# SYDNEY SPINAL SYMPOSIUM

HYATT REGENCY
DARLING HARBOUR
FRIDAY, 29 SEPTEMBER 2023

2023

# DELEGATE E-BOOK

SYDNEYSPINALSYMPOSIUM.ORG

# Table of Contents


WELCOME ..... 2
INFORMATION FOR DELEGATES AND PRESENTERS ..... 3
Venue Directory ..... 3
Registration Desk ..... 3
2023 Committee Listing ..... 3
Registration Inclusions ..... 4
Poster Viewing & Networking Reception ..... 4
Small Group Dinners ..... 4
Speaker Preparation ..... 4
Name Badges ..... 4
Internet Access ..... 4
iPhone/Android Conference Web-App ..... 5
Special Meal Requests ..... 5
Mobile Phones ..... 5
Insurance ..... 5
Disclaimer ..... 5
SPONSORS ..... 6
INVITED SPEAKERS ..... 7
PROGRAM ..... 9
**Friday 29th September 2023** ..... 9
**Registration, Coffee and Poster Mounting** ..... 9
**Acknowledgment of Country and Opening Remarks** ..... 9
**Session 1: Pharmacological and Non-Pharmacological Management of Spinal Pain** ..... 9
**Morning Tea and Poster Viewing** ..... 9
**Session 2: The Role of Pathology in Spinal Pain** ..... 9
**Lightning Talks 1** ..... 10
**Lunch and Poster Viewing** ..... 10
**Session 3: Surgical Management of Spinal Pain** ..... 10
**Lightning Talks 2** ..... 10
**Afternoon Tea & Poster Vieiwing** ..... 11
**Session 4: Spinal Outcomes** ..... 11
**Lightning Talks 3** ..... 11
**Dinner as small groups** ..... 11
POSTER LISTING ..... 12
SPONSOR & EXHIBITOR LISTING ..... 15
FULL ABSTRACTS ..... 17

# WELCOME

The **5th Annual Sydney Spinal Symposium (SSS 2023)** will be held at the **Hyatt Regency Sydney** in Darling Harbour on **Friday, 29th September 2023.**

The Sydney Spinal Symposium is built on the strong support of past stakeholders including practitioners, researchers, educators, and sponsors. A rich program of keynote speakers, featuring visiting professors and surgeons, will be complemented by leading researcher talks with abstract and poster presentations. A major feature in 2023 will be having the ANZBACK group as official participants to SSS and joining the scientific committee.

The program will include social and networking opportunities for Sponsors and Delegates to further develop their professional networks in a relaxed yet focused environment.

We would like to thank everyone for their participation and contributions!

**Ashish Diwan**
*Conference Chair*

**Dr Ashish Diwan**
Main Office, Suite 16, Level 5
St George Private Hospital
1 South St, Kogarah NSW 2217
T (02) 8566-7166 | F (02) 8566-7177
E A.Diwan@spine-service.org | W www.spineservice.com.au

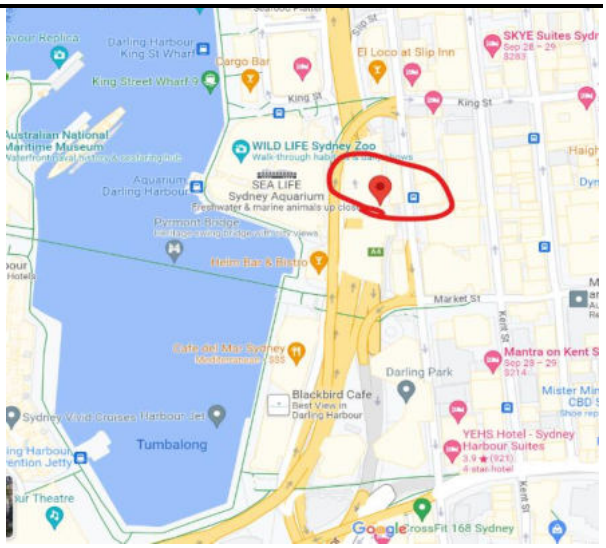
# INFORMATION FOR DELEGATES AND PRESENTERS

## Venue Directory

**Hyatt Regency Sydney**

161 Sussex Street
Sydney NSW 2000
Ph: +61 2 8099 1234
Web address: www.sydneyspinalsymposium.org

| Location | Item |
|---|---|
| **Maritime Room 2 & 3** | Sessions |
| **Maritime Room 4** | Exhibition and breaks |




## Registration Desk

The registration desk is located just outside Maritime Rooms 2 & 3. All symposium related enquires should be directed to ASN Events staff at this desk.

Upon entry to the hotel lobby, head to the left end of the hotel to the escalators up to the Maritime Ballroom.

Operation times: Friday, 29th September 2023, 7:30 AM – 6:30 PM

**Onsite Conference Manager:**
Sally Wills, ASN Events
Email: sally.w@asnevents.net.au
Mobile: +61 417 763 332
**ASN Events Pty Ltd**
9/397 Smith St, Fitzroy 3065
P: +61 3 8658 9530
Web: www.asnevents.com.au

## 2023 Committee Listing

**ORGANISING COMMITTEE**

| | |
|---|---|
| Ashish Diwan | Conference Chair |
| Christopher Little | Committee Co-Chair |
| Christopher Maher | Committee Co-Chair |
| Kyle Sheldrick | Committee Co-Chair |
| Neha Chopra | Program Committee Chair |
| Giovanni Ferreira | Program Committee Chair |

## Registration Inclusions

Delegates will receive the following goods and services as part of their registration:

- Access to the sessions of your choice
- Conference pocket timetable
- Morning tea, lunch and afternoon tea
- Ticket to the poster viewing & drinks reception (please RSVP if you haven't already, for catering purposes)
- Use of the Conference App
- Complimentary WIFI

## Poster Viewing & Networking Reception

All delegates are invited to join the committee and fellow delegates and presenters for a final poster viewing and networking reception on Friday, 29th September 2023 from 5:15PM – 6:30PM in Maritime Room 4 at the Hyatt Regency Sydney. Tickets are included in the registration; however, bookings are required for catering purposes. Please register via your registration portal here or see staff at the registration desk to RSVP if you haven't already done so online.

## Small Group Dinners

Following the poster viewing and networking reception, delegates are encouraged to sign up to join small dinner groups of about 10 – 15 people at various locations throughout Darling Harbour. Sign-up sheets will be located at the registration desk throughout the day. This dinner is not included in your registration fee, and each delegate will cover their own tab.

## Speaker Preparation

Presentations are to be loaded directly onto the PC in Maritime room 2 & 3 in the break prior to your session or prior to the start of the symposium if you are in the first session of the day. Presenters should bring their talk on a USB, saved in a format for display on a PC within the room (i.e. PowerPoint). An AV technician will be on hand to assist with uploading and to help you check your presentation. **Please note there is no Mac computer in the presentation room.**

## Name Badges

Delegates and registered partners are required to wear their nametags to all scientific and catered sessions.

## Internet Access

There is complimentary Wi-Fi available for Sydney Spinal Symposium delegates to use. Please connect to Hyatt_Meeting and accept the terms and conditions for access and enter the password: hyattevents (all lowercase).

The passcode will last for 12 hours and will give you 8MB up and down within that 12-hour period.

**Network:** Hyatt_Meeting
**Password:** hyattevents (all lowercase)

## iPhone/Android Conference Web-App

The App is displayed in a simple and easy to read format on your phone, iPad, or even your computer. To get the 'App', please open the below link in your internet browser on your smart phone, iPad or laptop.

http://sss-2022.m.asnevents.com.au/

You will be prompted to add an icon onto your device home screen. The web-based App will allow you to:

- View the full conference program
- View all abstracts for the conference
- Save your favorite sessions and plan your day
- Take notes which will then be saved and downloaded from your registration profile

To use most of these functions, you will be prompted to 'log in" each day. Simply enter the same email & password which you used to register.

