological, and social wellbeing (n=173); (2) diverse treatment options (n=69); (3) coping strategies (n=30); (4) dissemination of scientific information (n=86); and (5) health policy (n=4). Most of these tweets illustrated that spinal stenosis adversely affected patients' physical and psychosocial wellbeing to different extents (ranging from pain to end of career). Twitter users with spinal stenosis shared their experiences and sought helps from others, while some people used Twitter as a dissemination platform to share spinal stenosis-related information and research findings.

Discussion: This is the first study to demonstrate that Talkwalker can used to analyse specific health topics (spinal stenosis in this case) to deepen the understanding of a given disease on everyday life of patients or their families/friends. This analytic approach not only helps researchers/clinicians understand people's concerns about spinal stenosis in an uncontrolled environment, but also can be adopted to monitor the influences of rapidly transmitted diseases (e.g., COVID-19) or to promote public health education to Twitter users.

Booth # B-38

A qualitative study on the concerns, needs and lived experiences of community-dwelling older adults with chronic low back pain

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Abstract

Background: Chronic low back pain (CLBP) lasting for > 3 months is prevalent among community-dwelling older adults. While numerous quantitative studies have been conducted to investigate the epidemiology or treatment effectiveness in this population, no local qualitative research has investigated their concerns, needs and lived experiences, which affect CLBP self-management.

Purpose: To explore the perceptions and lived experiences of community-dwelling old adults with CLBP in Hong Kong.

Methods: Semi-structured interviews with 14 older adults with CLBP were conducted in Hong Kong. A 6-step thematic analysis was used to identify themes inductively. Data analyses were conducted using NVivo 12 Plus software.

Results: Seven themes were identified. Three themes were related to negative perceptions/experiences: (1) interferences of daily function (including sleep); (2) pessimistic attitudes toward their conditions/prognosis; and (3) self-perceived burden to families and avoidance of talking about their pain with families. Conversely, four positive themes were revealed: (1) maintaining their roles in families (e.g., housework); (2) experiencing supports from family and friends; (3) being contented despite CLBP; and (4) enjoying social activities in community centres.

Discussion: Although CLBP may negatively impact older adults, individual attitudes towards pain, as well as adequate social supports from family and friends influence older adults' attitude toward their pain and self-management. Relevant stakeholders (e.g., social workers, clinicians, family members, and peers) play important roles in helping older adults with CLBP to cope with pain experiences. Community centres can work with healthcare professionals to organize talks and activities to assist these people to effectively self-manage CLBP.

Booth # B-41

Fusion versus decompression surgery alone for lumbar degenerative spondylolisthesis: a Bayesian cost-utility analysis protocol

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Abstract

Background: Lumbar degenerative spondylolisthesis (LDS)—a condition in which there is slippage of one lumbar vertebra in relation to an adjacent vertebra—represents one of the most common spine-related degenerative pathologies worldwide. Despite recent clinical practice guideline efforts across multiple health systems, the comparative cost-utility of fusion versus decompression surgery alone for LDS remains controversial.

Aims: To evaluate the cost utility of decompression plus fusion surgery versus decompression surgery alone in patients with Meyerding grade I or II LDS over a 3-year follow-up for the primary outcome, assuming a provider's perspective for the Bayesian cost-utility analysis (CUA) across three health systems (Swiss, UK, US).

Methods: The best available randomised clinical trial evidence to-date will be used to compare decompressive laminectomy with laminectomy combined with posterolateral instrumented fusion. Data from the Lumbar Stenosis Outcome Study (LSOS) will also be extracted to complement missing data values from the trials. A Bayesian preference-based algorithm will be applied, and quality-adjusted life-years will be calculated from the results of the EQ-5D-3L and the Short Form-36 at baseline and 3-year follow-up after the two surgical interventions. In the absence of EQ-5D-3L utility data, other condition-specific outcome measures with a mapping algorithm will be incorporated into the model. A standard discount rate will be applied for costs and benefits. Direct healthcare costs will be obtained from official country-specific cost per unit prices available for Switzerland, UK, and the US. Probabilistic sensitivity analysis will be performed to assess the robustness of the model.

Relevance: Given the prevalence of LDS and challenges associated with rapidly ageing populations worldwide, the application of value-based care principles is imperative in orthopedic surgery and healthcare generally. Our Bayesian CUA findings will offer an innovative and standardized mechanism for comparing resource use and health outcomes, and hence guiding surgical decision-making in LDS management.

Booth # B-42

A state-of-the-art review on potential mechanisms underlying poor cognitive performance in people with chronic low back pain

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Abstract

Background: Low back pain (LBP) is the leading cause of disability in the world. There is growing evidence that patients with CLBP demonstrate declines in multiple cognitive domains (including attention, memory, working memory, language, visuospatial memory, decision-making & executive function) compared to asymptomatic counterparts. However, the potential mechanisms underlying poor cognitive performance in these patients have not been reviewed so far.

Objective: The current state-of-the-art review aimed to summarise potential mechanisms underlying the suboptimal cognitive performance and accelerated cognitive decline in people with CLBP.

Methods: Cohort studies investigating the associations between suboptimal cognitive performance and CLBP were identified from PubMed. Based on the currently available evidence, the hypothesised mechanisms regarding the association presented in these cohort studies were summarised. To further explore possible mechanisms, common CLBP-related comorbidities were analysed based on the evidence regarding the association between these comorbidities and cognitive impairment.

Results: From currently available literatures, multiple factors could contribute the suboptimal performance in people with CLBP during cognitive tasks. Four potential mechanisms have been hypothesised, with empirical data reporting: (1) altered brain structure and activities; (2) neuroinflammation; (3) LBP-related comorbidities (depression and insomnia); and (4) altered gut health. The altered brain activity and neuroinflammation caused by chronic peripheral inflammation appear to be two major pathways.

Discussion: Structural and functional magnetic resonance imaging studies showed that people with CLBP had decreased overall grey matter volumes, reduced dorsolateral prefrontal cortex (DLPFC) activities during decision-making, as well as increased resting-state brain activities of medial prefrontal cortex (mPFC) activities and default motor network (DMN). While decreased grey matter volumes negatively affect overall brain functions, inadequate DLPFC activities compromise higher-level cognitive functions. Conversely, overactivation of mPFC for pain processing and unpleasant emotion could compete with other cognitive functions (e.g., decision making or memory), while overactivation of DMN could lead to distraction in all cognitive tasks. People with CLBP are likely to have elevated pro-inflammatory cytokines in their blood. The elevated circulating levels of pro-inflammatory cytokines may damage the blood brain barrier and lead to influx of pro-inflammatory cytokines to the central nervous system, which in turn triggers M1 microglial activation resulting in neuroinflammation and neurodegeneration. In terms of comorbidities, people with CLBP are at risk of having sleep disturbance and/or depression. Severe insomnia and late-life depression are independent risk factors for cognitive impairment in older adults because these factors increase neuroinflammation. Finally, indirect evidence from overweight individuals with LBP and individuals with other chronic pain suggests that CLBP may result in disturbed gut microbiota composition. Since altered gut microbiota composition may disrupt the integrity of intestinal barrier, leading to

chronic inflammation and pain. Chronic inflammation and elevated pro-inflammatory cytokines in the blood will in turn induce neuroinflammation in the central nervous system, resulting in cognitive declines.

The mechanisms underlying the association between CLBP and poor cognitive performance remain uncertain. Given the ever-growing ageing population and high prevalence of CLBP, future large-scale prospective studies are warranted to clarify the causal relationship between CLBP and cognitive decline in humans.

Booth # B-43

Musculoskeletal Comorbidities of Chronic Low Back Pain Participants Presenting to U.S. Veterans Health Administration Chiropractic Clinics Enrolled in a Randomized Clinical Trial

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Abstract

Background: Previous work has shown increased prevalence of musculoskeletal comorbidity (MSKC) in chronic low back pain (cLBP) participants. However, the specific types of MSKCs have not yet been described. There has equally been little inquiry into MSKC among participants presenting to chiropractic care.

Objective: We aim to describe the prevalence and type of MSKC in cLBP participants presenting to chiropractic clinics in the Veterans Health Administration (VHA) of the United States who are enrolled in an existing randomized clinical trial.

Methods: A descriptive analysis of EHR data from participants enrolled in a multi-site pragmatic clinical trial on cLBP (Veterans Response to Dosage in Chiropractic Therapy [VERDICT]) in the VHA between February 1, 2021 and December 31, 2021. International Classification of Diseases 10th Edition (ICD-10) codes were collected for each participant using a 12-month lookback relative to each participant's date of enrollment across four VHA chiropractic clinics. We defined categories of MSKCs using previously established lists of musculoskeletal diagnoses: neck, mid-back, upper extremities, lower extremities, headache, and non-regional musculoskeletal complaints. Non-regional musculoskeletal complaints included ICD-10 codes ranging from myalgia to Chronic Pain Syndrome and Fibromyalgia. Participant placement in MSKC categories was not mutually exclusive.

Results: During the time-period, 154 participants were enrolled in the study. Of these 6.5% had 0 MSKCs, 40.9% had 1-2, 40.9% had 3-4, and 11.7% had 5-6. Non-regional MSKCs were identified in 68.2% of participants, lower extremity in 63.0%, upper extremity and mid-back in 35.7%, neck in 34.4%, and headache in 34.7%.

Discussion: Consistent with existing literature, cLBP participants enrolled in the VERDICT clinical trial had MSKCs in large percentages, with only a small minority not having any MSKCs. Therefore, consideration of MSKCs may be important for diagnosis and management of cLBP participants.

Booth # B-44

Description and classification of recurrent headaches in 7 to 14-year-old children. Baseline data from a randomized clinical trial

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Abstract

Objectives: Headache in children is common, often recurring, and may impact many aspects of childhood life. This emphasizes the need for early identification and proper management to reduce the risk of headaches persisting into adulthood.

To improve our knowledge about children with recurrent headaches we describe a population sampled for a randomized controlled trial (RCT) investigating the effectiveness of chiropractic spinal manipulation in children aged 7-14 with recurrent headaches.

The three objectives of this study are: 1) to describe headache characteristics and characteristics of children with recurrent headaches. 2) to investigate associations between headache- and child characteristics and the headache type. 3) to explore whether data supports the headache classification, as defined by The International Headache Society, in this population.

Method: Data were collected from November 2015 to August 2019 at a chiropractic clinic and a pediatric medical clinic in Denmark. Data for this study were based on a baseline questionnaire and clinical data from a physical screening. The available data does not cover the ICHD criteria entirely, so the classification was slightly modified. Children not fulfilling the criteria for migraine or tension-type-headache were regarded as having “non-classifiable headache”. The correlation between severity and symptoms indicators related to the migraine versus tension type distinction was investigated in order to define a continuous migraine-tension-type-index in this population.

Results: The baseline cohort consisted of 253 children, 44% boys and a median age of 11. The mean pain intensity was 5.9 measured on a numerical rating scale. More than 2/3 of the children had been suffering from headache for >1 year, and more than half of them for several days a week. More than 1/3 of the children used non-prescriptive medicine >=1 days a week. Half of the children were non-classifiable, 22% were categorized with migraine and 23% with tension-type headache. The differences between tension-type headaches and migraine headaches were most pronounced with respect to co-occurring symptoms and aggravation by sports, both predominantly associated with migraine. Severity indicators and symptoms showed the expected correlation and allowed us to define a migraine-tension-type-index as a summary score based on severity and symptoms. The index describes a continuous spectrum and not just two distinct groups, but probably with migraine in the high end of the index and tension-type headache in the low end. Such an index could be advantageous as it allows for combination of headaches with co-occurring symptoms, which are often seen in children. The non-classifiable group, including children with low or high index values, does not represent mixed headaches only, but may represent other diagnoses such as cervicogenic headache or medication overuse headache as well.

Conclusion: Children with recurrent headaches are severely affected. The ICHD classification criteria appeared feasible to distinguish between migraine and tension-type headaches in children, especially if a migraine-tension-type-index can be generated to allow for the presence of mixed headaches. There was a large group of non-classifiable headaches in our sample. Good diagnostic tools are essential to provide the best possible care and management.

Booth # C-11

Automating the Segmentation of Lumbar Paraspinal Muscles from T₂-Weighted MRI

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Abstract

Background: Paraspinal muscle health (size, shape, and composition) has been recognized as an important biological biomarker in spinal conditions and can be assessed with magnetic resonance imaging (MRI). The extraction of paraspinal muscle measures from MRI is conventionally done manually, which requires substantial expertise and time, making their calculation impractical in most clinical workflows. The application of advanced computer vision techniques is increasing the efficiency of quantifying paraspinal health with MRI. The space of modeling choices is large. Optimizing these approaches should improve the accuracy and reliability of assessing paraspinal muscle health and facilitate the translation of these techniques into clinical practice.

Objectives: Here we use convolutional neural networks (CNN) to automate the segmentation of the lumbar paraspinal muscles. We explore how the choice of CNN architecture and modelling parameters influences network expressivity and performance.

Methods: We trained a CNN to segment the left and right lumbar paraspinal muscles (erector spinae, multifidus, and psoas major) from T₂-weighted axial images from 76 participants with low back pain. The CNN performance was assessed on an independent testing dataset (n=26). CNN testing accuracy was compared between models using repeated-measures ANOVA with Bonferroni corrected post-hoc tests.

Results: Each model showed high CNN testing accuracy (Sørensen-Dice \geq 0.850) and excellent reliability (ICC_{2,1} \geq 0.850). The 2D models outperformed the 3D models (p=0.014), and training without data augmentation outperformed training with data augmentation (p<0.001). The 2D model trained without data augmentation demonstrated the highest testing accuracy (p=0.016).

Conclusion: Each CNN model had high accuracy and excellent reliability for segmenting the lumbar paraspinal muscles. The highest segmentation performance was obtained by using for a 2D model trained without data augmentation.

Booth # C-12

Value-based goals for people with back pain - Categorisation using ICF, SMART assessment, and evaluation of goal achievement

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Abstract

Background: Goal setting is found to be an essential part of a rehabilitation process and has been demonstrated to affect adherence to exercise and self-efficacy positively. GLA:D Back aims to support self-management through group education and supervised exercises. To get an in-depth understanding of the personal goals there is a need to categorise the types of goals. This may be achieved by systematising the goals into groups according to The International Classification of Functioning, Disability and Health (ICF) framework. It is recommended to focus goal setting on behaviours related to Activity and Participation rather than Body Function goals, but little is known about types of goals in back pain treatment or if these are accomplished.

Objectives: To describe personal goals set in GLA:D Back by linking the goals to the ICF, and make a qualitative assessment of their SMART (Specific, Measurable, Acceptable, Realistic and Time bound) adherence. Also, to investigate the self-reported goal accomplishment and to what extent it relates to improvement in widely used back pain outcomes.

Methods: The study used data from the Danish and Canadian GLA:D Back registries. The goals set in GLA:D Back were written text phrases that were classified in NVivo by two researchers and systematically reviewed. The goals were categorised into the five components of ICF using the ICF Linking Rules and their SMART adherence was assessed. The self-reported accomplishment of goals was assessed on a 0-10 scale and reported as median and the proportion of patients with a goal achievement above five. A Chi-Squared Test was used to analyse the association between achieving the goal and having a clinically relevant improvement in pain or function.

Results: 400 patients from the Danish GLA:D Back registry were randomly selected while 131 records from the Canadian registry were included. 87.0% of the Danish patients had registered a goal while 94.7% of the Canadian patients had registered a goal ($p=0.02$). 70.0% of the goals were classified as Activity goals. No difference between the proportion of ICF components for the Danish and Canadian population were found ($p=0.44$). Below 10.0% of the goals were assessed to meet all the SMART criteria with no significant difference between Denmark and Canada ($p=0.91$). 71.0% of the Danish patients and 64.8% of the Canadian patients had a goal achievement above five while the median accomplishment was eight and seven for Danish and Canadian patients respectively. Goal accomplishment was associated with clinically relevant improvement in pain or function ($p<0.01$), but 62% of those not improving on other outcomes achieved their goal and the opposite was true for 55%.

Discussion: Goals set in GLA:D Back primarily follows the recommendation of being related to the Activity component of ICF. There was a high accomplishment of goal in GLA:D Back and it was found to be associated with an improvement in core outcome measures such as pain and disability without mirroring these. The SMART approach was found to lack details regarding the goal setting process.

Booth # C-13

Chiropractic pediatrics patient management and interdisciplinary collaboration: a descriptive cross-sectional study of Quebec chiropractors

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Abstract

Background. Worldwide pediatric patients are seeking chiropractic care among them children under-age 18 years old. The purpose of this study was to investigate practice characteristics of chiropractors who treat pediatric patients in Quebec.