## Special Meal Requests

If you have listed a dietary requirement when you registered (vegetarian, dairy-free etc.) please identify yourself to Hyatt staff at the designated dietary requirements station at all breaks. All requests have been passed on and will be catered for accordingly.

## Mobile Phones

Please ensure your mobile phone is turned to silent during any session you attend.

## Insurance

The hosts and organisers are not responsible for personal accidents, any travel costs, or the loss of private property, and will not be liable for any claims. Delegates requiring insurance should make their own arrangements.

## Disclaimer

The hosts, organisers and participating societies are not responsible for, or represented by, the opinions expressed by participants in either the sessions or their written abstracts.

# SPONSORS

## Gold Sponsor

GLOBUS MEDICAL

## Silver Sponsors

DEVICE TECHNOLOGIES

NUVASIVE

## Exhibitors

3M Science. Applied to Life.™

Mainstay Medical

SIGNUS The Spine Sign®

SUcceSS

THE UNIVERSITY OF SYDNEY

## Academic Sponsor

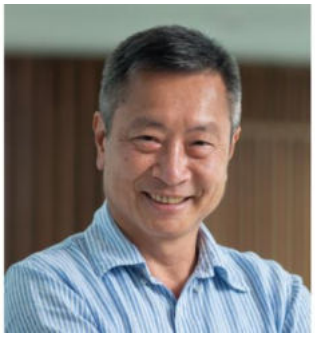
Maridulu Budyari Gumal
Working together for good health and wellbeing

# INVITED SPEAKERS

**ASSOCIATE PROFESSOR CLAIRE JONES**
***University of Adelaide, Adelaide, Australia***

Associate Professor Claire Jones is a research and teaching academic in the School of Electrical & Mechanical Engineering, and the Centre for Orthopaedics & Trauma Research, at The University of Adelaide. She is an affiliate Research Fellow at the South Australian Health and Medical Research Institute, and the Royal Adelaide Hospital. A/Prof Jones obtained her PhD in biomechanics from the University of British Columbia, where she initiated the development of the UBC porcine model of spinal cord injury.

At The University of Adelaide, A/Prof Jones leads the Adelaide Spinal Research Group, a multidisciplinary research team that brings together engineers, medical scientists and clinicians to study the biomechanics of the neuro- and musculoskeletal systems, with a primary focus on spinal column and spinal cord injury, and brain injury. Her research platforms encompass human volunteers, pre-clinical large animal models and cadaver models of trauma. A/Prof Jones' research has, in part, been funded by the Australian National Health and Medical Research Council, and the Australian Research Council. She is passionate about working with research students and staff to build a team environment that fosters inclusion, provides meaningful development opportunities and motivates research excellence.



**PROFESSOR DANNY CHAN**
***School of Biomedical Science, University of Hong Kong, Hong Kong***

Danny Chan is a professor and Director of the School of Biomedical Science at the University of Hong Kong, and Assistant Dean for research and research postgraduate studies at HKUMed. He graduated from the University of Melbourne, with BSc(Hons), MSc and PhD.

His research interest is in skeletal biology, focusing on development, growth, and degenerative processes of the skeleton. He has a particular interest in rare diseases. His research has contributed to key understandings in cartilage/bone development and growth, in health and disease. The emphasis is on genes regulating the linear growth of long bones, the formation of a synovial joint, and the intervertebral disc of the spine. The approach is to identify novel disease genes and to model the disease in mice to define the precise molecular and developmental changes. He leverages on the scientific discoveries to formulate therapeutic strategies in stem cell and regenerative medicine.

He is passionate in community outreach, supporting patients with rare diseases. He and his research team helped to initiate "The Little People of Hong Kong" Foundation in Hong Kong, an NGO for the patient groups, and to increase the community's awareness of their needs. He is also a council member of Rare Disease Hong Kong (RDHK), advocating for the needs of all rare disease patients in our society.

**PROFESSOR LISA HARVEY**
***University of Sydney, Sydney, Australia***

Professor Lisa Harvey (PhD) has 20 years clinical experience in spinal cord injuries. She currently holds an academic position at Faculty of Medicine and Health, University of Sydney where she teaches, runs her own research program, and supervises PhD students. She has over 200 publications which include clinical trials and systematic reviews. Most of her research has focused on putting an evidence base to widely administered rehabilitation interventions following spinal cord injury. She is currently principal investigator on the SCI-MT Trial which involves 15 sites across 8 countries. She teaches widely both nationally and internationally and is recent past Editor-in-Chief of *Spinal Cord*.

# PROGRAM

## Friday 29th September 2023

**Registration, Coffee and Poster Mounting**
7:30AM - 8:15AM

**Acknowledgment of Country and Opening Remarks**
8:15AM - 8:30AM Maritime Rooms 2&3

**Session 1: Pharmacological and Non-Pharmacological Management of Spinal Pain**
8:30AM - 10:00AM Maritime Rooms 2&3
Chair: Christopher Han & Adrian Traeger

8:30 AM **Claire Jones** *abs# 1*

9:00 AM **Aidan Cashin**
Pharmacological treatments for low back pain in adults: an overview of Cochrane Reviews *abs# 2*

9:15 AM **Jack Devonshire**
Effectiveness of Cognitive Functional Therapy for Reducing Pain and Disability in Chronic Low Back Pain: Systematic Review and Meta-analysis abs*# 3*

9:30 AM **Giovanni Ferreira**
Adding pain science or ergonomics messages to guideline advice does not increase feelings of reassurance in people with acute low back pain: a randomised experiment abs*# 4*

**Morning Tea and Poster Viewing**
9:45AM - 10:45AM Maritime Room 4

**Session 2: The Role of Pathology in Spinal Pain**
10:45AM - 12:00PM Maritime Room 2&3
Chair: Giovanni Ferreira

10:45 AM **Danny Chan**
Genetics, progression and biology of intervertebral disc degeneration *abs# 5*

11:15 AM **Stone Sima**
In subjects with back and leg pain, does Neuropathic Pain exclusively correlate to neuronal compression? A correlation study of and corresponding MRI and x-Ray findings *abs# 6*

11:30 AM **Zachary Gan**
Clinimetric evaluation of the painDETECT questionnaire: A tool used to differentiate nociceptive versus neuropathic pain in the context of the lower back *abs# 7*

11:45 AM **Christopher S Han**
Low back pain of disc, sacroiliac joint, or facet joint origin: a diagnostic accuracy systematic review *abs# 8*

**Lightning Talks 1**
12:00PM - 12:15PM Maritime Room 2&3
Chair: Giovanni Ferreira

12:00 PM **Teng Zhang**
SpineQ 3D: The fully automated 3D quantitative assessment of lumbar spine *abs# 20*

12:03 PM **Christopher Neason**
Is a twelve-week running program appropriate for people with chronic low back pain? Efficacy and feasibility data from a randomised controlled trial *abs# 21*

12:06 PM **Teng Zhang**
3D Spine model synthesis based on the back geometry *abs# 22*

12:09 PM **Harrison J Hansford**
The comparative effectiveness of lumbar fusion surgery and spinal decompression surgery for lumbar spinal stenosis: protocol for a target trial emulation *abs# 23*

12:12 PM **Stone Sima**
The Association Between Inflammatory Biomarkers and Low Back Disorder: A Systematic Review and Meta-Analysis *abs# 24*

**Lunch and Poster Viewing**
12:30PM - 2:00PM Maritime Room 4

**Session 3: Surgical Management of Spinal Pain**
2:00PM - 3:00PM Maritime Room 2&3
Chair: Ashish Diwan & Christopher Han

2:00 PM **Ashish Diwan**
Title coming soon *abs# 49*

2:30 PM **Giovanni Ferreira**
Surgical versus non-surgical treatment for sciatica: systematic review and meta-analysis of randomized controlled trials *abs# 11*

2:45 PM **Adrian C Traeger**
Spinal cord stimulation for low back pain *abs# 12*

**Lightning Talks 2**
3:00PM - 3:15PM Maritime Room 2&3
Chair: Ashish Diwan & Christopher Han

3:00 PM **Stone SS Sima**
Gut microbiome may predict spine surgery outcome: A pilot study *abs# 26*

3:03 PM **Froukje Koremans**
Influence of BMI on disability outcomes in Spinal Endoscopic Surgery: a cohort study *abs# 27*

3:06 PM **Charmian Stewart**
Halo traction evaluation of Cranio-cervical instability in hereditary connective tissue disorder patients: Case series *abs# 28*

3:09 PM **Caitlin Jones**
Randomized placebo-controlled trial of opioid analgesia for acute low back pain and neck pain – the OPAL trial *abs# 29*

3:12 PM **Lauren Barber**
Use of intra-operative 3D fluoroscopy during open posterior instrumented lumbar spine fusions is associated with an increased risk of infection *abs# 30*

**Afternoon Tea & Poster Vieiwing**
3:15PM - 4:00PM Maritime Room 4

**Session 4: Spinal Outcomes**
4:00PM - 5:00PM Maritime Room 2&3
Chair: Danny Chan & Caitlin Jones

4:00 PM **Lisa Harvey**
The international standards for neurological classification of spinal cord injury – essentials for orthopaedic surgeons and spine researchers *abs# 14*

4:30 PM **Alla Melman**
Prevalence of serious spinal pathology: clinical setting matters *abs# 15*

4:45 PM **Manon MS Levayer**
Pseudo-registration of spine trials and their outcomes *abs# 16*

**Lightning Talks 3**
5:00PM - 5:15PM Maritime Room 2&3
Chair: Danny Chan & Caitlin Jones

5:00 PM **Rosemary Marchese**
Improvement of trunk muscle endurance in adolescents with idiopathic scoliosis treated with ScoliBrace and the ScoliBalance exercise approach to scoliosis *abs# 31*

5:03 PM **Alla Melman**
Determining the effectiveness and feasibility of a virtual hospital model of care for low back pain *abs# 32*

5:06 PM **Prashanth Rao**
Cooled radiofrequency ablation of the sacroiliac joint a retrospective series *abs# 33*

5:09 PM **Prashanth JV Rao**
Endoscopic lumbar discectomy early results and complications an Australian perspective *abs# 34*

5:12 PM **Nashwa Najib**
The MYelopathy NAtural History (MYNAH) Registry: Protocol for Australian registry *abs# 35*

**Poster Viewing, Drinks & Substantial Canapes**
5:15PM - 6:30PM Maritime Room 4

**Dinner as small groups**
6:30PM - 10:00PM Various locations along Darling Harbour

# POSTER LISTING

**Gemma Altinger**
NUDG-ED: A randomised trial using behavioural nudges to reduce low-value care in Emergency Department clinical practice *abs# 37*

**Rodrigo Rizzo**
Non-pharmacological and non-surgical treatments for low back pain in adults: an overview of Cochrane Reviews *abs# 38*

**Saurab Sharma**
Low back pain care in 32 low- and middle-income countries *abs# 39*

**Alisha Wafa Dr Sial**
Radiological Factors Associated with Increased Intramedullary Signal Intensity Based on X-ray and MRI – Implications in our understanding of Degenerative Spondylomyelopathy *abs# 40*

**Deborah M Wareham**
A scoping review on swimming for low back pain *abs# 42*

**Natasha C Pocovi**
A qualitative study of participant perspectives of a walking program for preventing low back pain recurrences *abs# 43*

**Christina CA Abdel Shaheed**
Opioid analgesics for Osteoarthritis: Systematic Review and Meta-analysis *abs# 44*

**Ralph J Mobbs**
Proposed objective scoring algorithm for assessment and intervention recovery following surgery for lumbar spinal stenosis based on relevant gait metrics from wearable devices: the Gait Posture index (GPi) *abs# 45*

**Lauren Barber**
Socioeconomic Status and Race Do Not Influence Inpatient Opioid Use in One-Level Posterior Lumbar Fusions for Degenerative Spondylolisthesis *abs# 46*

**Lianne Koinis**
Characterising the pathological gait signatures of degenerative lumbar spine diseases using inertial wearable sensors: an observational study *abs# 47*

**Rohil Chauhan**
Is Degenerative Cervical Myelopathy being Missed in Primary Healthcare? *abs# 48*

**Teng Zhang**
SpineQ 3D: The fully automated 3D quantitative assessment of lumbar spine *abs# 20*

**Christopher Neason**
Is a twelve-week running program appropriate for people with chronic low back pain? Efficacy and feasibility data from a randomised controlled trial *abs# 21*

**Teng Zhang**
3D Spine model synthesis based on the back geometry *abs# 22*

**Harrison J Hansford**
The comparative effectiveness of lumbar fusion surgery and spinal decompression surgery for lumbar spinal stenosis: protocol for a target trial emulation *abs# 23*

**Stone Sima**
The Association Between Inflammatory Biomarkers and Low Back Disorder: A Systematic Review and Meta-Analysis *abs# 24*

**Stone SS Sima**
Gut microbiome may predict spine surgery outcome: A pilot study *abs# 26*

**Froukje Koremans**
Influence of BMI on disability outcomes in Spinal Endoscopic Surgery: a cohort study *abs# 27*

**Charmian Stewart**
Halo traction evaluation of Cranio-cervical instability in hereditary connective tissue disorder patients: Case series *abs# 28*

**Caitlin Jones**
Randomized placebo-controlled trial of opioid analgesia for acute low back pain and neck pain – the OPAL trial *abs# 29*

**Lauren Barber**
Use of intra-operative 3D fluoroscopy during open posterior instrumented lumbar spine fusions is associated with an increased risk of infection *abs# 30*

**Rosemary Marchese**
Improvement of trunk muscle endurance in adolescents with idiopathic scoliosis treated with ScoliBrace and the ScoliBalance exercise approach to scoliosis *abs# 31*

**Alla Melman**
Determining the effectiveness and feasibility of a virtual hospital model of care for low back pain *abs# 32*

**Prashanth Rao**
Cooled radiofrequency ablation of the sacroiliac joint a retrospective series *abs# 33*

**Prashanth JV Rao**
Endoscopic lumbar discectomy early results and complications an Australian perspective *abs# 34*

**Nashwa Najib**
The MYelopathy NAtural History (MYNAH) Registry: Protocol for Australian registry *abs# 35*

DEVICE SPINE

INTEGRITY IMPLANTS

# FLAREHAWK9

## EXPANDABLE LUMBAR INTERBODY FUSION SYSTEM

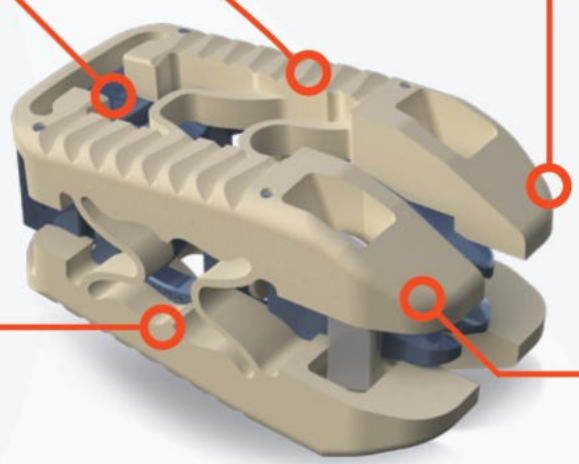
### Implant Design Features

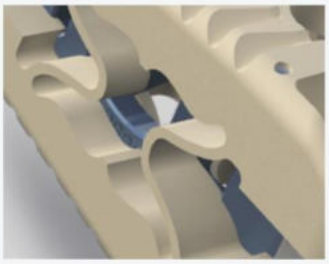
Titanium shim allows stability and height restoration

PEEK has been found to be appealing in orthopaedic applications due to its stiffness properties comparable to bone, inertness, and biocompatibility.[1,2]

Open architecture allows for continuous graft delivery through the implant and out into the disc space for substantial graft delivery

FlareHawk technology delivers an increase in width, height, and lordosis





Tapered nose facilitates insertion

**MINIMAL INSERTION PROFILE | MULTIDIRECTIONAL EXPANSION | SUBSTANTIAL GRAFT DELIVERY | ENDPLATE CONFORMITY**


*1. Warburton, A., Girdler, S. J., Mikhail, C. M., Ahn, A., & Cho, S. K. (2020). Biomaterials in Spinal Implants: A Review. Neurospine, 17(1), https://doi.org/10.14245/ns.1938296.148.*

*2. Ong, Y. (2015). New biomaterials for orthopedic implants. Orthopedic Research and Reviews, 7, 107–129. https://doi.org/10.2147/ORR.S63437*


FOR MORE INFORMATION, CONTACT YOUR LOCAL DEVICE TECHNOLOGIES REPRESENTATIVE


DEVICE TECHNOLOGIES

**1300 DT SPINE** (38 77463) spinecustomers@device.com.au www.device.com.au



RA.0109202310

# SPONSOR LISTING

**GLOBUS MEDICAL AUSTRALIA PTY LTD** ***Table 1***

***GOLD SPONSOR***

Globus Medical is driving significant technological advancements across a complete suite of products ranging from musculoskeletal solutions to enabling technologies.
For more information, visit globusmedical.com/international.