Objective. The purpose of this study was to document the practice profile of Quebec's pediatric (less than "18 yo) chiropractors. More specifically we aimed to describe the: 1) demographic data; 2) practice' characteristics; 3) knowledge of red flags and referral patterns 4) pediatric educational training 5) level of certainty in clinical impressions; 6) pediatric conditions treated and 7) nature of interdisciplinary collaboration between chiropractors and other primary care professionals and allied professions.

Methods: We conducted web-based cross-sectional survey of all licensed chiropractors within the province of Quebec (Canada). From July 2019 to May 2021, potential respondents were solicited by email and social media pages targeting chiropractors with pediatric interest. We translated and adapted a questionnaire developed for Swiss chiropractic clinics to collect our data. Descriptive statistics are produced for all the collected variables.

Results. Two hundred forty-five participants (response rate: 22.8%) completed our survey. Respondents were mostly women (63%) and most frequently practised in a clinic with other chiropractors (44.1%). One quarter reported postgraduate training and the half are members of pediatric chiropractic association and define themselves as generalists. Nearly all participants (99.2%) reported seeing 0–5 new pediatric patients/week and the most common pediatric age group was 6–12 years-old (57.1%). The main objective of their pediatric care was to improve function (47.3%). Pediatrics patients were most commonly referred to them by family members and "word of mouth". They also rarely referred their pediatric patients to a nurse/a family doctor or to a pediatrician. Consequently, communication to other healthcare providers related to pediatric patients was also rare. The respondents most frequently indicated that they strongly agree with statements affirming that they are confident in their diagnostic capacities for MSK disorders in all age groups and for non-MSK disorders of young teens. They reported a neutral agreement towards similar statements for the diagnostic non-MSK disorders in newborns, preschoolers, and children.

Chiropractors indicated that they would prefer to co-manage the following clinical presentations with a medical doctor: Scoliosis > 20 degrees, allergies, delay in motor development and muscle weakness.

Discussion. Our results suggest that Quebec's chiropractors are confident within their field of practice (MSK conditions) and will hesitate to seek a medical opinion when presented with non-MSK conditions or challenging MSK presentation. However, some might have unrealistic expectation regarding the co-management of non-MSK complaints.

Booth # C-14

Chiropractic techniques and treatment modalities included in academic programs: a survey of chiropractic educational institutions

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Abstract

Background. The chiropractic techniques learned during the academic training strongly influence the nature of treatments provided by chiropractors as well as their professional identity.

Objective. The objective of this project is to provide an exhaustive description of all chiropractic techniques and treatment modalities taught in chiropractic educational institutions.

Methods. A steering committee was formed in order to identify an exhaustive list of chiropractic techniques and treatment modalities. A preliminary questionnaire was sent to international experts, who were solicited to provide feedback on the exhaustivity and clarity of our preliminary questionnaire. Following the expert suggestions, we administered our improved cross-sectional survey to all the chiropractic education institutions listed on the World Federation of Chiropractic website. We also asked the contact information for an additional contact from each institution and surveyed them for triangulation purposes. We report descriptive statistics (frequencies and percentages) for the most formal context of teaching of the technique/modality surveyed. When the responses of two respondents from the same institution were not identical, we only considered the most formal context of teaching reported.

Results. Among the 47 chiropractic education institutions surveyed, 29 completed our survey (response rate: 62%) of which 18 (62%) had two respondents. Among all the chiropractic techniques and treatment modalities investigated, only the “Diversified” technique was included in the core curriculum of all responding institutions. A considerable proportion of the techniques/modalities studied were not included into the educational activities of the institutions, particularly within the manual tonal/reflex techniques, instrument-assisted articular techniques, as well as the “other” techniques/modalities categories. Exercise prescription was not included into the core curriculum of all the institutions. Some scientifically challenged approaches (ex. Functional neurology, applied kinesiology, etc.) were included in the educational activities of more than 40% of the institutions.

Discussion. The portfolio of therapeutic teaching varies greatly between chiropractic education institutions. A more standardized therapeutic curriculum could be beneficial to reduce public and interprofessional confusion toward therapeutic approaches in chiropractic.

Booth # C-21

Sensitivity analysis of different low-pass filter cut-off frequencies on lumbar spine kinematic data and its impact on the agreement between accelerometers and a motion capture system

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Abstract

Introduction: Spine kinematics are an important measure in the assessment of mechanical back pain. Accelerometers are a cost-effective and practical alternative to motion capture (MC) systems. However, these sensors are subject to high frequency noise, thus raw data must be filtered before analysis and interpretation. A common filter utilized for this purpose is a low-pass (LP) Butterworth filter, however, the specific filtering parameters such as the cut-off frequency (f_c) have been questioned and there is no definitive answer in the literature. The objective of this study was to:

- (1) systematically investigate the effect of different LP Butterworth filter f_c on accelerometer and motion capture data for peak lumbar spine flexion values, and
- (2) to determine the optimal f_c to appropriately smooth low velocity movement data without changing the peak ROM measurement.

Methodology: Twenty asymptomatic female participants (age 30-65 years) were instrumented with accelerometers and MC markers overlying the L2, L4 and S1 spinous processes. Participants then completed a standardized, guided flexion trial with the pelvis constrained. Participants performed a trunk flexion and return-to-neutral bend at constant 6°/s. Synchronized data were sampled at 60Hz. The flexion ROM for the upper segment (L2-L4), lower segment (L4-S1), and whole lumbar segment (L2-S1) were calculated using custom code. Data were iteratively LP filtered with a 4th order bidirectional Butterworth filter with f_c between 1-14Hz. The filtered data were then used to calculate peak ROM for all segments and the range, mean, 95% confidence interval (CI), and root mean square error (RMSE) of peak ROM for each f_c .

Results: LP Butterworth filter f_c minimally affected peak ROM for both accelerometers and MC (max diff: 0.66° and 0.23°). Therefore, a lower LP f_c (e.g., 1Hz) can justifiably be applied to accel and MC data without compromising outcomes in comparison to filtering at a higher f_c (e.g., 14Hz). Thus, a lower f_c may be used when smoother data are needed without compromise to peak values.

The difference between the systems at each f_c was also minimal (max diff: 0.82°) indicating that accelerometers can be used as an acceptable alternative to MC systems. For context, the differences between systems and LP filter f_c were smaller than the effects of age and sex and the standard error of measurement of lumbar flexion for MC (0.96-7°) [1].

Discussion: Both Butterworth LP filter f_c and measurement type had a minimum effect on peak ROM, demonstrating that published data using different cut-off frequencies are still comparable. Secondly, we showed that MC systems and cost-effective accelerometer solutions may be used interchangeably to determine segmental and total lumbar angles with acceptable agreement during low velocity movements. While a LP filter f_c of 1Hz can be applied to spine kinematics data to provide smoother data without negatively affecting outcome measures of interest, this may be due to the relatively slow flexion motion used in this experiment. Future studies should seek to determine the effect of LP filter f_c on flexion at different speeds.

Booth # C-22

Do two trunk endurance tests within the same session risk carry-over effects? – A pilot study

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Booth # C-23

Patients with low back pain presenting for chiropractic care who want diagnostic imaging are more likely to receive referral for imaging. A prospective cohort study.

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Abstract

Background: Patient requests for imaging have been suggested by clinicians as a key barrier to reducing inappropriate imaging use in primary care. It is unclear if the use of imaging for low back pain (LBP) is impacted by patient beliefs when presenting for chiropractic treatment.

Objective(s): This study aimed to (i) describe beliefs about the importance of imaging and whether patients wanted imaging when presenting for chiropractic care for LBP; (ii) describe associations between baseline patient characteristics and imaging beliefs and whether patients wanted imaging; and (iii) determine whether patients who believed imaging to be important in the management of LBP, or who wanted to receive imaging, were more likely to receive an imaging referral.

Methods: Prospective longitudinal observational data was collected between November 2016 to December 2019 from 10 primary care chiropractic clinics in Denmark. Consecutive patients aged 18 or older and presenting with a new episode of LBP were included (N=2818). Beliefs about the importance of imaging (two questions) and whether imaging was wanted (one question) were collected at the initial visit, together with baseline participant characteristics and whether an imaging referral was provided. Associations between imaging beliefs/desire to receive imaging and participant characteristics were explored using multivariable logistic regression analysis. The relationships between imaging beliefs and desire to receive imaging with subsequent imaging referral were assessed using multivariable logistic regression analysis adjusted for pre-selected confounder variables.

Results: Approximately one third of participants believed imaging to be important for the management of LBP (29.5% (95%CI: 27.8, 31.3) or 41.5% (95%CI: 39.6, 43.3) depending on the two imaging beliefs questions). Approximately one quarter (26.1%, 95%CI: 24.5, 27.7) of participants wanted to receive an imaging referral. Participants were more likely to believe in the importance of imaging or want an imaging referral if they had a longer duration of LBP, history of previous imaging for LBP, or a lower completed education level. Participants who wanted imaging at the initial consult were more likely to receive an imaging referral (Odds ratio; 95%CI: 1.6; 1.3, 2.1).

Discussion: Approximately one third of patients presenting for chiropractic care in Denmark believed imaging to be important in the management of LBP. One quarter wanted imaging at the initial consult. Patients' desire for imaging appeared to impact the use of diagnostic imaging and patient education resources should be considered when developing interventions to improve the appropriate use of imaging.

Booth # C-24

Validation of a novel pneumatic perceived pain meter

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Abstract

Background: Numeric pain rating scale and visual analog scale (VAS) (both written or verbally delivered) are validated instruments for self-reported pain [1]. One limitation, however, is their "one-point-in-time" nature. The current study will evaluate the validity of a novel pressure-input Pain Meter (PM) device, capable of providing time-varying pain ratings, by comparing pain ratings to the 100 mm VAS for pain during an induced pain protocol. To conclude that the PM is a valid tool for rating perceived pain, we will test the hypothesis that there are no significant differences in pain ratings between the two measures.

Objective: To determine the criterion concurrent validity of the Pain Meter compared to the digital VAS.

Methods: Fifty pain-free adults (>18) from the local population will be recruited for this laboratory-controlled study. Prior to commencing the pain induction, participants will be introduced to the 100 mm digital VAS (with anchors of 0mm = "No pain", 100 = "Worst pain imaginable" and the PM (pressure analogue scale with visual display between 0-100). A baseline rating of perceived pain will be taken with both pain measures. Pain will be induced by applying a 50° moist cloth, heat pack, and heat shield over the skin between L2 and L4 for 5 minutes. Five ml of 0.075% capsaicin cream will then be applied to the skin with the heat pack replaced for another 15 minutes. Heat packs will be changed every 2-3 minutes to maintain a constant temperature. Pain ratings (PM and VAS in random order) will be taken at 10 minutes and 20 minutes into the procedure. Pain measures (PM, VAS) at each time point (0, 10, and 20 minutes) will be compared using a repeated measures ANOVA (SPSS v#27, IBM SPSS Statistics), with significance accepted at 0.05.

Results and Discussion: The current COVID-19 restrictions have paused our data collection. To date, six participants (1 male, 5 females; average age 23 years +/- 2.8; average height 171.5cm ± 10.3cm; average mass 69kg ± 20.2kg) have completed the protocol. Preliminary results, descriptively analyzed only, found that baseline pain ratings were (VAS mean = 0.4 +/- 1.1 and PM mean = 0.3 +/- 0.8), while mean responses as measured by the VAS and PM at 10 minutes were 22.3 ± 11.5 and 20.9 ± 15.5, as well as those at 20 minutes were 33.1 ± 16.4 and 36.4 ± 16.0 respectively. No statistical analysis was conducted given the small sample size. This project is estimated to be completed by May 2022.

Significance: If valid, a time-varying measure of perceived pain may be a useful alternative clinical tool for patients to use during medical procedures and potentially for special populations (e.g., non-verbal individuals, or children).

Booth # C-25

The utilisation of regulated standardised care packages by Danish chiropractors: A mixed methods study

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Booth # C-26

Effect of a 'Spine Offloading' Chair Design on Seated Height and Posture

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Abstract

Introduction: Some occupations and tasks prohibit frequent movement breaks from seated posture and or require more forward flexed postures (i.e., data entry, surgical techniques, assembly stations); therefore, innovations in chair design may play a role in minimizing the load placed on the spine during sitting. Commonly, chair back rests serve the purpose of offloading forces from the spine and encouraging more lumbar extension. However, often users do not always fully engage the backrest in sitting. For instance, when completing a typing or data entry task, occupants tend to lean forward, using very little of the backrest and ultimately losing any potential benefits of offloading compressive forces from the spine. A prototype chair with anterior chest and arm supports has been designed to reduce compressive spine loads. The purpose of this study was to compare the effects of this offloading design on seated height compared to a control configuration of the same chair.

Methods: 20 males sat on each configuration for 1 hour in a laboratory-controlled experiment. Sessions were presented in a random order, at the same time of day, at least 24 hours apart. Seated height, perceived pain, spine angles, seat pressure, and participants' experiences were measured and compared between conditions with a repeated measures ANOVA (significance accepted at $p < 0.05$).

Results and Discussion: Spine height loss was significantly reduced in the offloading (-0.75 ± 3.79 mm) compared to the control configuration (-6.16 ± 4.27 mm, $p < 0.001$), and participants sat significantly more anterior on the seat pan in the offloading (20.56 ± 1.67 cm) compared to control configuration (18.03 ± 1.92 cm, $p < 0.001$). There were no differences in spine angles or perceived back and gluteal pain between configurations. This design appears to be a promising approach to protecting the back during sitting when engaging in forward leaning tasks where the offloading effect of a backrest may be minimized.

Significance: A prototype chair with anterior chest and arm supports designed to offload the spine was shown to significantly reduce seated height loss during 1-hour of sitting compared to a control configuration. While participants perceived the offloading design to be more supportive, no differences in perceived pain or posture were found.

Booth # C-27

Trajectories, prevalence, and diagnosis of spinal pain in children 6-17 years of age (CHAMPS Study-DK)

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Abstract

Background: Globally, spinal pain is the leading cause of disability and affects people across their life-course including children and adolescents. Spinal pain is complex and can follow different trajectories in adults. There is a paucity of evidence about the developmental patterns and diagnostic characteristics of spinal pain in childhood.

Objectives: This study aimed to describe the trajectories of spinal pain frequency from 6 to 17 years of age. As well as the prevalence and frequency of spinal pain, and the related diagnoses experienced by children following different pain trajectories.

Methods: We analysed prospective spinal pain data from the Childhood Health, Activity and Motor Performance School Study Denmark (CHAMPS Study-DK) collected between October 2008 and April 2014. Six- to 11-year-old pupils from 13 public primary schools in Svendborg, Denmark, were followed for 5.5 years on average. Occurrences of spinal pain were reported weekly via text messages. Children who reported spinal pain were evaluated and classified using International Classification of Disease criteria. We constructed a latent class growth model to identify different spinal pain trajectory subgroups from age 6 to 17 years.

Results: We included data from 1556 children (52.4% female), with a mean age of 8.4 years at baseline, and identified 10,554 weeks of spinal pain in 329,756 weeks of observation. Sixty-three percent of children reported one or more occurrences of spinal pain. We identified five distinct spinal pain trajectory subgroups from 6 to 17 years of age: “no pain” (49.8%), “rare” (27.9%), “rare, increasing” (14.5%), “moderate, increasing” (6.5%), and “early onset, decreasing” (1.3%). The most common diagnoses were descriptive and non-specific (e.g., “back pain”); tissue-specific and pathological diagnoses were less frequent.

Conclusion: Overall, spinal pain in children is common, often non-specific, transient, and follows a heterogeneous course of pain frequency. Most children (63%) reported at least one episode of spinal pain over the study period. Children with early-onset pain reported the most weeks with spinal pain overall, whereas those following an increasing trajectory were tracking to experience the most pain in late adolescence.

Booth # C-28

Association between cardiovascular disease risk factors and future spinal pain with the potential moderating role of health-related physical activity in children and adolescents (CHAMPS Study-DK)

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Abstract

Background: Factors contributing to spinal pain are not well known but it has been previously linked with cardiovascular disease risk factors in children.

Objective: To investigate any prospective associations between childhood cardiovascular disease risk factors and spinal pain occurrences, and to examine for a moderating role of health-related physical activity in these relationships.