**NuVasive** ***Table 2***

***SILVER SPONSOR***

NuVasive, Inc. is the leader in spine technology innovation, with a mission to transform surgery, advance care, and **change** lives. The Company's less-invasive, procedurally integrated surgical solutions are designed to deliver reproducible and clinically proven outcomes. The Company's portfolio includes surgical access instruments, spinal implants, fixation systems, biologics, software for surgical planning, navigation and imaging solutions, magnetically adjustable implant systems, and intraoperative neuromonitoring technology. With more than $1 billion in net sales, NuVasive operates in more than 50 countries.

**Device Technologies** ***Table 8***

***SILVER SPONSOR***

From high-quality consumables to advanced theatre equipment and robotics, Device Technologies is Australasia's largest independent provider of medical solutions and technologies. Partnering with the world's most innovative medical companies, Device Technologies offers a comprehensive range of supplies – with client and patient care at the core of our values. Our dedicated team of over 950 highly skilled healthcare specialists and support staff, is committed to providing superior outcomes for healthcare professionals and their patients across the entire healthcare community.

**Maridulu Budyari Gumal – SPHERE**

***ACADEMIC SPONSOR***

Maridulu Budyari Gumal is an NHMRC accredited Research Translation Centre with an ambitious purpose: to change the future of healthcare. We are a collaboration of universities, hospitals, research institutes, community, and primary care centres across the Sydney basin. We have combined 15, thought-leading organisations who have come together to create the Sydney Partnership for Health, Education, Research and Enterprise. Each partner is world-renowned for research, innovation, and education. Each has specialist healthcare knowledge and a heritage of game-changing initiatives to their name. We're building on this work, taking the best from each discipline to change the way we do healthcare – for good.

As partners, we are committed to working together in a spirit of collaboration. To accelerating life-changing research. To reducing healthcare costs and increasing healthcare value. To inspiring and training the next generation of health professionals. To improving economic prosperity in our region. And to creating real world benefits for our patients and communities.

Together we have over 50,000 staff, more than 100,000 students and over $5 billion in annual revenue. It is this combination of staff, facilities, and resources we are harnessing to create a world-leading health system in Australia.

# EXHIBITOR LISTING


**Globus Medical** ***Table 1***

**Nuvasive** ***Table 2***

**Device Technologies** ***Table 8***

**University of Sydney** ***Table 3***

**Mainstay Medical** ***Table 6***

**Signus Australia** ***Table 9***

**3M Australia Pty Ltd.** ***Table 10***

# FULL ABSTRACTS

**1**

## Abstract Not Available

**Claire Jones**[1]

*1. The University of Adelaide, Adelaide, SA, Australia*

Abstract not available

**2**

## Pharmacological treatments for low back pain in adults: an overview of Cochrane Reviews

**Aidan G Cashin**[1, 2], **Benedict M Wand**[3], **Neil E O'Connell**[4], **Hopin Lee**[5], **Rodrigo RN Rizzo**[1, 2], **Matthew K Bagg**[1, 3], **Edel O'Hagan**[1], **Christopher G Maher**[6, 7], **Andrea D Furlan**[8], **Maurits W van Tulder**[9], **James H McAuley**[1, 2]

*1. Centre for Pain IMPACT, Neuroscience Research Australia, Randwick, Australia*

*2. School of Health Sciences, University of New South Wales, Sydney, Australia*

*3. School of Physiotherapy, The University of Notre Dame Australia, Fremantle, Australia*

*4. Department of Health Sciences, Centre for Health and Wellbeing Across the Lifecourse, Brunel University, London, UK*

*5. Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences (NDORMS), University of Oxford, Oxford, UK*

*6. Sydney Musculoskeletal Health, The University of Sydney, Sydney, Australia*

*7. Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, Australia*

*8. Institute for Work & Health, Toronto, Canada*

*9. Department of Health Sciences, Faculty of Earth and Life Sciences, VU University Amsterdam, Amsterdam, Netherlands*

### Aims

To summarise the evidence from Cochrane Reviews of the efficacy, effectiveness, and safety of systemic pharmacological interventions for adults with non-specific low back pain (LBP).

### Methods

The Cochrane Database of Systematic Reviews was searched from inception to 3 June 2021, to identify reviews of randomised controlled trials (RCTs) that investigated systemic pharmacological interventions for adults with non-specific LBP. Two authors independently assessed eligibility, extracted data, and assessed the quality of the reviews and certainty of the evidence using the AMSTAR 2 and GRADE tools. The review focused on placebo comparisons and the main outcomes were pain intensity, function, and safety.

### Results

Seven Cochrane Reviews that included 103 studies (22,238 participants) were included. The reviews reported data on six medicines or medicine classes: paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, benzodiazepines, opioids, and antidepressants.

We found no high- or moderate-certainty evidence that any investigated pharmacological intervention provided a large or medium effect on pain intensity for acute or chronic LBP compared to placebo. For acute LBP, we found moderate-certainty evidence that NSAIDs and muscle relaxants may provide a small effect on pain, and high-certainty evidence for no evidence of difference between paracetamol and placebo. For safety, we found very low- and high-certainty evidence for no evidence of difference with NSAIDs and paracetamol compared to placebo for the risk of adverse events, and moderate-certainty evidence that muscle relaxants may increase the risk of adverse events. For chronic LBP, we found low-certainty evidence that NSAIDs and very low- to high-certainty evidence that opioids may provide a small effect on pain. For safety, we found low-certainty evidence for no evidence of difference between NSAIDs and placebo for the risk of adverse events, and low-certainty evidence that opioids may increase the risk of adverse events.

### Conclusions

The available evidence suggests that pharmacological interventions for adults with non-specific LBP appear to be ineffective or only marginally effective, and carry an increased risk of adverse events. There is a clear need to prioritise new effective and cost-effective treatment strategies to improve care for people with LBP.

**3**

## Effectiveness of Cognitive Functional Therapy for Reducing Pain and Disability in Chronic Low Back Pain: A Systematic Review and Meta-analysis

**Jack JD Devonshire**[1, 2], **Michael MW Wewege**[1, 2], **Harrison HH Hansford**[1, 2], **Hasibe HO Odemis**[1], **Benedict BW Wand**[3], **Matthew MJ Jones**[1, 2], **James JM Mcauley**[1, 2]

*1. University of New South Wales, RANDWICK, NEW SOUTH WALES, Australia*

*2. Centre for pain IMPACT , Neuroscience Research Australia , Sydney, NSW, Australia*

*3. Faculty of Medicine, Nursing & Midwifery and Health Sciences, The University of Notre Dame Australia, Fremantle , WA, Australia*

**OBJECTIVE:** We aimed to evaluate whether cognitive functional therapy (CFT) is an effective treatment for adults with chronic low back pain (LBP).