Methods: In this prospective study, we used data from the Childhood Health, Activity, and Motor Performance School Study Denmark (CHAMPS Study-DK) participants. The exposure variables were clustered cardiovascular risk score and homeostasis assessment model-estimated insulin resistance (HOMA-IR) score collected in 2008 and 2010. The spinal pain outcome comprised the number of weeks of non-traumatic spinal pain from 2008-2010 and 2010-2012. Mixed negative binomial regression models were created to investigate the prospective associations of cardiovascular disease risk factors and non-traumatic spinal pain, along with the potential moderating role of health-related physical activity (time spent in moderate-to-vigorous intensity physical activity) in these relationships.

Results: Girls with low HOMA-IR scores and boys with low clustered cardiovascular disease risk score who engaged in higher levels of moderate-to-vigorous physical activity reported more weeks of spinal pain. Also, boys with higher clustered cardiovascular disease risk who had less time in moderate-to-vigorous physical activity reported more weeks of spinal pain.

Discussion/conclusion: This finding supports the idea that depending on an individual's cardiovascular disease risk score, age and sex, too much or too little exercise may be associated with increased spinal pain. Further research is needed to better understand the reasons for and implications of these relationships.

Booth # C-31

Knowledge and beliefs questionnaires for musculoskeletal pain conditions: a systematic review protocol.

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Abstract

Background: Identifying patients' knowledge and beliefs about pain is relevant to a patient-centred treatment. The best method of measuring knowledge and beliefs about musculoskeletal conditions is unclear. An overview on measurement properties of available questionnaires to assess knowledge and beliefs about musculoskeletal conditions is lacking.

Objective: To investigate the measurement properties of available questionnaires that measure knowledge and/or beliefs about musculoskeletal conditions.

Methods: A systematic review will be conducted following the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) guideline. Electronic databases MEDLINE, EMBASE, CINAHL, and Web of Science will be searched. The search strategy will include three groups of search terms representing (1) construct, (2) population, and (3) instrument, in addition to a search filter on measurement properties. The search strategy will be devised in consultation with a librarian and no restriction on language, publication period or publication status will be applied. Citation tracking (in Scopus) of eligible studies and contact with experts will be conducted in order to minimise the risk of missing relevant articles. We will include primary studies of any study design that developed and/or tested measurement properties of self-reported questionnaires assessing knowledge and/or beliefs about musculoskeletal conditions, targeting people with musculoskeletal conditions or people from the general population. A study will be excluded if the questionnaire was developed and tested exclusively for clinicians or participants with recent trauma history. Search results will be screened by abstract and full text independently by two review authors. Extracted data will include bibliographic details, study characteristics, participants characteristics, questionnaires characteristics, measurement properties results, interpretability, feasibility, and distribution of scores. Authors will be contacted if more information is needed. The methodological quality of included studies will be assessed using the COSMIN Risk of Bias checklist and each item will be scored as "very good", "adequate", "doubtful", or "inadequate". The measurement properties of interest in the current study include reliability (internal consistency, measurement error, and test-retest, inter-rater and intra-rater reliability), validity (content validity including face validity, criterion validity, and construct validity including structural validity, hypotheses testing, and cross-cultural validity), and responsiveness, according to the COSMIN taxonomy definition. The overall assessment of each measurement property of each questionnaire will be classified based on the COSMIN updated criteria. Also, the quality of evidence will be rated using a modified Grading of Recommendations Assessment Development and Evaluation (GRADE) approach.

An overall recommendation will be formulated as: (A) Suitable for use: PROMs with evidence for sufficient content validity (any level of evidence) AND at least low-quality evidence for sufficient internal consistency; (B) Potentially suitable for use: PROMs categorised not in A or C; or (C) Not recommended: PROMs with high quality evidence for an insufficient measurement property. Data will be presented descriptively. A pooled result using meta-analysis of the parameters will be conducted if adequate data is available.

Significance: The results of this review will contribute to researchers and clinicians making evidence-based decisions on what instrument to use to measure knowledge and/or beliefs about musculoskeletal conditions.

Booth # C-32

Perceptual Sensory attenuation in chronic pain subjects and health controls

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Abstract

Background:

Sensory attenuation is a reduction in the perception of the afferent input of a self-produced tactile sensation due to the central cancellation of the reafferent signal by the efference copy of the motor command to produce the action. We investigated whether the sensory attenuation (or failure of) might be an explanation for heightened pain perceptions in individuals with chronic pain.

Methods:

N=131 participants (50% with chronic pain) underwent a single experimental paradigm, known as the force-matching task, and completed several self-reported symptom and psychological measures. Subjects were asked to match a force delivered to their finger, either by pressing directly on their own finger with their other hand (direct condition) or by controlling the device using an external potentiometer to control the force indirectly through a torque motor (slider condition).

Results:

All participants overestimated the target force in the direct condition, however no differences between chronic pain and control groups were observed ($Z=-1.27$, $p=.21$). An increased variance of the reproduced force in both the direct and slider conditions was observed in chronic pain subjects: $F(1,129)=7.22$, $p=0.008$ and $F(1,129)$, $p=0.05$. The mean error within the slider condition was correlated with depressive symptoms ($r=-0.24$, $p=.05$), high symptom count ($r=-0.25$, $p=.04$) and positive affect ($r=0.28$, $p=.02$). These correlations were only identified in the chronic pain subjects, indicating a subtle relationship between sensory and emotional processing.

Conclusion:

This study provides some evidence of differences in sensory predictive strategies utilised by those with chronic pain, which may help to explain maladaptive neuro-cognitive models related to symptom perception.

Booth # C-33

Roland Morris Disability Questionnaire, Oswestry Disability Index, and Quebec Back Pain Disability Scale: Which has Superior Measurement Properties in Older Adults with Low Back Pain?

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Abstract

Objective: To examine validity, reliability and responsiveness of three commonly used questionnaires for assessing physical function (i.e. Oswestry Disability Questionnaire (ODI), Quebec Back Pain Disability Scale (QBPDS) and Roland-Morris Disability Questionnaire (RMDQ)) in older patients undergoing chiropractic care for low back pain (LBP).

Design: Head-to-head clinimetric comparison.

Methods: Patients completed the ODI, QBPDS and RMDQ at baseline and after 2 weeks of treatment. Reliability was evaluated for internal consistency (Cronbach's α), test-retest reliability (interclass correlation coefficient [ICC]), measurement error (standard error of measurement (SEM), and smallest detectable change (SDC). Structural validity was evaluated through unidimensional confirmatory factor analysis, and construct validity was investigated by a priori hypotheses with other measures. Responsiveness was evaluated testing a priori hypotheses using data at baseline and 2-week follow-up.

Results: 214 patients (53 % males and 47% females) with a mean age 66.2 (SD 7.8 years) were included, of which 193 patients completed the 2 week follow-up for our responsiveness analysis. The RMDQ, ODI and QBPDS showed sufficient internal consistency (Cronbach's $\alpha = 0.89; 0.86; 0.94$ respectively) and test-retest reliability (ICC(2,1) was 0.85; 0.89; 0.84 respectively). The SDC for RMDQ was 6.9, ODI 19.1 and QBPDS 23.6, which are values larger than the Minimal Important Change (MIC). None of the measures met all criteria for sufficient structural validity, but RMDQ and ODI exhibited a partial unidimensional fit. The questionnaires displayed sufficient construct validity and responsiveness.

Conclusion: The ODI, QBPDS and RMDQ have similar measurement properties in older adults with LBP.

Booth # C-34

Corona and Manual Professions: the impact of the pandemic on chiropractors and naprapaths in Sweden.

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Booth # C-35

Comparison of Student Provider and Patient Perceptions of Care Utilizing the Biopsychosocial Model of Pain

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Abstract

The biopsychosocial model (BPS) of pain is a common theoretical framework for viewing and addressing pain in clinical populations. This model is taught to providers across many clinical disciplines, and offers an integrative structure with which to manage, co-manage and treat pain. However, the extent to which current providers utilize the BPS model when treating their patients is unclear. The first phase of this survey appraised student provider perceptions of pain and prognosis through a BPS lens during their time in student clinic. In the second phase, these responses will be compared to patient perceptions of their own care in the same clinic. The current abstract details only the student provider responses, as the patient data is still being collected. Survey questions focused on student provider perceptions of their patients' outlook and care. Overall, the survey had 21 respondents (40% female; mean age: 28.4 ± 4.1 years). All respondents typically saw patients with musculoskeletal chief complaints. Average pain level was a 4.65 out of 10, with a mean of 1.9 ± 0.8 visits per week; other common conditions listed were sleep disturbances (69.6%), stress (56.5%), fatigue (52.2%), anxiety (47.8%), depression (26.1%), difficulty remembering tasks to be completed (17.4%) and no other complaints (13.0%). Of those providers seeing patients with non-MSK complaints, 55% manage at least some of these issues personally. Of those providers managing in the clinic, 30% have referred patients to other healthcare providers for these conditions. For an average patient, providers believed that patient perception of recovery was very likely (26.1%), somewhat likely (43.5%), neutral (17.4%), somewhat unlikely (4.3%), and very unlikely (8.7%); 87% of providers addressed outlook with their patients. Providers also believed that patient control over their own life was very in control (26.1%), somewhat in control (34.8%), neutral (17.4%), somewhat out of control (13.0%), and very out of control (8.7%); 52.2% addressed individual agency with their patients. Perception of patient control over their own pain was very in control (0%), somewhat in control (47.8%), neutral (17.4%), somewhat out of control (30.4%), and very out of control (4.3%); 78.3% of providers addressed agency of injury with their patients. Perception of familial support was very supportive (26.1%), somewhat supportive (34.8%), neutral (17.4%), somewhat unsupported (13.0%), very unsupportive (8.7%); 65.2% addressed familial support with their patients. The initial phase of this study has provided unique insight into student provider perceptions of patient autonomy and social support across various realms of pain management, while allowing for the future exploration of BPS factors as prospective mediators. The comparison of these insights to patient feedback will serve to potentially highlight perceptual incongruencies in the patient-provider relationship that may prove to be beneficial in prognosis and overall improvement of patient quality of life.

Booth # C-36

A comprehensive set of systematic reviews of the literature on mechanisms of spinal manipulation, specifically on: i) objectively measured anatomical/biomechanical changes related to spinal manipulation, ii) objectively measured physiological changes related to spinal manipulation and iii) clinical effects related to spinal manipulation

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Abstract

Background: In order to understand the way any therapy works, three elements need to be scientifically studied: 1) the anatomical/biomechanical/physiological responses in the human body objectively measured after the therapy is applied, 2) clinically relevant effects as demonstrated through validated outcome measures, and 3) the link between the two, i.e. determining whether and how an anatomical/physiological change translates to clinical effects. This generally requires a reductive approach, isolating the “active ingredient” in the therapy by discarding any unnecessary non-active ingredients. This also holds true for manual therapy, specifically joint manipulation, if manipulation is to be given the credit for clinical improvement in patients. Although many mechanisms for the clinical effects have been proposed, none have become well-established, and there is a paucity of strong evidence supporting these. Therefore, it would be useful to understand the current state of the evidence for the effect of spinal manipulation on spine-related anatomical structures and the resultant associations with clinically relevant effects. This, in turn, would help direct future efforts in further developing evidence for manual therapies.

Methods: Systematic reviews of the literature without meta-analysis.

Current status: Review 1 PROSPERO protocol registered, review teams assembled, search terms defined.

Results (hypothesised): Our hypothesis is that there are postural, anatomical and physiological changes in spinal structures as a result of high velocity, low amplitude (HVLA) manipulation, but that an unknown quantity of high-quality research has been conducted that provides definitive links associating clinically significant effects with these changes. We expect to find much fertile ground for future investigations into spinal manipulation.

Conclusions (hypothesised): Ultimately, this understanding will help inform patients as to what happens inside their bodies when their spines are manipulated. It may provide clinicians with better information when discussing therapeutic interventions with patients, so that patients can make better informed choices. The results from this study will also help indicate gaps in knowledge, thus highlighting useful areas for further study.

Booth # C-37

Emergency department care for older adults diagnosed with low back pain

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Abstract

Background: In Australian emergency departments (EDs), 30% of all back pain presentations are for older adults. Relatively little is known about the care that this population receives during an ED stay, including admission to hospital.

Aim: to describe the ED management of older adults diagnosed with a lumbar spine condition and to determine predictors of hospital treatment in this population.

Methods: A secondary, retrospective analysis of electronic medical record data of adults aged ≥ 65 years who received a lumbar spine discharge diagnosis code related to low back pain. Demographic, clinical care and costs data were extracted from Sydney Local Health District Targeted Activity and Reporting System; with descriptive analyses and multilevel mixed-effects logistic regression models performed.

Results: There were 4,093 presentations to EDs, with most being female (58.3%). Across all low back pain presentations, 39.9% had some form of lumbar imaging and 34.1% were subsequently admitted to hospital. The most commonly prescribed pain-relieving medicines were opioid analgesics (67.1%), followed by paracetamol (63.9%) and NSAIDs (33.0%). Predictors of hospital treatment and hospital inpatient admission were receiving a laboratory test and receiving any opioid. For 1,648 low back pain presentations in 2019-20, the mean (SD) total cost of care per presentation was \$5,629 (\$11,982).

Conclusions: Between January 2016 to December 2019, there were more than 4,000 presentations to EDs by an older adult with low back pain due to a lumbar spine condition. Opioid analgesics were the most commonly administered pain medication, and in more than half of all low back pain presentations patients received a combined prescription of opioids and paracetamol. Alternative pathways of care to minimise ED presentations are needed, alongside the development and implementation of new models of care in pre-hospital and post-hospital settings.

Booth # C-38

Preliminary results from the BAcK Complaints in the Elderly :Chiropractic - Australia study. A cohort profile

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Abstract

Objective/Aim: One in seven adult chiropractic patients are aged >65 years and of these, 60% present with a back problem. The aim of the BAcK Complaints in the Elderly:Chiropractic - Australia study is to examine the clinical course of LBP in older adults who seek chiropractic care.

Methods: Design: a 12-month, prospective longitudinal cohort study. Inclusion criteria was a 'new' episode of LBP. Questions about sociodemographic factors, lifestyle characteristics, health, pain, functional status, cognition, adverse events, medications, satisfaction with chiropractic and quality of life were asked at baseline and at follow up (2 and 6 weeks and at 3, 6, 9 and 12 months). Longitudinal SMS pain data was captured daily for two weeks and then weekly for 11.5 months. Descriptive statistics will report the cohort profile.

Results: 226 chiropractic patients were enrolled into the study, with 52.4% female and a mean age of 67.6 (s.d 8.6) years. Only 7.9% reported LBP for the first time, and 65.0% described pain that extended into the lower limb. At baseline, mean VAS for LBP at baseline was 4.2 (s.d. 2.5) and the highest proportion for ODI scores was 48% for moderate disability. The STarT back questionnaire identified 41.9% of participants as having low risk of chronicity.

Discussion: At baseline, more than 90% of older adults with LBP had a past history of LBP, disability levels were high and lower limb pain was common. As we finish 12 month longitudinal data collection, the study will allow a better understanding of the demographics, clinical course and predictors of LBP in older adults.

Booth # C-41

Use of a pressure-sensing glove system to measure manual therapies biomechanical parameters: development of an acquisition interface and prevalidation

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Abstract

Background: Spinal manipulation (SM) and mobilization (MOB) are two motor acts commonly performed by various health professionals such as chiropractors. These acts are characterized by a force varying with time and performed using a variable surface of the hand. The measurement of the mechanics of SM/MOB is essential to improve the understanding of the mechanisms underlying the clinical effects of SM/MOB as well as these acts safety. Although many devices have been used to measure SM/MOB parameters, to date, no device has been developed and validated to measure parameters directly at the clinician's hand within a clinical setting.

Objective: The main objective is to develop an acquisition interface for a pressure-sensing glove system (Grip system, Tekscan) adapted to the context of SM and MOB. The secondary objective is to perform a preliminary validation using a reference device.

Methods: An iterative process was used to develop an acquisition interface adapted to the context of SM/MOB and fitting the needs of an acquisition within a clinical context. When an initial version satisfied all the research team members, a prevalidation study took place. During a laboratory session, chiropractic interns and chiropractors performed a total of 24 SM and 24 MOB of varying force (very low to very high force). During the delivery of the SM/MOB, participants wore a pressure-sensing glove. The SM/MOB were executed on an instrumented device that includes a load cell and that has been previously used to investigate the learning of SM at our institution. The data collected by the reference device and the glove system were then compared by superimposing the force-time graphs. The variation of the amplitude on the contact surface (thenar region) as a function of time was also carried out for the pressure-sensing glove system.

Results: The research team included a chiropractic researcher, an electrical and informatics engineering researcher, a chiropractic intern, a master's student with a chiropractic background and a research professional. Following several meetings, an initial version of the data acquisition interface was developed using MATLAB software (Mathworks®). A total of 16 participants took part in the prevalidation study. Data were collected synchronously by the reference device software and the glove acquisition interface. Technical issues were noted throughout the data collection. MATLAB codes were developed to analyze the data using the glove sensors located in the region of interest (thenar region). Given calibration issues, data from the instrumented gloves were normalized in function of the maximum of the force measured by the reference device. The superposition of the force-time curves of the two systems suggests the measurement of similar phenomena. The analysis of the pressure distribution shows that it is distributed non-uniformly during a SM/MOB.

Conclusion and perspective: As a result of the prevalidation study, some improvements will be made to the acquisition interface such as the inclusion of a calibration procedure. MATLAB codes to calculate and analyze the biomechanical parameters will also be improved and automated.

Booth # C-42

Reliability of a novel pneumatic perceived pain meter

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Abstract

Introduction: The Pain Meter is a novel, pressure gauge device, designed for measuring continuous perceived pain data. Despite the novelty of this device, its reliability has yet to be tested. The purpose of this study is to: (1) determine the test-retest reliability and standard measurement error of the Pain Meter, and (2) investigate if the usage of the Pain Meter may induce muscle fatigue that could affect the recorded pain ratings on the meter.

Methods: A cross-sectional research design, with fifty participants, will be conducted. Each participant will hold the Pain Meter in their dominant hand and squeeze the bulb to move the dial to correspond to 10 pre-determined pain ratings. Each rating is reached 3 times in a block randomized order. Surface electromyography (EMG) data is collected from the flexor digitorum superficialis during the trials. Raw EMG signals will be processed with custom software (MATLAB r2017, The MathWorks, Nattick, MA, USA). Specifically, this will include DC bias removal, rectification, smoothing with a dual pass 4th order Butterworth filter with an effective cutoff frequency of 3Hz, and subtracting resting EMG levels. Trials will be normalized to a percentage of MVC by dividing by maximum activity (taken as the maximum value out of the three maximum trials), and multiplying by 100. To investigate the presence of fatigue, a Fast-Fourier Transform will be applied to a 500 ms window from the raw EMG signals of each experimental trial and the mean power frequency calculated.

Descriptive statistics (average, range, standard deviation, and 95% confidence intervals) will be calculated for all variables. The within-day test-retest reliability of the Pain Meter will be assessed with the Intraclass Correlation Coefficient (ICC3,1) with a 95% confidence interval. The strength of reliability will be interpreted using the following criteria: less than 0.50 is considered poor, between 0.50 and 0.75 moderate, between 0.75 and 0.90 good, and above 0.90 excellent.

Results and Discussion: As a result of the Omicron variant, we have only been able to collect data from 4 participants to date (1M, 3F, avg age 22.5 years +/- 3.4, avg height 171cm +/- 11.8, avg mass 65.6kg +/- 24.3). We will not be completing the statistical or fatigue analysis until the full data set is collected to prevent biasing our analysis. Preliminary results of the mean and standard deviation of pain levels 10 through 100 (intervals of 10) are: (9.19 +/- 0.52, 19.01 +/- 0.79, 28.63 +/- 0.59, 38.51 +/- 0.35, 47.69 +/- 0.52, 57.78 +/- 0.69, 68.26 +/- 0.66, 79.67 +/- 0.47, 88.60 +/- 1.38, 99.01 +/- 0.94). The estimated completion date for this project is May 2022.

Significance: Determining if the Pain Meter is a reliable tool in pain measurement will advance the ways we quantify pain, allowing researchers to obtain continuous data during treatments/exposure.

Booth # C-43

Trajectories of disability in low back pain

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Abstract

Introduction: Low back pain (LBP) is the leading cause of years lived with disability. Stratifying high-risk LBP patients to psychologically augmented physiotherapy, has been shown to result in significantly better recovery from disability compared to usual care. Unfortunately, not much knowledge exists about distinct trajectories of recovery from disability after LBP and their potential psychological predictors.

Study objective: The aim of the present study was to identify trajectories of functional disability in LBP and their potential baseline psychological predictors. First, we hypothesized to find distinct trajectories of disability among a chronic non-recovering class. Second, we hypothesized that gender, age, and baseline levels of pain intensity, pain catastrophizing, fear-avoidance beliefs (kinesiophobia), and depressive symptoms would be predictive of class membership.

Methods and material: A 1-year consecutive cohort (N = 1048) of patients with LBP referred to the Spine Centre of Southern Denmark if they have not improved satisfactorily from a course of treatment in primary care after 1 to 2 months, were assessed by self-report questionnaires at their first visit and at 6- and 12-month follow-up. Data from patients who responded to the Roland Morris Disability Questionnaire at least twice (N = 747) were used to assess trajectories of functional disability by Latent Growth Mixture Modelling. The following measures were used as baseline predictors of the trajectories: Pain Intensity Numerical Rating Scales, Pain Catastrophizing Scale, Tampa Scale for Kinesiophobia, and Hospital Anxiety and Depression Scale.

Results: Four distinct trajectories were identified: high-stable (22.0%), high-decreasing (20.4%), medium-stable (29.7%), and low decreasing (27.9%). Using the low-decreasing trajectory as reference, baseline pain intensity, depressive symptoms, and pain catastrophizing predicted membership of all 3 symptomatic trajectories. However, using the high-decreasing trajectory as reference, age, baseline pain intensity, and depression were predictors of the high-stable trajectory.

Conclusion: The findings suggest that LBP patients with high levels of baseline depressive symptoms and psychological distress in combination with persistent high levels of pain intensity and disability in the high-stable trajectory is of potential clinical importance. Targeting this patient group with evidence-based cognitive behavioural therapeutic approaches such as psychologically augmented physiotherapy, may prove to be a prudent therapeutic approach.

Booth # C-44

The effect of social interaction on conditioned pain modulation in patients with chronic low back pain. A randomised trial

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Abstract

Background: Studies have found an association between social interaction and pain perception, indicating that pain is dependent on whether we are alone or in the presence of others.

Quantitative sensory testing (QST) is a psychophysical method used to quantify pain perception, including conditioned pain modulation (CPM), which in turn quantifies the effect of the endogenous pain-inhibitory system. However, it is not known how social interaction affects CPM response.

The primary aim of this study was to investigate whether there was a difference in CPM response in a QST paradigm for patients with chronic low back pain (CLBP) measured in a setting with social isolation compared to a setting where QST is measured with clinical interaction. Additionally, we also compared different QST parameters.

Method: We conducted a randomised controlled trial where participants with CLBP recruited from the Spine Centre of Southern Denmark were allocated one of three QST examinations:

- i) QST protocol performed by a robot whilst in social isolation guided by a video (*Auto*)
- ii) QST protocol performed by a robot during clinical interaction guided by a research assistant (*Guided*)
- iii) QST protocol performed manually by a research assistant with clinical interaction (*Manual*).

The CPM response was quantified as the difference in pain pressure thresholds (PPT) before and after a cold pressor test (CPT). The PPTs were tested on the Tibialis Anterior muscle either by a robot (*Auto* and *Guided*) or a handheld pressor algometer (*Manual*).

Results: A total of 92 participants were included. When comparing *Auto* and *Guided*, no statistically significant difference in CPM response was found (Between-group difference=-0.4 kg (95% Confidence interval=-0.7 kg to 0.3 kg), P-value =0.52). Likewise, no statistically significant difference in CPM response was found between *Auto* and *Manual* (Between-group difference=0.7 kg, (95% Confidence interval=-0.05 kg to 1.01 kg), P-value = 0.07). No statistically significant differences in any of the other examined QST parameters was found.

Discussion: In this experimental setup, pain perception was not affected by social interaction for patients with CLBP. At face value, the current results indicate, that QST procedures are robust enough not to be influenced by social interaction to an appreciable degree.

Booth # D-11

The Impact of Participant Instructions on Lumbopelvic Rhythm Outcome Variables During a Spine Flexion and Return Task

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Abstract

Background: Lumbopelvic rhythm (LPR) describes the relative contributions of the two interactive segments to total trunk motion during a forward bending movement [1]. Currently, it is thought that an aberrant lumbopelvic rhythm, could have clinical significance for early prediction of clinical low back pain. However, the instructions participants are given to complete the flexion movement could confound the outcome.

Objectives: The objective of this study is to determine if the LPR is different when specific instructions on spine flexion are given compared to minimal instructions (free flexion) in young, back-healthy individuals.

Methods: 25 participants will be recruited. Spine angles are determined from 2 accelerometers (ADXL335 Analog devices, Norwood, MA, USA), fixed over L1 and S2 (+y down). Participants stood shoulder-width apart and with their feet forward and arms crossed with thumbs in the crooks of their arms then completed 3 trials of free flexion, followed by 3 trials of instructed and paced flexion. The flexion and re-extension phases of the flexion trials were divided into four quartiles (Q1-Q4) respectively. Time-varying change in lumbo-pelvic ratio (LPR) was calculated and averaged for each quartile and the full-flexion position. LPR was defined as change in lumbar angle divided by change in pelvic angle. A positive value indicates greater lumbar contribution to overall motion.

Results: Preliminary data for 6 females and 2 males are presented (average; age 23.13 ± 7.36 years, height 165.75 ± 10.17 cm, weight 71.68 ± 22.72 kg). Statistical analysis will only be conducted on the completed dataset. Without instructions, LPR is smaller at all time points indicating that the contribution of the pelvis to overall motion is greater compared to a flexion trial where participants were instructed to flex using a 'top-down' movement (LPR_{free} was $-3.27(16.33)$ and LPR_{inst} $15.34(24.87)$). LPR during Q1 is greater for instructed than free flexion (LPR_{free}: 1.55 ; LPR_{inst}: 7.13). LPR then appears to decrease after Q3 during flexion. During free flexion, LPR indicates a greater lumbar contribution during the early stages of flexion (Q1-3) and middle phase of re-extension (Q2-3). During re-extension LPR_{inst} decreases gradually and LPR_{free} increases during Q1 and Q4 before decreasing again during Q3 and Q4.

Discussion: Our results show that the instructions participants receive before a flexion trial matters. During free flexion, the contribution of the pelvis to overall motion is greater compared to instructed flexion. Based on our findings, we would suggest that results from studies using different flexion/extension instructions would not be comparable. We also showed that most participants (6 out of 8) cannot follow the instruction to refrain from moving their pelvis. Without clear and concise instructions participants tend to deviate spine strategies which can alter the data. This indicates that researchers must carefully examine instructions given when trying to draw comparisons between studies.

Booth # D-12

A retrospective analysis of pain changes and opioid use patterns temporally associated with a course of chiropractic care at a publicly funded inner-city facility

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Abstract

Background: Opioid prescriptions as an initial treatment for chronic spine pain are no longer recommended by clinical practice guidelines. Despite these recommendations, opioid prescriptions in the USA and Canada are more prevalent than in most European countries. Strategies to transition away from opioid prescription need to be explored. A course of chiropractic care was associated with a reduction in opioid prescriptions among a USA veteran population. More research is warranted to explore how access to chiropractic services temporally coincides with opioid use and prescription patterns in various populations.

Objective: To determine if a course of chiropractic care coincided with changes in pain and/or opioid usage in a financially disadvantaged, inner-city population at a publicly funded facility.

Methods: The present study is a retrospective analysis of prospectively collected quality assurance data. The data was collected between 2011-2017 at a publicly funded multidisciplinary healthcare facility which serves financially disadvantaged individuals in the inner-city. Patients from the database were included for analysis if they: 1) received a course of chiropractic care; and 2) reported the use of opioids at some point during their course of chiropractic care. Specific timepoints were analyzed, including the patients' first visit with the treating chiropractor (baseline), the 5th visit, and the last visit (discharge). Analyzed data included: 1) a numeric rating scale (NRS) patients used to rate their pain in each body region (cervical, thoracic, lumbar, sacroiliac, extremity) at each visit; and 2) the number of patients using opioids at each timepoint. A one-way ANOVA (3 time points; baseline, 5th visit, discharge) was used to test changes in NRS pain ratings across time points for each region. Post-hoc paired Student's t-tests were used to parse main effects. McNemar's test was used to determine if the number of people using opioids at baseline that were not at discharge was significantly different than the number of people who didn't use opioids at baseline who did at discharge. The level of significance was set to $\alpha=0.05$ and the minimal clinically important difference (MCID) was defined as a 20% change from baseline.

Results: A total of 64 patients (age: 49.6 ± 13.6 , 38 female) were included in the sample. There were clinically significant pain reductions in all regions respectively, after a course of chiropractic care between baseline and discharge: cervical (-30.8%); thoracic (-37.2%); lumbar (-40.5%); sacroiliac (-43.9%); and extremity (-43.0%). The ANOVA results revealed significant main effects for a change in pain across timepoints in all regions ($p < 0.001$). Post-hoc tests yielded significant decreases in pain ratings between baseline and the 5th visit, baseline and discharge, but not visit 5 and discharge in all regions. McNemar's test revealed that the number of patients who used opioids at baseline that did not use opioids at discharge was significantly lower than the number who did not use opioids at baseline but did at discharge ($p=0.012$). **Discussion:** A publicly funded course of chiropractic care temporally coincided with clinically and statistically significant decreases in pain and opioid usage in a financially disadvantaged inner-city population.

Booth # D-13

Diversity of the chiropractic profession in Canada: A cross-sectional survey of Canadian Chiropractic Association members

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Abstract

Background: Despite rapidly increasing diversity of the Canadian population, there is no available data on the diversity of the chiropractic profession with respect to gender, sexual orientation, race, ethnicity and community of practice. Diversity provides a foundation for culturally competent care delivery at the provider level and is paramount in the pursuit of a culturally congruent model of chiropractic care.

Objective: To explore the diversity of the chiropractic profession in Canada.

Methods: All registered members of the Canadian Chiropractic Association (N=7721) were invited to participate in a web-based survey between May and June 2021. Survey questions explored diversity with respect to personal demographics (age, sex, gender, sexual orientation, race, ethnicity, language) and practice characteristics (community setting, practice type).

Results: We received a total of 3143 survey responses (response rate – 41%). The average age of chiropractors in our sample was 44.7 years (standard deviation (SD) 12.7). Forty-five percent of chiropractors surveyed were female with the same proportion (45.2%) identifying as women. Ninety-one percent of the sample identified as heterosexual. With respect to race, 78% of respondents were Caucasian. Seventy percent of chiropractors in our sample identified themselves as ethnically Canadian and 29% were European. In comparison to the Canadian population, most visible minorities were underrepresented. This was most pronounced for Black and Indigenous chiropractors. With respect to ethnicity, chiropractors who were Canadian, American or from Oceania were overrepresented in our sample compared to others, specifically North American Indigenous, Caribbean, and South, Central and Latin American ethnicities. Sixty-one percent of chiropractors practiced within a major city and most work in interdisciplinary clinics (42% complementary and 33% rehabilitation).

Discussion: This study provides an initial description of diversity within the chiropractic profession in Canada. Although women make up nearly half of the profession nationally, very few identify as a gender minority. Overall, there is little racial and ethnic diversity in the profession compared to the Canadian population, with Black and Indigenous peoples underrepresented. This study provides a foundation for future work exploring provider-level attributes that contribute to cultural competence. Future work should focus on patient-level attributes and assess the activities of professional organizations and institutions in support of equitable delivery of chiropractic care.

Booth # D-14

The influence of multimorbidity and co-occurring pain on low back pain-related disability: secondary analyses of longitudinal data from the selfBACK trial

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Abstract

Objectives: selfBACK, an artificial-intelligence (AI)-based app, has been shown to reduce back-related disability. Since low back pain commonly co-occurs with multimorbidity (>2 long term conditions [LTCs]) or pain at other musculoskeletal (MSK) sites, this study investigates whether these elements modify the effect of the selfBACK app's or influences outcome trajectories.

Methods: Secondary analysis of a randomised controlled trial (n=461) with nine-months follow-up. The selfBACK trial was conducted in Trondheim, Norway, and Odense, Denmark. Participants were recruited in primary care by physiotherapists, chiropractors, general practitioners and from an outpatient spine clinic. Primary outcome was LBP-related disability (Roland Morris Disability Questionnaire, RMDQ). Secondary outcomes were stress, depression, illness perception, self-efficacy, general health, quality of life, physical activity, and global perceived effect. Linear mixed models were used for continuous outcomes and logistic generalized estimating equation models for binomial outcomes. Analyses were stratified by multimorbidity status or number of co-occurring MSK pain sites to assess effect modification, whereas control (n=229) and intervention (n=232) groups were pooled according to number of LTCs and MSK pain sites in analyses of outcome trajectories.