**DESIGN:** Intervention systematic review with meta-analysis.

**LITERATURE SEARCH:** We searched 4 electronic databases (CENTRAL, CINAHL, MEDLINE, and Embase) and 2 clinical trial registers (ClinicalTrials. gov and the EU Clinical Trials Register) from inception up to March 2022.

**STUDY SELECTION CRITERIA:** We included randomized controlled trials evaluating CFT for adults with LBP.

**DATA SYNTHESIS:** The primary outcomes were pain intensity and disability. Secondary outcomes were psychological status, patient satisfaction, global improvement, and adverse events. Risk of bias was assessed using the Cochrane Risk of Bias 2 tool. Certainty of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) approach. Random-effects meta-analysis with the Hartung-Knapp-Sidik-Jonkman adjustment was used to estimate pooled effects.

**RESULTS:** Fifteen trials were included (9 ongoing and 1 terminated), of which 5 provided data (n = 507; n = 262 CFT, and n = 245 control). There was very low certainty for the effectiveness of CFT compared to manual therapy plus core exercises (2 studies, n = 265) for reducing pain intensity (mean difference: −1.02/10, 95% confidence interval: −14.75, 12.70) and disability (mean difference: −6.95/100, 95% confidence interval: −58.58, 44.68). Narrative synthesis showed mixed results for pain intensity, disability, and secondary outcomes. No adverse events were reported. All studies were judged to be at high risk of bias.

**CONCLUSION:** Cognitive functional therapy may not be more effective than other common interventions for reducing pain and disability in adults with chronic LBP. The effectiveness of CFT is very uncertain and will remain so until higher-quality studies are available.

**4**

## Adding pain science or ergonomics messages to guideline advice does not increase feelings of reassurance in people with acute low back pain: a randomised experiment

**Giovanni Ferreira[1], Joshua Zadro[1], Adrian Traeger[1], Caitlin Jones[1], Courtney West[1], Mary O'Keeffe[1], Hazel Jenkins[2], James McAuley[3], Christopher Maher[1]**

*1. Institute for Musculoskeletal Health, Institute for Musculoskeletal Health, Sydney Local Health District & The University of Sydney, Sydney, NSW, Australia*

*2. Department of Health Professions, Department of Health Professions, Faculty of Medicine and Health Sciences, Macquarie University, Sydney, NSW, Australia*

*3. Centre for Pain IMPACT, Neuroscience Research Australia, Sydney, NSW, Australia*

**Background:** Standard guideline advice includes messages on the importance of staying active, returning to work as early as possible, and to avoid bed rest. There are several popular approaches to providing advice to people with acute low back pain in addition to guideline advice, such as messages based on pain science of ergonomics principles. It is unknown whether adding those messages to standard guideline advice is more effective at reassuring patients than providing guideline advice only.

**Objective:** To investigate the effects of adding pain science or ergonomics messages to guideline advice on feelings of reassurance and management intentions among people with acute low back pain (LBP).

**Design:** Three-arm parallel-group randomised experiment.

**Methods:** We recruited people with acute LBP (pain for ≤ 6 weeks) who were randomised at a 1:1:1 ratio to guideline advice alone (adapted from the Australian LBP clinical care standard), or with the addition of brief pain science or ergonomics messages. Reassurance that (i) no serious condition is causing LBP and (ii) continuing with daily activities is safe were co-primary outcomes. Secondary outcomes were perceived risk of developing chronic pain, management intentions (bed rest, see a health professional, see a specialist, and imaging), credibility, and relevance of the advice in addressing the participant's concerns.

**Results:** Data from 2,297 participants (99.3% of 2,313 randomised) were analysed. Adding brief pain science or ergonomics messages to guideline advice did not change reassurance that LBP was not caused by serious disease. The addition of ergonomics advice provided worse reassurance that it is safe to continue with daily activities compared to guideline advice (mean difference [MD]: -0.33, 95% CI 0.13 to 0.53). There was no difference between groups on management intentions.

**Conclusion:** Adding pain science or ergonomics messages to guideline advice did not increase reassurance or change management intentions in people with acute LBP. Ergonomics messages may lead to reduced feelings of reassurance.

**5**

## Genetics, progression and biology of intervertebral disc degeneration

**Danny Chan[1]**

*1. School of Biomedical Sciences, LKS Faculty of Medicine, The University of Hong Kong, Hong Kong*

Intervertebral disc degeneration (IDD) is a primary cause of chronic back pain, impacting millions of people worldwide. This presentation provides a summary of the current state of IDD research, focusing on genetic aspects based on magnetic resonance imaging (MRI) as the gold standard. It highlights the need for larger cohorts and the inclusion of quantitative molecular traits to enhance detection power.

IDD is a complex disease with diverse MRI features, and understanding their correlations with each other and disease progression is crucial for assessing genetic predisposition and improving clinical management. Such insights can be obtained through longitudinal MRI imaging in large cohort studies.

The potential benefits of biological interventions in disease prevention and progression are yet to be explored. To this end, it is essential to understand the key biological alterations within the disc, examining cell and extracellular matrix changes. The focus should be on disc progenitor cells, the balance between anabolic and catabolic activities of disc cells, and their responses to environmental factors such as mechanical loading and nutritional/hypoxic stress.

Clearly, a multidisciplinary approach is necessary to gain insights into the genetics, progression, and biology of IDD. This will pave the way for the development of innovative therapeutic strategies and more precise management of back pain caused by IDD.

## 6

### In subjects with back and leg pain, does Neuropathic Pain exclusively correlate to neuronal compression? A correlation study of and corresponding MRI and x-Ray findings

**Stone Sima[1], Sam Lapkin[2], Ashish Diwan[1]**

*1. Spine Service at St George and Sutherland Clincal School at UNSW, Bruce, ACT, Australia*

*2. Faculty of Health, Southern Cross University, Bilinga, QLD, Australia*

**Purpose:** The nature and type of pain in the low back (LBP) is complex. The PainDETECT questionnaire is a screening tool to discriminate between neuropathic, nociceptive and ambiguous pain. The purpose of this study was to assess the relationship between PainDETECT scores and lumbar intervertebral degenerative and stenosis parameters in paired imaging.

**Methods:** A secondary review of 279 consecutively patients, above 18-years-of-age with completed PainDETECT questionnaires, lumbar MRI and/or X-ray scans was conducted. Of the 279 patients included in the study, 102 had nociceptive, 78 had ambiguous and 99 had neuropathic pain as described by the PainDETECT questionnaire.

**Results:** Nociceptive group had highest mean age, followed by ambiguous and neuropathic group (58.21 vs. 55.33 vs. 53.63, p=0.04). The neuropathic group had highest mean NRS, followed by ambiguous and nociceptive (7.9 vs. 6.9 vs. 5.9, p<0.001). There was a positive relationship between PainDETECT score and foraminal stenosis (=0.422, p<0.001), spinal stenosis (=0.332, p<0.001) and pfirmann grade (=0.324, p<0.001), and a negative relationship between PainDETECT score and pelvic incidence (=-0.177. p=0.45). The distribution of foraminal stenosis (H(2)=12.742, p=0.002), spinal stenosis (H(2)=9.948, p=0.007) and pfirmann grade (H(2)=6.823, p=0.033) was significantly different across the three PainDETECT groups. There was a significantly higher foraminal stenosis severity (U=18.962, p=0.002), spinal stenosis severity (U=14.481, p=0.005) and pfirmann grade (U=14.221, p=0.028) in the neuropathic group compared to the nociceptive group. There was significantly higher number of neuropathic patients with intervertebral disk bulge (96% vs. 78% vs. 78%, p=0.002) and high intensity zones (51% vs. 41% vs. 19%, p<0.001) compared to patients with nociceptive pain and ambiguous pain.

**Conclusion:** Neuropathic pain as classified by the PainDETECT questionnaire is associated with increased neural compression severity, increased discogenic disease and inflammatory disk severity, and decreased pelvic incidence. This is the first study to link pathological findings with pain categorisation and will allow clinicians to formulate clear management plans, and reduce the level of unnecessary pharmacotherapy, imaging and untargeted surgical interventions.