Results: There was no interaction between the effect of the selfBACK app and multimorbidity or co-occurring musculoskeletal pain on any outcomes. The effect was slightly greater in participants with multimorbidity than among those with LBP only (difference in RMDQ due to interaction, -0.9 [95 % CI -2.5 to 0.6]), however, the precision of the estimates was low. People with larger number of LTCs and more co-occurring MSK pain had higher levels of baseline disability, along with higher baseline scores for stress, depression, illness perception and poorer pain self-efficacy and general health ratings. In the pooled sample, LBP-related disability improved less over time for people with ≥ 2 LTCs additional to LBP or ≥ 4 co-occurring MSK pain sites compared to no multimorbidity and ≤ 1 additional MSK pain site (difference in mean change at 9 months = 1.5 and 2.2, respectively). For secondary outcomes, there were minor improvements over time for all groups.

Conclusion: Co-existence of multimorbidity or co-occurring MSK pain with LBP does not modify the effect of the selfBACK app even though people with these problems had greater pain-related disability at baseline. This suggests that personalised AI-based apps for self-management of LBP can be considered additionally to usual care also for those with multimorbidity or co-occurring MSK pain. Participants with these health problems gradually improved in LBP-related disability over time, but less so for those most affected.

Booth # D-21

Intervention usage for the management of low back pain in a chiropractic teaching clinic

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Abstract

Background: Despite numerous low back pain (LBP) clinical practice guidelines, published studies suggest guideline nonconcordant care is still offered. However, there is limited literature evaluating the degree to which chiropractors, particularly students, follow clinical practice guidelines when managing LBP.

Objective: The aim of this study was to evaluate the frequency of use of specific interventions for LBP by students at a chiropractic teaching clinic, mapping recommended, not recommend, and without recommendation interventions based on two clinical practice guidelines.

Methods: This was a retrospective chart review of patients presenting to the Canadian Memorial Chiropractic College teaching clinic with a new complaint of LBP. This study methods were prospectively registered on the Open Science Framework (#g74e8). Interventions provided under treatment plans for each patient were extracted. The proportion of treatment plans including each intervention was calculated. Interventions were next classified as recommended, not recommended, or without recommendation according to two guidelines, the NICE and OPTIMA LBP guideline. The proportion of patient files with recommended, not recommended, or without recommendation interventions were calculated according to each guideline.

Results: 377 of 1000 screened patient files were included. The most frequent interventions provided to patients were manipulation/mobilization (99%) and soft tissue therapy (91%). Exercise, localized percussion, and advice and/or education were included in less than 50% of treatment plans. Patient files contained similar amounts of recommended (70%) and not recommended (80%) interventions according to the NICE guideline classification, with half the treatment plans including an intervention without recommendation. Based on the OPTIMA acute guideline, patient files contained similar amounts of recommended and not recommended care, while more recommended care was provided than not recommended according to the OPTIMA chronic guideline.

Discussion: Spinal manipulation/mobilization and soft tissue therapy are used much more frequently than education and exercise. Despite chiropractic interns providing guideline concordant care for the majority of LBP patients, interventions classified as not recommended and without recommendation are still frequently offered. This study provides a starting point to understand the treatment interventions provided by chiropractic interns. Further research should be conducted to improve our understanding of the use of LBP guideline recommended care in the chiropractic profession.

Booth # D-22

Manual Therapy by Chiropractors for Infants with Musculoskeletal-Related Suboptimal Infant Breastfeeding: a Pilot Study

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Abstract

Objective: to assess one-week outcomes of manual therapy by chiropractors for infants with musculoskeletal dysfunction and suboptimal infant breastfeeding (SIB), using the MIBAQ (Musculoskeletal Infant Breastfeeding Questionnaire).

Methods: This was a descriptive cohort study. Volunteer chiropractors who frequently treat infants with musculoskeletal dysfunctions enrolled eligible infants within a 2-month study period. Mothers of infants ≤ 3 months currently or recently breastfeeding presenting for care in the participating office were eligible. Mothers who declined to participate were excluded. The primary outcome was MIBAQ change from pre-treatment to one week later. A secondary measure was the Patient's Global Impression of Change.

Results: A total of 72 participants from 6 chiropractic offices completed the pre-survey; 35 (49%) completed both pre- and post-survey. The MIBAQ scores improved highly significantly ($p < .000$) from pre- to post and were significantly correlated with the PGIC (Pearson correlation=.408; $p=.021$).

Conclusions: These results demonstrate that the MIBAQ appears to be clinically responsive to changes in SIB-related symptoms and could facilitate larger practice-based research studies of infants with musculoskeletal dysfunction contributing to SIB. In this study, significant clinical change was reported by mothers of infants with SIB after one week of chiropractic manual therapy.

Booth # D-23

The Swiss chiropractic practice-based research network: a cross-sectional analysis of participating clinicians and primary-care practices to inform future research

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Abstract

Background: The Swiss chiropractic practice-based research network (PBRN) is a nationwide project developed to advance clinical research within the Swiss chiropractic community.

Objectives: The aim of this study was to describe the characteristics of clinicians recruited to the PBRN to guide subsequent practice-based research in the areas of chiropractic and musculoskeletal (MSK) health.

Methods: We performed a cross-sectional analysis of chiropractors who provided consent to participate in ongoing self-selected research activities and completed a PBRN entrance questionnaire. Participant recruitment occurred between 9 September 2021 and 19 December 2021. All clinician members of the Swiss Chiropractic Association (ChiroSuisse) were eligible. The questionnaire consisted of items relating to demographics, practice characteristics, confidence in the management of low back pain, biomedical versus biopsychosocial treatment orientation, use of an electronic health record (EHR) system, practice changes due to the COVID-19 pandemic, and motivation (0-100 VAS) to participate in a subsequent patient cohort pilot study nested within the PBRN infrastructure.

Clinician characteristics were presented as descriptive statistics. Multivariable logistic regression was used to assess the association between clinician characteristics (age, practice size, language of practice, EHR use) and motivation to participate in the patient cohort pilot study (Yes/No, cut point operationalized as VAS score ≥ 70).

Results: Among 326 eligible chiropractors, 147 enrolled in the PBRN (45% participation proportion; mean age 46 [SD, 13] years; 53% men). 65% of participants reported practicing with other chiropractors, while 41% endorsed sharing a practice with other healthcare professionals – the most common being massage therapists. Low back pain without leg pain (96%) and neck pain without arm pain (94%) were described as the two most commonly managed patient complaints. 56% of PBRN members reported use of an EHR system for clinical record keeping. Clinicians endorsed high confidence for the management of low back pain (mean score 5.6; range 4-20, lower score means greater self-confidence) and higher biopsychosocial versus biomedical treatment orientations (52 versus 32; range 10-60 each, higher score means greater treatment orientation). Most clinicians described their work hours and patient numbers as unchanged compared with before the COVID-19 pandemic, 63% and 75%, respectively. A total of 56 participants (38%) rated themselves ≥ 70 on motivation to participate in the patient cohort pilot study. Those practising in a clinic with 2 or 3 chiropractors, compared with those in solo practice, were 2.5 times more likely to express motivation to participate in the patient cohort pilot study (OR, 2.5; 95% CI, 1.1 to 5.8). Age, language of practice, and EHR use were not found to be associated with motivation for the patient cohort study.

Conclusion: The Swiss chiropractic PBRN has enrolled almost half of all Swiss chiropractors. The first nested project to be conducted within this PBRN infrastructure (The Swiss Chiropractic Cohort (ChiCo) Study) is registered as a 12-week prospective cohort pilot study and will recruit consecutive patients with a new episode of MSK pain from PBRN participating practices to assess feasibility of methods and describe the clinical course of patients MSK pain.

Conservative interventions and clinical outcome measures used in the perioperative rehabilitation of breast cancer patients undergoing mastectomy: a scoping review.

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Abstract

Background: Mastectomy represents the first-line treatment approach for more than 90% of breast cancer patients. Physical impairments associated with this surgical procedure are numerous, which negatively impacts the patient's quality of life. Despite evidence supporting the benefits of rehabilitation interventions to reduce shoulder functional deficits in women undergoing mastectomy, there are limited rehabilitation resources available for this population within the institutions affiliated to the Centre intégré universitaire de santé et de services sociaux de la Mauricie-et-du-Centre du Québec (CIUSSS-MCQ). To promote the development of interventions whose modalities will meet patients' needs and reflect the particularities of breast cancer care pathways, we must first establish a comprehensive portrait of rehabilitation strategies and clinical outcome measures that have already been used for this population.

Objective: (1) Identify and describe the conservative interventions and the clinical outcome measures used as part of the perioperative physical rehabilitation of women with breast cancer who are awaiting or have undergone mastectomy; (2) Report on the barriers and facilitators to participation and completion of these rehabilitation programs.

Methods: MEDLINE, CINAHL and the Cochrane Library were searched from inception to January 2021. We included peer-reviewed English and French literature with quantitative designs, describing conservative interventions and clinical outcome measures used within rehabilitation programs designed for women who were awaiting or had undergone mastectomy. Paired reviewers independently reviewed all citations and articles using a two-phase screening process. Data extracted from eligible studies were descriptively reported.

Results: The literature search yielded 5605 articles and 12 additional articles were retrieved from other data sources. Of the 46 eligible studies, most interventions were multimodal (60.9%), which combined exercise with one or more of the following: [1] patient education (45.7%); [2] manual therapy (23.9%); or [3] lymphatic drainage (17.4%). Rehabilitation programs were initiated a few days following surgery (84.8%) and performed under supervision until hospital discharge (45.7%). Objective measures of physical function most frequently used were shoulder range of motion, muscle strength and signs of lymphedema, whereas quality of life, shoulder function and pain were the primary patient-reported outcome measures. Most studies did not discuss study compliance and reasons to decline research participation. Undergoing another breast surgery, death, and cancer recurrence were the most reported barriers to study completion.

Discussion: This scoping review reports on the heterogeneity and wide range of conservative interventions and clinical outcome measures used in physical rehabilitation for breast cancer patients who had undergone or were scheduled to undergo mastectomy. Supervised multimodal interventions combining exercise with patient education, lymphatic drainage, or manual therapy were the most frequently reported. These interventions were predominantly initiated following breast surgery. Further research is needed to identify barriers and facilitators to study participation and completion, as well as breast cancer patients' needs and expectations, particularly in the preoperative period.

Booth # D-25

Can we compare spinal stiffness between subjects?

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Abstract

Background: When clinicians push posteroanteriorly into the lumbar spine of a prone patient, they do not create movement in a single vertebra. Instead, 3-point bending of the spine occurs. Supported on the treatment table by the pelvis and ribs, the lumbar spine bends as a unit, becoming progressively more lordotic with posteroanterior loading. The result can be expressed as flexural stiffness (applied external load / applied external displacement). Used in industry to evaluate material strength, flexural stiffness measures should be normalized by a cross-sectional measurement (e.g. thickness, area, volume) to be interpreted correctly. Unfortunately, cross-sectional measurements of the spine are not usually available making it difficult to compare flexural stiffness between persons. In this study, we investigate how readily available physical characteristics of scale (e.g. height, weight) could be used to normalize flexural stiffness measures then evaluate if these measures are representative of internal vertebral mechanics.

Methods: Flexural stiffness values were obtained using external indentation testing of the lumbar spine. Individual flexural stiffness values were divided by individual values of height, weight, abdominal circumference and body mass index then plotted against these same values to assess their scale response. Using lateral spine radiographs obtained during indentation testing, the internal vertebral stiffness of the vertebra immediately beneath the indenter was calculated then plotted against flexural stiffness normalized by weight. Complete imaging was available in 19/26 subjects. This imaging was also used to determine vertebral stiffness of neighbouring vertebra which can be used as a measure of internal spinal flexibility; an inflexible spine will have a smaller standard deviation of stiffness among neighbouring vertebra.

Results: Flexural stiffness normalized by weight then plotted against weight resulted in a correlation of 0.6334. Similar plots of flexural stiffness normalized to body mass index, height and abdominal circumference, then plotted against those same characteristics, had lower correlations of 0.4211, 0.2932 and 0.2266 respectively. Normalized flexural stiffness values demonstrated low correlation when plotted against internal vertebral stiffness (0.1269). Flexural stiffness values normalized to weight were not correlated with spinal flexibility (0.0503) while spinal flexibility was not correlated to weight (0.0162).

Discussion: Flexural stiffness values normalized by weight showed the greatest correlation to a scalable physical feature. As such, flexural stiffness values normalized by weight should be used when comparing this measure between persons (in the absence of cross-section measurements). Importantly, normalized flexural stiffness measures do not account for spinal biomechanics (i.e. spinal flexibility).

Importance: To better compare stiffness measurements from a thin marathon runner and a massive bodybuilder, external measures of spinal stiffness should be divided by the persons weight. Having said that, a person's weight does not dictate their internal spinal mechanics – two patients of similar weight can have different spinal flexibility. Our observations create the possibility of establishing normalized values of external spinal stiffness measures which could help clinicians identify abnormal values then track these measures before, during and after care.

Booth # D-26

The Alberta Back Care Pathway: Implementation of a novel care pathway to improve LBP management in primary care settings – protocol for a hybrid effectiveness-implementation study

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Abstract

Introduction: Globally, low back pain (LBP) is one of the most frequently reported health concerns while years lived with disability caused by LBP has increased significantly over the past decade. In Canada, individuals experiencing this chronic illness will often seek treatment initially from their family General Practitioner (GP) largely because primary care in Canada is provided at no-cost to patients. Unfortunately, current evidence-based guidelines for LBP, which include education and exercise as first-line interventions, are infrequently followed by GPs. While this education and exercise are available outside of primary care (e.g. physiotherapy, chiropractic, etc.), cost is a significant barrier. As a result, low-value care is often provided to most LBP patients in Canada, including inappropriate use of opioids, imaging and specialist referrals. To overcome this problem in Alberta, Canada, the Alberta Back Care Pathway (ABCp) was developed together with patients, clinicians, scientists and administrators. The ABCp provides current guideline/evidence-based care for LBP while providing no-cost access to education and exercise when appropriate via the GLA:D Back program (Good Life with Osteoarthritis: Denmark).

Objective: To evaluate the implementation and effectiveness of a novel care pathway (ABCp) in primary care settings.

Methods: In this non-randomized control study, primary care network (PCN) clinics across Alberta, Canada, are currently being recruited to take part in the ABCp. As part of the Quality Implementation Framework, readiness will be assessed in each PCN clinic before training begins. Post-training, the ABCp is used by primary care physicians assessing patients with LBP. Program implementation outcomes will be evaluated within the RE-AIM framework. Essential program elements (Reach, Effectiveness, Adoption, Implementation and Maintenance) will be evaluated at individual and system levels. At an individual level, reach will be measured by the proportion of patients participating in ABCp. Effectiveness, at the individual level, will be assessed by evaluating changes in patient outcomes after participating in the ABCp (related to pain, function, quality of life and self-efficacy). System-level effectiveness measurement will be evaluated by determining health resource utilization changes (measured by patient visits and visits, specialist referrals, and spinal imaging). We will evaluate the adoption of ABCp at an individual level (number of clinicians utilizing the program) and at a system level (number of PCNs who adopted the ABCp). Additional measures will be employed to assess implementation and maintenance success.

Results: At present, the study is ongoing. Our expected results are that 1) ABCp will be adopted by the majority of PCN clinics and clinicians trained in the ABCp, 2) the majority of LBP patients seen by ABC trained clinicians will enroll in the program, and 3) in ABCp clinics, there will be a significant impact on patient outcomes as well as system-level measures related to cost and healthcare utilization.

Booth # D-27

Digging deeper -- exploring chiropractors' online claims about non-musculoskeletal disorders.

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Abstract

Background: Some chiropractors suggest that chiropractic treatment is appropriate for health issues other than musculoskeletal problems. The prevalence of such claims on individual clinic websites has previously been reported as approximately one-in-four in Denmark. The underlying rationales for such claims may reflect convictions about traditional chiropractic subluxations paradigms, but are not self-evident and has not previously been studied.

Objectives: To investigate the underlying rationales for chiropractic online claims about non-MSK treatment.

Methods: An exploratory qualitative case interview study of Danish chiropractors with websites which contain claims about chiropractic efficacy in the treatment of non-musculoskeletal disorders. Websites were identified from a nation wide random sample (57%) of all chiropractic clinic websites.

Results: Of the original 139 websites, 36 were identified as mentioning non-MSK conditions. When revisited, 19 of those clinic websites still mentioned non-MSK disorders and were contacted. Eleven (11) declined our invitation to participate. Interviews were conducted with the responsible chiropractor from each of the remaining 8 clinics. Five distinct themes were identified in the rationales for treating non-musculoskeletal disorders: 'Positive side-effects,' 'Experience,' 'Web page,' 'Communication' and 'Conviction.'

Discussion: A minority of Danish chiropractic websites suggest that non-musculoskeletal disorders are within the chiropractic scope of practice. Those that do, do so for varying reasons—poor communication and website maintenance were commonly cited problems. An explicitly stated adherence to traditional chiropractic subluxations concepts was uncommon. By contrast, a more tempered rationale that suggested a potential beneficial side-effect of chiropractic on non-musculoskeletal health issues were more common and was typically presented in softer-language and/or with some reservations.

Booth # D-28

Development of a Practice-Based Research Network: The Collaborative Research UK Network for Chiropractic (CRUNCH)

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Abstract

Background: The interface between clinical practice and clinical research provides significant opportunities for the generation of relevant research questions, clinical data collection, and greater impact of research results. Whilst many other UK-based healthcare professions possess robust research cultures, and collect clinical data in established and routine manners, the chiropractic profession lacks capacity and activity in this approach. Other national organisations have developed and established practice-based research networks (PBRNs), in which members are committed to collecting clinical data, participating in research activity in collaboration with a team of experienced researchers. Using perceptions and experiences of key stakeholders, this research project will explore how best to facilitate these opportunities and overcome potential barriers to them. This information will be used to develop a Collaborative Research UK Network for Chiropractic (CRUNCH) using a practice-based research model. This network will provide a baseline dataset on practitioner and patient characteristics, reported in the final stage of the study.

Objectives: 1) To explore, document, and understand the challenges faced in creating, recruiting to, and running a research network in the UK from the practitioner perspective and engaging with existing networks in other national jurisdictions. 2) To create a UK-based research network organizational structure to which we will recruit UK based chiropractors using a recruitment and promotion strategy informed by aim 1. 3) To provide an initial baseline analysis of practitioner and patient characteristics within the network

Methods: In phase one, a qualitative analysis of stakeholder needs will be conducted. Semi-structured interviews (online or face-to-face) will be held with three stakeholder groups: UK-based registered chiropractors, international researchers and administrators with experience of setting up chiropractic PBRNs, and researchers and chiropractors currently participating in or utilizing data from existing PBRNs. Phase two will consist of using qualitative findings and findings of a literature review to develop a logic model. The logic model will represent key issues in PBRN development and key design features of its development and implementation. The final phase will be a cross-sectional study to collect baseline characteristics of participating chiropractors and their practices. Pilot testing of the survey will be undertaken, prior to distribution for data collection.

Results (anticipated or actual) : Data collection for phase one has begun. Recruitment for interviews with UK-based chiropractors has been successful, and data collection with other key stakeholders will begin imminently. It is anticipated that recruitment with other stakeholders will be successful.

Discussion: This project will lead to the development and implementation of a PBRN for chiropractic care in the UK. The methods employed over the three stages of the project were selected to provide information on the current understanding, preferences, and needs of UK chiropractors, facilitating the development of a PBRN which supports participation.

Booth # D-31

Exploration of chiropractic students' motivation toward the incorporation of new evidence on chiropractic maintenance care

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Abstract

Background: Chiropractic maintenance care (ChiroMC) is described as a long-term management strategy, introduced when optimum treatment benefit has been reached. Researchers have systematically investigated indications, content, and frequency of ChiroMC in a series of research projects, including a randomized clinical trial that subgroup low back pain patients by psychological characteristics. This study found differences in the outcome of ChiroMC that could fundamentally change the way ChiroMC is delivered in practice. From these findings, the MAINTAIN tool has been developed for subgrouping in clinical settings. This study was designed to explore the optimal way to train chiropractic students on the use of the MAINTAIN tool.

Objective: To explore final year students' attitudes towards incorporating evidence on chiropractic ChiroMC.

Methods: This layered mixed method inductive approach explored the research questions with surveys, monologue, and dialogue qualitative feedback from students in a chiropractic program at Parker University (USA) between Jan2021–Nov2021. The initial step of this research study involved all 5th-0th trimester students(n=563) completing a quantitative questionnaire that evaluated their attitudes/understanding of patient-centeredness (Patient-Practitioner Orientation Scale-PPOS) and chronic pain (Health Care Providers' Pain and Impairment Relationship Scale-HC-PAIRS), as well as their current evidence perspectives. The qualitative components began with four open-ended, reflective questions sent to 8th-9th trimester students(n=215). The next phase consisted of individual semi-structured interviews with students theoretically sampled to further explore responses from phase1. The final phase consisted of one-on-one semi-structured interviews developed from phase2 findings with a theoretical sampling of students used again. Descriptive statistics were performed for the quantitative questionnaire. For the qualitative phases of the study, responses to the open-ended responses and semi-structured interviews were reviewed by multiple team members. Codes and themes were generated for the responses with team members meeting to determine coding agreement and establishing a coding tree.

Results: The qualitative questionnaire was completed by 74.4% of students (n=419). The majority of students had already received their Bachelor's degree(84.5%), were male(57.5%), and had a mean grade point average of 3.15(SD:0.369). Evidence perspectives were diverse: Biomechanical, n=140(33.4%), General Problem/Biomechanical, n=18(4.3%); Biomechanical/Organic Visceral, n=6(1.4%); General Problems, n=110(26.3%); Somatic Dysfunction, n=49(11.7%), Vertebral Subluxation, n=96(22.9%). The PPOS(1-6; high score desired) had a mean score of 3.9(range: 1.72-5.17) and the HC-PAIRS(1-7; low score desired) had a mean score of 4.2(range: 2.20-6.27). Concepts identified through the qualitative phases included the need to have some basic understanding of MC terminology. There was much emphasis on the impact of the supervising clinicians' role on discussing evidence, seeing evidence in-action, and how to be continuously learners. The concept that research is something that builds education and experience, not something added to education was identified, along with the need to increase research literacy/confidence.
Discussion: As the MAINTAIN tool is furthered explored to assist with treatment plan development, key concepts from this study may assist with optimizing training strategies, including operationally defining terminology, involving instructors who are fundamental to students' training, and increasing research literacy.

Booth # D-32

Defining Chiropractic Professional Identity: A Concept Analysis

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Abstract

Background: The concept of professional identity within chiropractic is often discussed and debated, however in the field to date, there is no formal definition of chiropractic professional identity (CPI). This article aims to create a coherent definition of CPI and to formalise the conceptual domains that may encompass it.

Methods: Using the Walker and Avant (2005) process, a concept analysis methodology was employed to clarify the diffuse concept of CPI. This method initially involved selecting the concept (CPI), determining the aims and purpose of the analysis, identifying concept uses, and defining attributes. This was achieved from a critical literature review of professional identity across health disciplines. Chiropractic-related model, borderline and contrary cases were used to exemplify characteristics of CPI. The antecedents required to inform CPI, consequences of having, and ways to measure the concept of CPI were evaluated.

Results: From the concept analysis data, CPI was found to encompass six broad attributes or domains: knowledge and understanding of professional ethics and standards of practice, chiropractic history, practice philosophy and motivations, the roles and expertise of a chiropractor, professional pride and attitude, and professional engagement and interaction behaviours. These domains were not mutually exclusive and may overlap.

Discussion/Conclusion: A conceptual definition of CPI may bring together members and groups within the profession and promote intra-professional understanding across other disciplines. The CPI definition derived from this concept analysis is: 'A chiropractor's self-perception and ownership of their practice philosophies, roles and functions, and their pride, engagement, and knowledge of their profession'.

Booth # D-33

Are Menstrual Migraines Associated with Vertebral Artery Dissection and Cervical Spinal Manipulation? A Research Proposal

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Abstract

Background: Previous studies have found an association of vertebral artery dissection (VAD) and cervical manipulative therapy (cSMT). Currently, the exact mechanism of how or when this may occur is not clear. Migraines have been reported as having a strong association with VAD. A systematic review concluded that migraine sufferers have a two-fold increased risk of cervical artery dissection. Interestingly, approximately half of the 18% of women who suffer from migraines say they are connected to their menstrual cycle. Given this, some have suggested a relation between migraines and estrogen as estrogen is known to affect both the vascular and tendon/ligamentous system with the vascular system being implicated in migraines. We are currently unaware of any prior studies that have investigated to see if women migraineurs may be at a higher risk of a diagnosed VAD following cSMT and if this may be related to their menstrual cycle. As only around 15% of migraine sufferers have sought chiropractic care such a study would require a prospective design with a large number of eligible participants. Before such a study could be undertaken, we propose a single-site feasibility study to determine if the requisite data could be collected. **Objective:** To determine the feasibility of collecting VAD related data from a single major trauma emergency department. **Methods:** A standalone questionnaire would be added to the hospital's existing intake forms. The questionnaire would consist of a series of patient-reported and physician-reported responses. **Patient-reported responses:** Age Perimenopause History of migraine, last migraine Migraines attributed to menstrual cycle Last time cSMT was performed and by whom Reasons for having cSMT Any increase in head or neck symptoms after cSMT Head or neck trauma in the last two weeks. Taking oral contraceptives or any hormone altering drugs Smoker, packs per day Recent upper respiratory infection and/or the use of fluoroquinolone antibiotics in the past three months. **Physician-reported responses:** Unilateral or bilateral VAD Location of the VAD It may be possible to cross reference some of the obtained responses to concurrent data in other repositories (e.g., VAD diagnostic codes, etc). Feasibility will be achieved if 90% of diagnosed cases of VAD have a 90% questionnaire response rate with each questionnaire having 90% of its fields completed. **Possible limitations:** Including an additional questionnaire to the existing hospital protocol could be a challenge. In addition, the questionnaire would have to be a combination of patient self-report and physician-report which are both susceptible to various forms of bias. All data must be HIPAA compliance. **Conclusion:** If this initial project is conducted and deemed feasible, additional trauma centers would be contacted in order to ascertain interest and potential enrollment in a large multi-center study. Since most major medical centers already record the findings and outcomes on VAD patients this would be requesting them to expand their history/intake form and make that information available for analysis.

Booth # D-34

The association between chiropractors' view of practice and patient encounter-level characteristics in Ontario, Canada: a cross-sectional study

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Abstract

Background: Chiropractors have diverse views of practice, but the impact on their patient profiles and treatment approaches remains unclear. We assessed the association between chiropractors' view of practice (unorthodox versus orthodox) and patient encounter-level characteristics among chiropractors who practice in Ontario, Canada.

Methods: We conducted a cross-sectional study using Ontario Chiropractic Observation and Analysis Study (O-COAST) data. In O-COAST, Ontario chiropractors were randomly recruited from a list of registered chiropractors in 2015 and recorded up to 100 consecutive patient encounters. We classified chiropractors' response regarding their views of practice as unorthodox when viewing "vertebral subluxation as an encumbrance to health that is corrected to benefit overall well-being"; other views were considered orthodox. Patient encounter-level characteristics included: (1) non-musculoskeletal reason-for-encounter; (2) subluxation as diagnosis; (3) duration of encounter (log-transformed for modeling); (4) unimodal manipulative treatment; and (5) patient health characteristics (good health status, some activity limitations). We conducted multilevel logistic regression to assess the association between view of practice and aforementioned characteristics, accounting for potential confounders and clustering of encounters within chiropractors. The multilevel models had two levels (level 1—patient encounter level; level 2—chiropractor level), with level 1 patient encounters nested within level 2 chiropractors.

Results: We included 40 chiropractors (mean age = 43.4 years, SD = 11.5) and 3,378 chiropractor-patient encounters. The 2,332 unique patients identified had a mean age of 48.5 years (SD = 18.5). Chiropractors with unorthodox views had higher odds of having patients with a non-musculoskeletal reason-for-encounter (adjusted odds ratio (aOR) 16.5, 95% CI 3.2–84.0) and subluxation as diagnosis (aOR 63.0, 95% CI 4.2–949.1). Encounters of chiropractors with unorthodox views were 0.6 times shorter than those with orthodox views (95% CI 0.4–0.9). Chiropractor level explained 32%, 75%, and 49% of the variability in non-musculoskeletal reason-for-encounter, subluxation as diagnosis, and encounter duration, respectively. We observed no association between unorthodox view and unimodal manipulative treatment or patient health characteristics.

Discussion: Chiropractors with an unorthodox view of practice were associated with treating a non-musculoskeletal reason for encounter, subluxation as diagnosis, and shorter duration of encounter. Chiropractor level explained a high proportion of the variability in these outcomes. Findings have implications for understanding chiropractic practice and informing interprofessional collaboration and future research.

Booth # D-35

Force distribution within spinal tissues during posterior to anterior spinal manipulative therapy: a secondary analysis

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Abstract

Background: It is well known that spinal manipulative therapy (SMT) transfers forces to different spinal tissues. Previous studies have shown that the intervertebral disc experiences the greatest forces during SMT and that the distribution of SMT forces among spinal tissues change as a function of the applied SMT parameters. However, a more comprehensive description of SMT force distribution contextualizing the forces experienced by spinal structures relative to the ones applied and experienced by the whole functional spinal unit is still needed to understand the underlying mechanisms of this common conservative therapy.

Objective: This study aimed to describe the percentage force distribution between spinal tissues relative to the applied SMT forces and total force experienced by the functional unit.

Methods: A secondary analysis of forces experienced by spinal structures during a posterior-to-anterior SMT application was conducted. Thirty-five fresh porcine cadavers were exposed to a simulated 300N SMT thrust to the skin overlying the left L3/L4 facet joint via servo-controlled linear motor actuator. Vertebral kinematics were tracked optically using indwelling bone pins. The functional spinal unit was then removed and mounted on a parallel robotic platform equipped with a 6-axis load cell. The kinematics of the spine during SMT were replayed by the robotic platform. By using serial dissection, peak (maximum force during thrust) and mean (average force during preload and thrust) forces induced by the simulated SMT experienced by spinal structures in all three axes of motion were recorded by the load cell. Forces experienced by spinal structures were analyzed descriptively and the resultant force magnitude was calculated.

Results: During SMT, the intact functional spinal unit experienced a median peak resultant force magnitude of 36.4N (IQR: 14.1N) and a mean resultant force magnitude of 25.4N (IQR: 11.9N). Peak resultant magnitude experienced by the spinal segment corresponded to 12.1% of the total force that was applied during SMT thrust (300N). The resultant force magnitude experienced by the intact functional spinal unit was then considered to be 100%. Relative to this, the supra and interspinous ligaments experienced 0.3% of the peak forces and 0.5% of the mean forces. Facet joints and ligamentum flavum experienced 0.7% of the peak forces and 3% of the mean forces, while intervertebral disc and longitudinal ligaments experienced 99% of the peak and 96.5% of the mean forces.

Discussion: In this animal model, a small percentage of the forces applied during a posterior-to-anterior SMT reach spinal structures in the lumbar spine. Most SMT forces (over 96%) are experienced by the intervertebral disc. This study provides a novel perspective on SMT force distribution within spinal tissues.

Booth # D-36

Social Network and Lexical Analysis of CARLoquium 2021

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Abstract

Background: Academic conferences are an important element of the research ecosystem, and so stakeholders will want to understand what to expect of upcoming conferences and what to make of past events. There are no broadly accepted metrics by which to gauge the success of a conference, and it may be that, in general, no formal post-hoc analysis is performed.

Objectives: The purpose of this study was to pilot a number of methodologies to characterize the poster presentations and the presenters at CARLoquium 2021.

Methods: The conference proceedings from CARLoquium 2021 were downloaded as a pdf and converted to a worksheet using Excel power query. The names, primary affiliations, and countries of the presenters were extracted, as were titles of presentations and the names of co-authors. Numbers of presentations per country and per institution were calculated and graphed in Excel. A corpus of presentation titles was created in Excel and processed in VosViewer 1.6.18 to create a network visualization of nouns and noun phrases which commonly co-occurred in presentation titles. The identification of over-represented terms (also called 'keywords' in linguistics) was confirmed by statistical comparison performed in WordSmith Tools V8, using a reference corpus of general English. A network map of contributors was created in the network application Gephi 0.9.2 by mapping presenters, as 'sources', onto all of their co-authors, as 'targets'. Node sizes were weighted according to the number of presentations on which a participant was listed as a contributor, and nodes were coloured according to whether or not a contributor was a faculty member/fellow of CARL.