## 7

### Clinimetric evaluation of the painDETECT questionnaire: A tool used to differentiate nociceptive versus neuropathic pain in the context of the lower back

**Zachary Gan[1], Stone Sima[1], Samuel Lapkin[2], Ashish Diwan[1]**

*1. University of New South Wales, Kensington, NSW, Australia*

*2. Faculty of Health, Southern Cross University, Bilinga, QLD, Australia*

**Purpose:** The character and affect of pain in the lower back remains complex. The painDETECT questionnaire (PD-Q) serves as a screening tool aimed at differentiating pain of primarily nociceptive, neuropathic, or indeterminate origin. The purpose of this study was to assess the relationships between pain categories as described by the PD-Q and other measures of pain, disability, quality-of-life, and sociodemographic status.

**Methods:** A retrospective analysis of patients presenting to the Spine Service at St George Private Hospital was performed. Completed PD-Q, Oswestry Disability Index (ODI), European Quality-of-Life 5 Dimensions 3-Level Version (EQ5D3L) and Numerical Rating Scale (NRS) forms were required. An ANCOVA analysis was conducted comparing PD-Q to ODI and EQ5D3L. Subgroup analysis concerning individual ODI and EQ5D3L components was also performed.

**Results:** A positive association was found between PD-Q score and both ODI score ($\tau$=0.367, p≤0.001) and NRS score ($\rho$=0.491, p≤0.001). Similarly, a negative association between PD-Q score and EQ5D3L score ($\tau$=-0.340, p≤0.001) was shown. When confounded for NRS, analysis of covariance demonstrated a 37.9% higher ODI score (p≤0.001) and 30.7% lower EQ5D3L score (p≤0.001) in the neuropathic compared to nociceptive group. Individual EQ5D3L scores in the self-care (p≤0.05) and pain/discomfort (p≤0.01) categories were higher in neuropathic pain compared to nociceptive. Likewise, individual ODI scores in the personal care (p≤0.001), lifting (p≤0.001), standing (p≤0.001), sleeping (p≤0.001) and social life (p≤0.001) categories were higher in the neuropathic compared to nociceptive group. Smokers possessed higher PD-Q scores (U=1666, p≤0.05) and were 3.4 times more likely to suffer neuropathic pain (OR=3.391, 95%CI [1.407, 8.176], p≤0.01) compared to non-smokers.

**Conclusion:** Patients suffering primarily neuropathic pain as defined by the PD-Q experienced increased pain and disability levels in conjunction with lower quality-of-life, as demonstrated by higher NRS and ODI scores alongside lower EQ5D3L scores respectively. Smoking was associated with an increased likelihood of neuropathic pain. Various categories within both the ODI and EQ5D3L were more strongly associated with neuropathic pain. Overall, this study exemplifies the need to continue developing and improving pain assessment methodologies, noting the importance of preserving patient individuality. Such notions remain crucial in the enduring pursuit of personalised medicine.

## 8

### Low back pain of disc, sacroiliac joint, or facet joint origin: a diagnostic accuracy systematic review

**Christopher S Han[1], Mark J Hancock[2], Sweekriti Sharma[1], Saurab Sharma[3], Ian A Harris[1], Steven P Cohen[4], John Magnussen[5], Christopher G Maher[1], Adrian C Traeger[1]**

*1. The Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, Australia, Sydney, NSW, Australia*

*2. Faculty of Medicine, Health and Human Sciences, Macquarie University, Sydney, NSW, Australia*

*3. Department of Exercise Physiology, School of Health Sciences, Faculty of Medicine and Health, University of New South Wales, Sydney, NSW, Australia*

*4. Anaesthesiology, Pain Medicine Division, Johns Hopkins School of Medicine, Baltimore, MD, USA*

*5. Department of Clinical Medicine, Faculty of Medicine, Health and Human Sciences, Macquarie University, Sydney, NSW, Australia*

## Background

The accuracy of diagnostic tests available in primary care to identify the disc, sacroiliac joint, and facet joint as the source of low back pain is uncertain.

## Methods

Systematic review of available diagnostic tests. MEDLINE, CINAHL, and EMBASE were searched between March 2006 and 25th January 2023. Pairs of reviewers independently screened all studies, extracted data, and assessed risk of bias using QUADAS-2. Positive likelihood ratios (+LR) ≥2 and negative likelihood ratios (−LR) ≤0.5 were considered informative.

## Findings

We included 62 studies: 35 investigated the disc, 14 the facet joint, 11 the sacroiliac joint, and 2 investigated all three structures in patients with persistent low back pain. For risk of bias, the domain 'reference standard' scored worst, however approximately half the studies were of low risk of bias for every other domain. For the disc, pooling demonstrated MRI findings of disc degeneration and annular fissure resulted in informative +LRs: 2.53 (95% CI: 1.57–4.07) and 2.88 (95% CI: 2.02–4.10) and −LRs: 0.15 (95% CI: 0.09–0.24) and 0.24 (95% CI: 0.10–0.55) respectively. Pooled results for Modic type 1, Modic type 2, and HIZ on MRI, and centralisation phenomenon yielded informative +LRs: 10.00 (95% CI: 4.20–23.82), 8.03 (95% CI: 3.23–19.97), 3.10 (95% CI: 2.27–4.25), and 3.06 (95% CI: 1.44–6.50) respectively, but uninformative −LRs: 0.84 (95% CI: 0.74–0.96), 0.88 (95% CI: 0.80–0.96), 0.61 (95% CI: 0.48–0.77), and 0.66 (95% CI: 0.52–0.84) respectively. For the facet joint, pooling demonstrated facet joint uptake on SPECT resulted in informative +LRs: 2.80 (95% CI: 1.82–4.31) and −LRs: 0.44 (95% CI: 0.25–0.77). For the sacroiliac joint, a combination of pain provocation tests and absence of midline low back pain resulted in informative +LRs of 2.41 (95% CI: 1.89–3.07) and 2.44 (95% CI: 1.50–3.98) and −LRs of 0.35 (95% CI: 0.12–1.01) and 0.31 (95% CI: 0.21–0.47) respectively. Radionuclide imaging yielded an informative +LR 7.33 (95% CI: 1.42–37.80) but an uninformative −LR 0.74 (95% CI: 0.41–1.34).

## Interpretation

There are informative diagnostic tests for the disc, sacroiliac joint, and facet joint (only one test). The evidence suggests a diagnosis may be possible for some patients with low back pain.

**10**

### Abstract Not Available

**James Elliott**[1]

*1. The Kolling Institute - The University of Sydney/Northern Sydney (Arabanoo) Precinct, St Leonards, NSW, Australia*

Abstract not available

**11**

### Surgical versus non-surgical treatment for sciatica: systematic review and meta-analysis of randomised controlled trials

**Giovanni Ferreira**[1], **Chang Liu**[1], **Christina Abdel Shaheed**[1], **Qiuzhe Chen**[1], **Ian Harris**[2], **Chris Bailey**[3], **Wilco Peul**[4], **Bart Koes**[5], **Christine Lin**[1]

*1. Institute for Musculoskeletal Health, Institute for Musculoskeletal Health, Sydney Local Health District & The University of Sydney, Sydney, NSW, Australia*

*2. Ingham Institute of Applied Medical Research, Southwestern Sydney Local Health District and University of New South Wales, Sydney, NSW, Australia*

*3. Department of Surgery, Western University, London Health Sciences Centre, London, ON, Canada*

*4. Neurosurgical Center Holland, Leiden University Medical Center and Haaglanden MC and Haga Teaching Hospital, Leiden, Netherlands*

*5. Department of General Practice, Erasmus MC, University Medical Center, Rotterdam, Netherlands*

**Objective** To investigate the effectiveness and safety of surgery compared with non-surgical treatment for sciatica.

**Methods:** We conducted a systematic review with meta-analysis. Electronic databases were searched from inception to June 2022. Randomised controlled trials comparing any surgical treatment with non-surgical treatment, epidural steroid injections, or placebo or sham surgery, in people with sciatica of any duration due to lumbar disc herniation (diagnosed by radiological imaging) were eligible. Two independent reviewers extracted data. Leg pain and disability were the primary outcomes. Adverse events, back pain, quality of life, and satisfaction with treatment were the secondary outcomes. Pain and disability scores were converted to a scale of 0 (no pain or disability) to 100 (worst pain or disability). Data were pooled using a random effects model. Risk of bias was assessed with the Cochrane Collaboration's tool and certainty of evidence with the grading of recommendations assessment, development, and evaluation (GRADE) framework. Follow-up times were immediate-term (≤six weeks), short-term (>six weeks and ≤three months), medium-term (>three and <12 months), and long-term (at 12 months).