Results: Data were obtained for 108 poster presentations. Seventy-eight percent (85 of 108) of presentations originated from just 4 countries: Canada (27), Denmark (21), Australia (20) and the USA (17). Thirty-nine percent (42 of 108) of presentations originated from 4 institutions: the University of Southern Denmark (12), Macquarie University (12), Balgrist University Hospital (10) and Canadian Memorial Chiropractic College (8). Lexical analysis of titles showed a predominance of terms associated with clinical practice, especially as it related to musculoskeletal care. References to the basic sciences and education were extremely sparse. Faculty and fellows of CARL represented 22% (117 of 537) of contributor listings although they only represented 9% (30 of 339) contributors. Two contributors exhibited very high levels of connectedness within the network as measured by 'degree': 26 and 20, respectively, compared to an average of 2.38 for all participants. Furthermore, one of these contributors exhibited an extraordinarily high level of influence as measured by Eigenvector centrality: 1.0 compared to an average of 0.05 for all participants.

Discussion: This is the first application of network analysis to an academic conference in chiropractic, and so there are no standards against which to measure the results presented herein. However, the organizers may wish to consider whether the diversity of topics and contributors, and the social dynamics of CARLoquium 2021 reflect their goals for the conference.

Booth # D-37

Descriptive comparison of force-time profiles of diversified and terminal point technique measured with a novel hand-held force sensing load cell: a protocol design

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Abstract

BACKGROUND: Low back pain and other musculoskeletal conditions are among the leading causes of disability globally. Chiropractic utilises high velocity, low amplitude spinal manipulative therapy (HVLA SMT) to treat a range of musculoskeletal and health related conditions. HVLA SMT plays a central role in pain management as it has been shown to decrease pain and improve function.

Quantifying forces delivered during HVLA SMT (force-time profile) is important when considering the efficacy of therapy and safety of the patient. Chiropractors apply a range of manipulative techniques, but it is unknown how technique choice influences the force-time profile of the HVLA thrust. Previous studies have quantified HVLA SMT, but have used multiple measurement devices, varied sensor placement, and heterogeneous study designs, making technique comparison difficult. The use of a single sensing device across different techniques under controlled conditions will solve this issue.

AIM: To descriptively compare two styles of high velocity low amplitude spinal manipulative therapy commonly used by chiropractors, using a novel measurement device.

METHODS: A hand-held force sensing load cell ("puck") will be used to measure HVLA SMT thrusts delivered by three experts upon a mannequin. Experts (participants) are registered chiropractors/educators who have a minimum five years of clinical experience in Diversified and terminal point technique (TPT). The puck will be positioned on the mid "thoracic" region of a prone mannequin upon a standard treatment table. The puck will be positioned between the participant's hand and the mannequin. Participants will deliver 10 Diversified thrusts to the mannequin. Participants will then deliver 10 TPT thrusts on the mannequin while positioned on a "drop" treatment table. The drop piece within the table is raised (approximately 20mm) to the "cocked" position before each TPT thrust. Measurement outcomes are key parameters of the force-time profile. For each thrust (60 total) the following parameters will be recorded: mean preload force (N), take off force (N), loading rate (N/ms), total peak force (N) and duration (ms). The mean of each set of 10 force-time profiles will be described and compared between each technique.

EXPECTED RESULTS: It is expected the force-time profiles of Diversified and TPT thrusts will differ. Additionally, it is hypothesised force-time profiles will differ between participants. It is anticipated that the Diversified-thrust will generate larger total peak forces, while TPT-thrust will generate a greater loading rate and have two force peaks; the first due to practitioner thrust and the second from the drop table reaction force.

CONCLUSION: The use of a novel hand-held puck will allow the measurement and comparison of force-time profiles between different HVLA SMT styles due to its portability. By using a single measurement device in future studies, we may gain insight into clinical effect based on different force-time profiles.

Booth # D-38

CIRCuit: Recruiting for a new international chiropractic practice-based research network

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Abstract

Background: The Chiropractic International Research Collaborative (CIRCuit) is an exciting practice-based research network (PBRN) opportunity. CIRCuit aims to connect researchers with clinicians and their patients to facilitate data collection from real-world practices and communities. CIRCuit will commence clinician recruitment within a year to become members of our international chiropractic focused PBRN.

Objective: To recruit members to the CIRCuit PBRN and simultaneously collect detailed data about their demographics, and practice and patient care characteristics.

Methods: Chiropractic clinicians will initially be recruited through the Evidence-Based Chiropractic Network Facebook group, which currently has more than 11,000 members, who are primarily chiropractors. After providing information about the CIRCuit PBRN and the role of clinician membership, all those who agree to become members will be asked to complete an online survey. The survey will gather information about the practitioner, their practice/s, and their routine patient care.

Outcomes: These data will form the CIRCuit database of clinician members. The database will be used to target recruitment information for approved research projects by matching projects to clinician members and their patients. We will publish anonymous data describing the characteristics of the CIRCuit PBRN members after the initial recruitment drive.

Booth # D-41

The moderating role of depressive symptoms on the association between symptoms severity and time to recovery in individuals with grade I-II whiplash-associated disorders

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Abstract

Background: Depression is one of the strongest predictors of delayed recovery in acute whiplash-associated disorders (WAD). Yet, we do not understand the mechanisms through which depressive symptoms impact recovery.

Objective: We investigated the moderating role of depressive symptoms on the association between pain severity and time to recovery in individuals with grade I-II WAD.

Methods: We conducted a secondary analysis of a randomised controlled trial investigating the effectiveness of a government-regulated rehabilitation guideline for the management of grade I-II WAD. Participants who completed baseline questionnaires for neck pain intensity and depressive symptoms and follow-up questionnaire on self-reported recovery were included in the analysis. We built Cox proportional hazards models and reported hazard rate ratios to describe the association between neck pain intensity and time to self-reported recovery and to assess the effect modification of depressive symptoms.

Results: We included data from 303 participants. Despite baseline level of depressive symptoms and neck pain intensity being independently associated with delayed recovery, the association between neck pain intensity and time to recovery was not stronger for individuals with significant post-collision depressive symptoms (HRR=0.91 (95%CI 0.79–1.04)) than for those without depressive symptoms (HRR=0.92 (95%CI 0.83-1.02)).

Discussion: Depressive symptoms are not an effect modifier of the association between neck pain intensity and time to self-reported recovery in acute WAD. This finding may have important implications in whiplash-associated disorders management. Specifically, this suggest that different interventions should target both pain and depression to optimize recovery.

Booth # D-42

Reassurance for low back pain in primary healthcare: a scoping review protocol

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Abstract

Background: Low back pain (LBP) is the leading cause of disability globally. Evidence-based guidelines recommend reassurance as a first-line intervention for LBP. Reassurance is defined as the 'de-escalation of fears and concerns. Reassurance can be provided as an intervention, the amount of reassurance created as a result of an intervention can be measured (e.g. using the consultation-based reassurance questionnaire (CRQ)), or patient outcomes of a reassurance intervention can be measured, such as, fear-avoidance or illness concern. Despite reassurance being widely accepted as essential in the management of LBP, the methods in which this is delivered in a consultation are poorly defined.

A preliminary search of MEDLINE, the Cochrane Database of Systematic Reviews, and Joanna Briggs Institute Evidence Synthesis was conducted on the 11/01/2022, found no current published systematic or scoping reviews that describe reassurance interventions for low back pain or how reassurance interventions and reassurance outcomes have been measured.

Objectives: We will conduct a scoping review of the literature with the following aims: (i) identify and describe interventions that aim to deliver reassurance to patients with LBP of any duration in primary healthcare settings. (ii) identify how the degree of reassurance delivered during the intervention is assessed (e.g. CRQ) and (iii) identify how the outcomes of a reassurance intervention are assessed (e.g. disability, healthcare utilisation and fear avoidance behaviours) in studies identified in aim (i).

Methods: This scoping review will be performed in accordance with the Joanna Briggs Institute methodological framework for scoping reviews. We will conduct an electronic database search of EMBASE, Medline, Cochrane Central, and CINAHL, and forward and backward citation tracking of relevant papers. Two authors will independently screen titles and abstracts. Full-texts will be retrieved and independently screened against the eligibility criteria described below: **Participants:** Patients with LBP +/- leg pain of any duration. Studies that included patients with underlying serious pathology will be excluded (e.g. cauda equina, cancer, infection and/or inflammatory arthritis). **Concept:** Studies that explore reassurance interventions, measurement of reassurance interventions and measurement of reassurance outcomes. Studies do not need to explicitly mention reassurance; however, the intention to provide reassurance needs to be apparent. Studies may discuss reassurance related to one or more of the following topics: prognosis (LBP has a favourable prognosis or LBP is usually self-limiting), pathology (benign nature of LBP, LBP is rarely caused by a serious health problem, or a specific diagnosis of LBP is not essential for effective management) and activity (safety of return to movement/work/usual activities). **Context:** Studies which explore reassurance in a primary healthcare setting.

We will extract data publication details, study design, study objectives, participants, concept, context, LBP characteristics, methodology, outcome measures, and key findings. Data will be analysed descriptively, and interventions described using the TiDieR checklist.

Discussion: This study will provide important information about available reassurance interventions, and measurement of reassurance interventions and reassurance outcomes in primary healthcare settings. In addition, this review will help to highlight evidence gaps and inform the development of future research in this area.

Booth # D-43

Clinical indications or rationales for the use of diagnostic imaging for spinal disorders by chiropractors: a scoping review protocol

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Abstract

Background: Spinal disorders, including pain, dysfunction or deformities are leading causes of disability globally and commonly present to primary healthcare practitioners such as chiropractors. Chiropractors primarily diagnose and manage musculoskeletal disorders, and in some jurisdictions can perform or refer for specific types of diagnostic imaging. Practitioners are generally encouraged to restrict the use of imaging to cases where it is considered the gold standard for the identification of a particular pathology or where there is sufficient evidence that imaging will alter the patient's clinical management. This is to ensure that the potential benefit of the imaging outweighs the potential risks, such as cost to the patient or exposure to radiation.

Clinical indications, such as specific signs or symptoms that increase the suspicion of spinal disorders are commonly used to justify imaging. Practitioners may also rationalise the need for imaging based on factors such as their clinical experience, patient preference, or access to facilities.

Clinical indications and rationales for the use of imaging can vary considerably between individual chiropractors. Potentially due to conflicting advice regarding its appropriateness in different clinical scenarios being delivered by different professional authorities or bodies. However, the extent to which, and how they vary is currently unknown. Our objective is to identify and synthesize the clinical indications or rationales for diagnostic imaging put forward by chiropractors for patients with spinal disorders.

Methods: This scoping review will be performed in accordance with the framework outlined by the Joanna Briggs Institute and pre-registered on the open science framework. A search strategy will be developed in consultation with a research librarian and will include search terms relating to 'spinal disorders,' 'diagnostic imaging' and 'chiropractic.' A search of MEDLINE, Embase, CINAHL and Index to Chiropractic Literature (ICL) from database inception to March 2022 will be performed, as well as forward and backward citation searching. Retrieved sources will be screened by two reviewers. Eligible sources must include patient's presenting to a chiropractor for the assessment of a spinal disorder and discuss the clinical indications or rationale used to determine whether imaging will be referred for or taken. Included sources must be published in peer reviewed journals or be referenced within a published source. Sources will not be limited by study type. The results of the screening process will be presented in a PRISMA flow diagram. The extracted data will be analysed descriptively using content analysis to identify and categorise potentially salient clinical indications or rationales for diagnostic imaging.

Discussion: This will be, to our knowledge, the first review to identify and synthesize all published clinical indications or rationales chiropractors use to justify diagnostic imaging for patients with spinal disorders.

This review will help to identify potential research gaps in our understanding of how chiropractors make clinical decisions regarding diagnostic imaging. It may inform future research investigating the validity and reliability of certain indications/rationales, as well as how diagnostic imaging may change the clinical course or inform a chiropractor's management of patients with spinal disorders.

Booth # D-44

Chronic opioid use before and after exercise therapy and patient education among patients with knee or hip osteoarthritis

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Abstract

Background: Exercise therapy and patient education can reduce osteoarthritis-related pain, but the potential to reduce opioid use among chronic opioid users is unknown.

Objectives: To investigate changes in opioid use after supervised exercise therapy and patient education among knee or hip osteoarthritis patients with chronic opioid use.

Methods: Cohort study based on nationwide patient register data linked with national health registries. Patients starting a standardised primary care treatment program for osteoarthritis (Good Life with osteoArthritis in Denmark, GLA:D[®]) between January 2013 and November 2018 were included. GLA:D[®] consists of supervised neuromuscular exercises (12 sessions) and group-based patient education (2 sessions) delivered by a trained physiotherapist over an 8-week period. Chronic opioid use was defined in line with a previously published definition based on the amount and temporal distribution of dispensed opioids. We used change in annual opioid use measured as milligram oral morphine equivalents (OMEQs) from the year before the intervention to the year after as outcome.

Results: Among 35 549 included patients, 1262 were classified as chronic opioid users the year before the intervention. Chronic opioid users were on average 66 years old, 78% were women, and the mean BMI was 30.3 kg/m². We found a 10% decrease in mg OMEQs from the year before to the year after the intervention (mean mg OMEQ before: 13 988 [standard deviation: 15 506] vs. after: 12 671 [15 542]; incidence rate ratio [IRR]: 0.90, 95% confidence interval [CI]: 0.86, 0.94). Additional analyses suggested this decrease to be mainly attributable to regulatory actions targeting opioid prescribing during the study period (IRR among patients participating in the intervention before: 0.98 [95% CI: 0.89, 1.07] vs. after: 0.83 [0.74, 0.93] regulatory actions). In a random sample of matched chronic opioid users from the general population, a similar opioid use pattern was observed over time, further supporting the impact of regulatory actions on the opioid use in the study population.

Conclusions: Among patients with knee or hip osteoarthritis and chronic opioid use, a standardised first-line treatment program did not change opioid use when regulatory changes in opioid prescribing were taken into account.

Booth # E-21

Selecting patients suitable for Chiropractic Maintenance Care: Development and evaluation of the MAINTAIN instrument – The Nordic Maintenance Care program

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Booth # E-22

Association of pain neurophysiology knowledge and application amongst UK chiropractic students: a cross-sectional study

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Abstract

Background: The experience of pain is subjective and more than a simple sensation, and is influenced by experience, beliefs, culture, and expectations. Previous research has identified that damage, pain, and nociception are not directly linked and pain management should encompass biopsychosocial approaches including beliefs, memories, language, and knowledge. Chiropractic interns can help manage patients who present with pain, both passively and actively and integrate evidence-based care during this process. There is currently no research exploring chiropractic students' pain neurophysiology knowledge and their application of chronic pain mechanisms in practice.

Methods: Participants were chiropractic students in their final year undergraduate (MChiro), and 1st and/or 2nd year post-graduate studies (MSc 1 and 2, and MSc Graduate Entry 2) from AECC University College (AECCUC) and University of South Wales (USW) (n=231). The main variable was the result of the revised Neurophysiology of Pain Questionnaire (rNPQ) and the researcher's self-made questionnaire: applying chronic pain knowledge in practice. This contained statements regarding the benefits of patient education, understanding and explanation of pain and its importance. It also included statements concerning the participants' confidence applying pain science within the management of chronic pain patients. Data were analysed using Microsoft Excel and SPSS.

Results: There was an overall response rate of 21.6% (n=50). Of these, 96% (n = 48) were from AECCUC and 4% (n = 2) from USW. Most participants were in the age range of 21-24 (n = 72%). The total rNPQ mean score was 71% (95% CI: 42.7-94.8). rNPQ mean scores were different for gender, where males had significantly higher mean scores 5.18 (1.29) than females 3.89 (1.44). There was no significant difference in rNPQ mean scores by age, number of chronic pain patients seen in practice or previous qualifications. The question that achieved the lowest percentage was: "when part of your body is injured, special pain receptors convey the pain message to your brain" (12%) and the highest percentage was: "worse injuries always result in worse pain" (98%).

Discussion: Overall, the level of knowledge of pain amongst these students can be considered high (71%) when compared to similar studies. This study showed that male students had slightly higher knowledge of pain than females. It is unclear why this is the case but could be suggestive that men understands the teaching aspects better. This study included a relatively small number of participants from two universities, as well as a low response rate (21.6%). Future studies with larger samples should be conducted. The survey results may also have been influenced by the responders having an existing knowledge and interest in understanding pain.

Conclusion: The findings from this survey show that the majority of AECCUC and USW chiropractic interns utilise knowledge of pain science in their practice with an understanding that compares favourably with similar research. It is recommended that future research and curricula prioritise the education of pain mechanisms within the profession to further inform and assist clinical practice

Booth # E-26

Low Back Pain Visits Seen From the Patient and Clinician Perspective: A Protocol For a Field Study in Chiropractic, Physiotherapy and General Practice

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Abstract

Introduction: Patients with low back pain (LBP) report discrepancies between their own and clinicians' beliefs about diagnosis and management of LBP, which present challenges to obtaining patient satisfaction and providing quality care.