**Results** 24 trials were included, 12 investigated the effectiveness of discectomy compared with non-surgical treatment or epidural injections (n=1711). Very low to low certainty evidence showed that discectomy, compared with non-surgical treatment, reduced leg pain: the effect size was moderate at immediate-term (mean difference −12.1 (95% confidence interval −23.6 to −0.5)) and short-term (−11.7 (−18.6 to −4.7)), and small at medium-term (−6.5 (−11.0 to −2.1)). Negligible effects were noted at long-term (−2.3 (−4.5 to −0.2)). For disability, small, negligible, or no effects were found. A similar effect on leg pain was found when comparing discectomy with epidural steroid injections. For disability, a moderate effect was found at short-term, but no effect was observed at medium and long-term. The risk of any adverse events was similar between discectomy and non-surgical treatment (risk ratio 1.34 (95% confidence interval 0.91 to 1.98)).

**Conclusion** Very low to low certainty evidence suggests that discectomy was superior to non-surgical treatment or epidural steroid injections in reducing leg pain and disability in people with sciatica with a surgical indication, but the benefits declined over time.

**12**

## Spinal cord stimulation for low back pain

**Adrian C Traeger[1], Stephen E Gilbert[1], Ian A Harris[2], Christopher G Maher[1]**

*1. The University of Sydney, Sydney, NSW, Australia*

*2. University of New South Wales, Sydney, NSW, Australia*

**Background**

Spinal cord stimulation (SCS) is a surgical intervention thought to modulate pain by sending electrical signals via implanted electrodes into the spinal cord. We aimed to assess the benefits and harms of SCS for people with low back pain.

**Search methods**

On 10 June 2022, we searched CENTRAL, MEDLINE, Embase, and one other database for published trials. We also searched three clinical trials registers.

**Selection criteria**

We included all randomised controlled trials and cross-over trials comparing SCS with placebo or no treatment for low back pain. The primary comparison was SCS versus placebo, at the longest time point measured.

**Data collection and analysis**

We used standard methodological procedures expected by Cochrane.

**Main results**

We included 13 studies with 699 participants: 55% of participants were female; mean age ranged from 47 to 59 years; and all participants had chronic low back pain with mean duration of symptoms ranging from five to 12 years. Ten cross-over trials compared SCS with placebo. Three parallel-group trials assessed the addition of SCS to medical management.

Most studies were at risk of performance and detection bias from inadequate blinding and selective reporting bias. The placebo-controlled trials had other important biases, including lack of accounting for period and carryover effects. Two of the three parallel trials assessing SCS as an addition to medical management were at risk of attrition bias, and all three had substantial cross-over to the SCS group for time points beyond 6 months.

None of our included studies evaluated the efficacy of SCS on mean low back pain intensity in the long term (≥ 12 months). The studies most often assessed outcomes in the immediate term (less than one month). At 6 months, the only available evidence was from one cross-over trial (n=50) which provided moderate-certainty evidence that SCS probably does not improve back or leg pain, function, or quality of life compared with placebo. Serious adverse events with SCS included infections, neurological damage, and lead migration requiring repeated surgery.

**Conclusions**

Data in this review do not support the use of SCS to manage low back pain outside a clinical trial.

**14**

## The international standards for neurological classification of spinal cord injury – essentials for orthopaedic surgeons and spine researchers

**Lisa Harvey[1]**

*1. University of Sydney, St Leonards, NSW, Australia*

The International Standards for the Neurological Classification of Spinal Cord Injury (ISNCSCI) are endorsed by the International Spinal Cord Society (ISCoS) and the American Spinal Cord Injury Association (ASIA). Whilst ISNCSCI has existed for nearly 30 years, there remains ongoing confusion about aspects of the assessment and classification. There is also a common misunderstanding about the definition of a “complete” injury with most reverting back to the old Frankel definitions. The situation is confounded by recent changes and updates on important aspects of the ISNSCI. Yet clearly it is important that ISNCSCI data collected as part of routine care and/or research are accurate. This short presentation highlights some of the recent changes and idiosyncrasies of the ISNCSCI. It will focus on the distinction between AIS B and AIS C, and the new rules around the use of asterisks, “not determinable” and high cervical sensory loss in the face of normal upper limb strength.

**15**

## Prevalence of serious spinal pathology: clinical setting matters

**Alla Melman[1], Christopher G Maher[1], Christopher Needs[1], Gustavo C Machado[1]**

*1. Sydney Musculoskeletal Health, Sydney Local Health District and University of Sydney, Sydney*

**INTRODUCTION:** The virtual hospital model of care has been proposed as a clinical pathway for musculoskeletal back pain. Understanding the prevalence of serious pathology in patients who are admitted with a provisional diagnosis of non-serious back pain is essential in determining the feasibility and safety of a virtual hospital model care as an alternative to inpatient admission.

**AIM:** To determine the proportion of patients admitted to hospital for back pain, that have non-serious back pain, serious spinal, or serious other pathology as their final diagnosis.

**METHODS:** Electronic medical record data between 2016-2020, from three Emergency Departments (ED) in Sydney, Australia were used to identify inpatient admissions. SNOMED-CT-AU diagnostic codes were used to select ED patients aged 18 and older with an admitting diagnosis related to non-serious back pain. The inpatient discharge diagnosis was determined from the primary ICD-10-AM codes by two independent clinician researchers.

**RESULTS:** Over half (57%) of the admissions from ED with a provisional diagnosis of nonserious back pain had an equivalent discharge diagnosis and so are likely to be suitable for a virtual hospital model of care. However, a significant proportion of patients admitted with nonserious back pain were subsequently diagnosed with a specific pathology likely unsuitable for virtual care; 14.2% with a serious spinal pathology and 23.9% with a serious pathology beyond the lumbar spine. The most common serious spinal pathologies were fracture (8.7%) and infection (2.1%), and the most common serious pathologies beyond the spine were pathological fracture (7.3%) and infection (4.3%). In those aged ≥ 65, serious spinal pathology had a prevalence rate of 16.2%, compared to 10.6% in those under 65. Pathologies beyond the lumbar spine were also more prevalent at 26.6% in those aged ≥ 65, compared to 18.9% of those younger than 65.

**CONCLUSION:** A challenge for implementing virtual care in this setting is screening for patients with serious pathology. Protocols need to be developed to reduce the risk of patients being admitted to virtual hospital with serious pathology as the cause of their back pain.

**16**

## Pseudo-registration of spine trials and their outcomes

**Manon MS Levayer[1], Ashish D Diwan[1], Kyle A Sheldrick[1]**

*1. Spine Labs (UNSW), Kogarah, NSW, Australia*

**Aim.** This work aims to quantify the rate of false positive trials due to poor pre-registration of outcomes. It also proposes solutions to mitigate this phenomenon.

**Methods.** 20 spine trials using ODI as a primary outcome, pre-registered on ClinicalTrials.gov in 2022, were included. Based on the description of the outcome included in the registration (e.g. "ODI", "change in ODI", "at least 5 points change in ODI"), each trial was simulated 100,000 times using R under the null hypothesis (where the intervention has no effect). In scenario A, each set of simulation results was analysed using seven of the most common statistical tests used in spine research: ANCOVA, t-test on the post scores, t-test on the change in scores, dichotomisation by fixed optimal cut-point, dichotomisation by arbitrary post hoc cut-point, dichotomisation by fixed optimal percentage, and dichotomisation by arbitrary post hoc percentage. In scenario B, the same tests were performed but dichotomisation was restricted to cut-points found in the literature.