Objectives: The purpose of this study is to explore how patients and clinicians perceive LBP visits in chiropractic, physiotherapy, and general practice. Specifically, we address research questions such as: what do patients hope for and expect from their LBP visit, how do patients and clinicians communicate in the clinical encounter, focusing on the decision-making process, and how do patients and clinicians experience the clinical encounter?

Methods: A qualitative field study is conducted using focused ethnography. Patients scheduling visits regarding LBP in chiropractic, physiotherapy, or general practices receive information about the study from clinicians or staff. If they give consent to contact, the researcher approaches the patients for inclusion. We aim to include two practices from each profession. Data is generated pre-, during, and post-visits, and includes formal and informal interviews pre- and post-visit for patients, post-visit for clinicians, and observations during the visit. Interviews are transcribed verbatim, and observations are jotted down as field notes. An inductive thematic content analysis approach is conducted and involves the iterative process of open and subsequently focused coding to identify themes and subthemes related to the research questions. Written consent is collected from patients and clinicians.

Results: We expect this study will add understanding to what patients find important and clinicians find challenging in the management of patients with LBP. Meeting patient expectations and involving patients in decision-making are important parts of patient-centred care, and these data may shed light on whether the way the patients were managed by clinicians aligned with the patients' hopes and expectations. Further, we can seek an understanding of clinicians' thoughts and considerations about clinical management and the challenges they experience in everyday practice.

Discussion: Patients seek care from different clinicians in the same sector but in different contexts. This study has the potential to highlight communicative and interactional factors that are important to both patients and clinicians within each practice, understand differences and similarities in the clinical encounters and elements affecting them, and discuss how to address the findings in future research and clinical practice. Clinical encounters are complex interactions, and this design allows for investigating what is observed and what is experienced from the patient, clinician, and observer perspective. Combining data from the same event will allow a detailed description of what influences the outcomes of the clinical encounter.

Booth # E-27

Attitudes, Beliefs, and Recommendations for Chronic Low Back Pain Patients: Cross-Sectional Surveys of a Chiropractic Teaching Clinic

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Abstract

Background: Attitudes and beliefs of providers have an influence on patient outcomes. Despite the prevalence of chiropractors' confidence and engagement in spine care and chronic pain conditions, chiropractors' attitudes and beliefs related to chronic spine pain and its impact on patients are not fully known. The attitudes and beliefs of chronic low back pain (CLBP) patients in chiropractic students and faculty has also not been evaluated.

Objective: To assess attitudes and beliefs of students and faculty of a chiropractic teaching institution in 2018 and 2020 regarding CLBP and evaluate their recommendations for work and activity in vignettes of patients with CLBP.

Methods: The Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS) and clinical vignettes were requested to be completed by chiropractic faculty and all students at Parker University in April 2018 and July-December 2020. The HC-PAIRS is a 15-item measurement tool developed to assess the attitudes and beliefs of health care providers regarding functional expectations for patients with CLBP and 4 factors (Functional Expectations, Social Expectations, Need for Cure, Projected Cognition). It has been shown to be a valid and reliable assessment tool for HCPs using a 1-7 point rating scale. The higher the score, the stronger the belief that CLBP justifies disability and the limiting of activities. The 3 clinical vignettes have been found to be valid ways to explore physicians' recommendations regarding work and activity levels for CLBP patients.

Results: Response Rate: Student response rates in 2018 and 2020 were 497/781=63.6% and 325/1176=27.6%. Faculty were 23/30=76.7% and 22/53=41.5%, respectively. HC-PAIRS Results: Both students (2018=4.41, 2020=4.42) and faculty (2018=3.66, 2020=3.49) had a slight decrease in scores with students' decrease being statistically significant (mean change=0.19, $p<0.05$) but not the faculty's score decrease (mean change=0.17, $p=0.55$). Faculty did have statistically significantly lower scores than students both years ($p<0.05$). In both years, faculty had lower scores than students in all factors except for Projected Cognition in 2020 (faculty=5.45, student=5.36). Both faculty and student scores decreased for Functional Expectations (faculty=3.51,3.14; student=4.36,4.11) and Need for Cure (faculty=3.38,3.02; student=4.41,4.00). Faculty scores increased for Social Expectation (3.14,3.26) and Projected Cognition (5.00,5.45) and scores did not change for students.

Clinical Vignette Results: The percentage of faculty that provided adequate activity (62.1%,66.7%) and work (41.0%,45.5%) recommendations increased from 2018 to 2020, but were not statistically significant. The percentage of students that provided adequate activity recommendations decreased (33.9%,30.3%), while adequate work recommendations increased (22.1%,23.8%); both were not statistically significant.

Discussion: This initial exploration of students and faculty at a chiropractic teaching institution's attitudes and beliefs of CLBP patients found student mean scores (4.22-4.41) to be on the higher end of other published healthcare professional students' scores (3.49-3.66). Faculty mean scores (3.49-3.66) were also on the higher end of HC-PAIRS scores from HCP's scores (2.58-3.80).

Response rates in 2020 were much lower due to COVID. While spurious decreases occurred, they were not clinically meaningful. Future work should investigate specific strategies to modify attitudes and beliefs regarding CLBP and assess if these changes do enhance patient outcomes.

Booth # E-28

‘There’s a dance to be had’: Exploring the interface between UK chiropractors and evidence-based practice. A reflexive thematic analysis.

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Abstract

Background: Most surveys of chiropractor’s attitudes to evidence-based practice (EBP) assume they have a good understanding of the term. Other work looking at Chiropractors relationship with EBP focus on research and rarely focus on expertise or patient values. Understanding how chiropractors relate to this predominant health care paradigm could help inform the educational strategies of regulators, associations and course curricula development.

Objectives: The aim of this exploratory study was to investigate the landscape of practice knowledge that chiropractors use to make decisions about the patients in their care. To achieve this, observations and interviews of 20 practicing chiropractors were undertaken in 2019 in which the interface of the chiropractor and EBP were explored. The data were interrogated using a reflexive thematic analysis.

Methods: The study used a non-participant observational approach to watch chiropractors at work in their own clinics. Semi-structured interviews followed immediately after the observations and explored areas relevant to the research. Field notes and transcriptions of recorded interviews were read and re-read whereupon patterns of meaning were set into codes. Using a reflexive thematic analysis, themes as ‘Central Organising Concepts’ were constructed from the data using an inductive reasoning and a hermeneutic approach.

Results: Four themes were developed and represent central organising concepts. 1 - The Otherness of EBP: These participants found it difficult to define EBP. They felt it was optional and created by others and was a barrier to innovation in practice. To them, EBP was a process not owned by chiropractors, undertaken only for professional recognition and legal protection. 2 - ‘There’s a dance to be had’: performance and EBP. The more of a routine with treatment and examination these participants demonstrated, the less the chiropractor related to the idea of EBP. Donald Schon’s ‘Technical Rationality’ versus his ‘Professional Artistry’ is suggested as an interpretation of this phenomena. 3 - An Incongruence of thought: These participants felt that EBP did not apply to them whilst in contrast they supported the profession’s use of EBP. This incongruity suggests a complex and possibly unresolved relationship with EBP. 4 - An imbalance of practice knowledge: These chiropractors privileged non-propositional knowledge (knowledge from practice or personal experience) over propositional knowledge. ‘Results’ drove their decision making. Whereas their definition of EBP often centred around research, they explicitly used professional experience to inform their care in preference to codified knowledge

Discussion: For these participants the relationship they have with EBP begins with their difficulty in defining it. This and their distance from the concept guides their thoughts on its use in practice. As a consequence they regard results that they observe in clinic as their main decision driver. This suggest that these chiropractors favour knowledge gained in practice at the expense of codified knowledge.

Booth # E-31

Subsequent and recurrent injuries in elite Australian football players

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Abstract

Background: Professional football (soccer) players incur many injuries each season that pose a major burden on player participation and performance. While the rate of new injuries is higher than the rate of recurrent injuries, recurrent injuries may incur a longer period of absence from play. Having incurred an injury may also be associated with subsequent injury risk, particularly for strains of the thigh and sprains of the knee and ankle. Recent advances in subsequent sports injury categorisation can be applied to injury surveillance data retrospectively.

Objectives: This study aims to: determine rates of subsequent and recurrent injury in elite Australian football players; quantify and describe subsequent and recurrent injury in elite Australian football players by setting, mechanism, type, and location on the body; and quantify and describe subsequent and recurrent injuries in elite Australian football players by severity in terms of time-loss from match play.

Methods: We plan to conduct a retrospective analysis of prospectively collected observational injury surveillance data from six consecutive seasons of men's (A-League Men) and women's (A-League Women) elite Australian football. The injury data was collected by Football Australia for both A-Leagues on an on-going prospective basis. A de-identified dataset will be sourced from Football Australia's ongoing injury surveillance study. Our secondary analysis of subsequent and recurrent injuries will be of observations (data collected) in the 2012/13 to 2017/18 seasons. The subsequent injury categorisation 2.0 model (SIC2.0) will be retrospectively applied to the working dataset. The SIC2.0 provides a two-tiered hierarchical structure for subsequent injury categorisation. The SIC2.0 model has the ability to identify and differentiate a number of different relationships between a subsequent injury and the injuries that preceded it. This data-driven approach allows for greater sensitivity than previous subsequent injury models and provides a standardised method of categorisation that is reproducible. Regarding our analysis, descriptive statistics will be used to quantify and describe the distribution of subsequent and recurrent injuries by setting, mechanism, type, location on the body, severity, and type of SIC2.0 category. Subsequent injury incidence rates per athlete season will be calculated with 95% confidence intervals using standard formulae for Poisson rates. If the data allows it, subsequent injury incidence rates may also be calculated using different denominators (e.g. per athlete-game, per athlete-game hours) from subsets of the data. Injury burden will be presented graphically using an injury risk matrix plot.

Significance: Systematic reviews show recurrent and subsequent injury evaluation is inconsistent and underutilised in football and across many other professional and elite sports. Limited understanding of subsequent injuries continues to hamper return-to-play considerations and mitigation strategies in sports injury prevention. Knowledge acquired in our research may aid in better clinical management of sports injuries. This study will inform the knowledge gap by reporting estimates of subsequent and recurrent injuries in elite Australian football players.

Booth # E-32

Association of a clinical journal club with knowledge, attitudes, and behaviour of evidence-based practice among chiropractic students: a before-and-after pilot study

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Abstract

Background: Evidence-based practice (EBP) has been conceptualised as the integration of the best research evidence with clinical expertise and patients' values and preferences. To date, little is known about the knowledge, attitudes, and application of EBP among chiropractic students and trainees. Our aim was to examine the association of implementation of a new chiropractic journal club with knowledge, attitudes, and application of EBP among chiropractic students and trainees in a Swiss university chiropractic education setting.

Methods: Through a newly implemented chiropractic journal club based on "community of practice" and 'team-based learning' conceptual frameworks, we conducted a before-and-after pilot study with 5th and 6th year chiropractic students and postgraduate trainees between 1 February 2021 and 31 July 2021. We administered a brief survey measuring participant characteristics and a validated questionnaire assessing EBP knowledge, attitudes, personal application, and future use, before and after the first and last journal club sessions, respectively. We summarised participants' characteristics using descriptive statistics, estimated overall before-and-after EBP total scores and factor scores (ie, knowledge, attitudes, personal application, and future use), and conducted an exploratory subgroup analysis based on journal club attendance (Group A: 3-5 sessions attended, Group B: ≤ 2 sessions attended).

Results: Among 32 eligible students and trainees, we enrolled a total of 29 participants: 25 (78%) responded to the pre- and 29 (91%) to the post-assessment surveys. Participants had a mean age of 26 ± 4 years and 79% (n=23) were female. There were 10 (35%) 5th year students, 13 (45%) 6th year students, and 6 (21%) postgraduate trainees. Group A consisted of 12 and group B of 17 participants. Overall, our findings were compatible with no difference in before- and after- EBP scores (median EBP total score before: 116 [IQR, 105-122], median EBP total score after: 117 [IQR, 102-123]). We found some small before-and-after differences in the EBP factor scores for knowledge, attitudes, personal application, and future use. Exploratory subgroup analyses were consistent with our overall findings.

Conclusion: Our pilot study suggests that embedding chiropractic educational research within a newly implemented journal club is feasible, although the small study size of a single semester limits our conclusions. Due to our nonrandomized pilot design, causal inferences about the effect of the journal club on EBP knowledge, attitudes, personal application, and future use should be avoided or at least very cautiously interpreted.

Booth # E-37

The relationship between induced leg length inequality and pelvis orientation: a pre and post measurement study.

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Abstract

BACKGROUND: Chiropractors commonly deduce that a relationship exists between leg length inequality (LLI) and intrapelvic torsion, knowledge which underpins interventions in systems-based techniques. However, the design of kinematic studies to date do not allow for accurate estimates of the magnitude and direction of pelvic torsion, in three-dimensional (3-D) planes, as a function of LLI. This uncertainty about pelvis kinematics creates ambiguity in the use of heel-lift therapy when managing lumbo-pelvic conditions.

OBJECTIVE: The aim of this study was to evaluate the immediate effects of artificially induced LLI on whole-pelvis and relative-pelvis orientation using 3-D motion analysis.

METHODS: A single group repeated measures design studied the effects of artificially induced LLI on the pelvis orientation of healthy adults aged 18 to 30 years. 3-D optoelectronic motion capture tracked the movement of infrared markers attached at standardised positions on each participant. A series of heel-lifts (5, 9 and 12 mm) were placed in the right shoe of participants in either an order of sequentially increasing height or decreasing height. Kinematic data were used to create a participant-specific 8-segment linked rigid model of the lower extremities, pelvis, and thorax. Two additional representations of the left and right sides of the pelvis segment quantified their relative movement. All models were capable of calculating joint angles to determine overall pelvis orientation (global and relative movement) at upright stance. An a priori sample size calculation ($\beta=95\%$, $\alpha=5\%$, $F=0.33$) determined a sample size of 22 was required.

RESULTS: Fourteen males and eight females were enrolled (25 ± 1.6 years). One-way repeated-measures analysis of variance showed significant main effects of heel-lifts in the frontal plane ($F(3,63)=53.466, p<0.001, \eta^2=0.718$) and sagittal plane ($F(3,63)=9.590, p<0.001, \eta^2=0.314$) for the whole-pelvis, and the norm of rotations about all three axes ($F(3,63)=3.081, p=0.034, \eta^2=0.128$) for relative-pelvis orientation. From 0 to 12 mm of heel-lift, the whole-pelvis orientation changed -1.38° ($-1.77^\circ, -0.99^\circ$) in the frontal plane and 1.79° ($0.56^\circ, 3.03^\circ$) in the sagittal plane, while the norm of rotations about all three axes of relative-pelvis orientation changed 1.12° ($-0.07^\circ, 2.31^\circ$).

DISCUSSION: This study is the first to use 3-D motion capture to measure the immediate effects of heel-lifts on pelvis orientation, raising doubts about traditional understanding of the relationship between LLI and intrapelvic torsion. While heel-lifts are associated with small changes ($<2^\circ$) to whole- and relative-pelvis rotations during immediate upright stance, future research is required to evaluate the effect of heel-lifts in the management of people with back and pelvis pain attributed to LLI.

Booth # E-38

Who are the Quebecers who consult in chiropractic or physiotherapy in Quebec? : a secondary analysis of the CCHS

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Abstract

Background: Physiotherapists and chiropractors have overlapping scopes of practice. Emerging studies suggest that the use of these paramedical services in Quebec may differ from the rest of Canada.

Objective: The objective of this study is to compare the characteristics of patients who consult physiotherapist with those of those who consult chiropractors.

Method: A secondary analysis of Quebec data from the 2017–2018 Canadian Community Health Survey was conducted. The characteristics of respondents having consulted a physiotherapist were compared with those of respondents having consulted a chiropractor using t-test and chi-square tests.

Results: It is estimated that the 292,700 Quebecers consulting physiotherapists report poorer health, living in urban areas, being minors or very old, studying and suffering from repetitive movement injuries, more than the 312,300 consulting chiropractors. Quebec chiropractic consultants were more likely to report a spinal injury and being employed. There were no significant differences in gender, level of education, smoking, and identification of a regular source of medical care.

Conclusion: The use of chiropractic and physiotherapy services in Quebec varies according to perceived health status, type of injury, age, and administrative regions. Although there are differences between chiropractors and physiotherapist patients, there is also many similitudes and further studies would be required to better define their respective field of practice as well inter-professional collaborative opportunities.