**Results.** 18 of the 20 trials (90%) did not specify their analytical strategy for ODI with sufficient detail to be limited to a single statistical test. Scenario A showed that when all allowable tests are performed, p-values below 0.05, which are expected to arise 5% of the time under the null hypothesis, were instead returned between 19% and 48% of the time. Scenario B found that when dichotomisation is limited to previously published cut-points, this reduces the prevalence of significant trials by 20 to 50%. Finally, using a single dichotomisation cut-point calculated to match the expected mean change reduces the inflation of significant results by up to 83%.

**Conclusions.** Current registration practices allow for an analytical freedom that impacts the meaningfulness of trial results. Most of the trials simulated returned a significant p-values from at least one test at least 20% of the time. The cherry picking of dichotomisation cut-points, in particular, inflates false positives up to 9 times and we conclude that limiting dichotomisation, when chosen as the analytical strategy, to a single cut-point chosen at the time of pre-registration, would significantly reduce false positives.

**20**

## SpineQ 3D: The fully automated 3D quantitative assessment of lumbar spine

**Xihe Kuang[1], Jason Cheung[1], Tao Huang[1], Teng Zhang[1]**

*1. the University of Hong Kong, Hong Kong, HONG KONG, China*

**Introduction:**

Low back pain (LBP) is a common health problem, with a lifetime incidence of 80%. It is believed that LBP results from pathological changes that occur with lumbar degenerative diseases (LDD). Currently, the clinical diagnosis and treatment planning of LDD is usually done manually which is inefficient and inconsistent. Besides, based on the 2D slice of MRI or CT, the complex 3D parameters are difficult to measured accurately, which may need to across different slices. Therefore, the automated 3D quantitative analysis can have great significance to improve the efficiency, consistency, and accuracy of diagnosis and treatment planning.

**Methods:**

A dataset was esteblished based on an LDD cohort from the southern Chinese population[1], which contained sagittal and axial MRI scans from 2473 subjects (mean age 45.2; 39.5% male). Our deep learning pipeline adopted the Spine-GFlow[2], a robust unsupervised multi-tissue segmentation framework, that could accurately identify different anatomical structures from lumbar MRI without relying on any manual annotation. Further, based on the segmentation result, multiple parameters, including anteroposterior (AP) vertebral body (VB) diameter, midline VB width, mid-AP canal diameter, canal width, mid-AP dural sac (DS) diameter, pedicle width, lamina angle, and facet joint angle, were measured using the 3D symmetrical boundary searching and knowledge-based distance retrieve algorithm. The automated measurement accuracy was validated by comparing it with the manual measurement annotated by a spine specialist with over 20 years of clinical experience.

**Results:**

Preliminary validation showed that the deep learning pipeline achieved satisfactory performances on the measurement. For the distance parameters, the average absolute error was 3.721mm/4.538pix, and for the angle parameters, the average absolute error was 4.891 degree.

**Conclusions:**

A deep learning pipeline for fully automated 3D quantitative assessment of lumbar is developed and tested. The fast and consistent 3D parameter measurement can assist clinicians in efficient and consistent diagnosis and treatment planning. The preliminary validation shows that our method can achieve good performance on the measurement of multiple parameters without relying on any human intervention. A prospective clinical study needs to be performed for further validation.

1. [1] Samartzis D, Karppinen J, Chan D, Luk KD, Cheung KM (2012). The association of lumbar intervertebral disc degeneration on magnetic resonance imaging with body mass index in overweight and obese adults: a population-based study. Arthritis Rheum 64:1488-1496. doi: 10.1002/art.33462
2. [2] Kuang, X., Cheung, J. P. Y., Wong, K. Y. K., Lam, W. Y., Lam, C. H., Choy, R. W., ... & Zhang, T. (2022). Spine-GFlow: A hybrid learning framework for robust multi-tissue segmentation in lumbar MRI without manual annotation. Computerized Medical Imaging and Graphics, 99, 102091.

## 21

### Is a twelve-week running program appropriate for people with chronic low back pain? Efficacy and feasibility data from a randomised controlled trial

**Christopher Neason[1], Claire L Samanna[1], Daniel L Belavy[2], Steve J Bowe[3], Matthew J Clarkson[4], David Connell[5], Emma A Craige[6], Romina Gollan[1], Clint T Miller[1], Ulrike H Mitchell[7], Niamh L Mundell[1], David Scott[1], Scott D Tagliaferri[1], Jamie L Tait[1], Grace E Vincent[8], Patrick J Owen[1]**

*1. Deakin University, Burwood, VIC, Australia*

*2. Department of Applied Health Sciences, Division of Physiotherapy, Hochschule für Gesundheit (University of Applied Sciences), Bochum, Germany*

*3. Victoria University of Wellington, Wellington, New Zealand*

*4. Institute for Health and Sport, Victoria University, Melbourne, Victoria, Australia*

*5. Imaging @ Olympic Park, AAMI Park, Victoria, Australia*

*6. Central Queensland University, Rockhampton, Queensland, Australia*

*7. Brigham Young University, Provo, Utah, United States of America*

*8. Central Queensland University, Adelaide, South Australia, Australia*

**Aims:** We assessed the efficacy (subjective pain intensity and disability) and feasibility (attrition, adherence and safety) of a 12-week running intervention in individuals with chronic low back pain compared to waitlist control.

**Methods:** Participants (n=40, mean [SD] age: 33 [6] years, female: 50%) with non-specific chronic low back pain were randomised to the intervention or waitlist control group. Following initial assessment, the intervention group completed a 12-week progressive run-walk interval training program comprising three 30-minute digitally-delivered community-based exercise sessions per week under the supervision of an exercise physiologist. At baseline and 12 weeks, low back pain intensity (100-point visual analogue scale) and disability (Oswestry Disability Index; 0-100 points) were assessed. Feasibility outcomes included attrition at follow-up, training session adherence and the number and seriousness of adverse events. Linear mixed models with an intention-to-treat approach were used to evaluate between-group differences.

**Results:** There was no attrition, mean [SD] training adherence was 70 [20%] (2.1 of 3 sessions per week) and running distance increased from 2.9 [1.3] to 5.6 [5.3] km per week from baseline to 12 weeks. Nine adverse events deemed likely study-related were reported in the intervention group, of which all were non-serious; seven were related to lower limb injury/pain (knee or ankle), one to pre-existing cardiac syncope and only one to an increase of low back pain. When compared to control, running decreased both pain intensity (mean between-group difference [95%CI]: -15.30 [-25.33, -5.27] points, P=0.003) and disability (-5.20 [-10.12, -0.24] points, P=0.038) at 12 weeks.

**Conclusions:** A 12-week run-walk intervention appears acceptable, safe, and effective in individuals with non-specific chronic low back pain, although the between-group differences did not reach minimal clinically meaningful cut-off scores. Clinicians should monitor for lower limb pain or injury and consider cardiac risk factors when prescribing a run-walk program to individuals with low back pain, but our findings indicate interval running is feasible in this population.

## 22

### 3D Spine model synthesis based on the back geometry

**Nan Meng[1], Pengyu Lu[1], Xihe Kuang[1], Teng Zhang[1]**

*1. The University of Hong Kong, Pok Fu Lam, HONG KONG, Hong Kong*

**Aims:**

Adolescent Idiopathic Scoliosis (AIS) is a three-dimensional spinal deformity that affects children's health. Traditional screening and diagnosis require patients to undergo X-ray examinations, which is detrimental to adolescents' health. This study aims to propose a novel solution using deep learning and depth sensing techniques to generate the 3D spine model for

**Methods:**

From October 9, 2019, to May 21, 2022, a total of 2238 AIS patient data were collected at Queen Mary Hospital and Duchess of Kent Children's Hospital at Sandy Bay in Hong Kong. Among these, data from 1936 patients were used for training and validating the deep learning model, and data from 302 patients were used for prospective independent testing. The collected patient data included demographic data, colour and depth (RGBD) images of patients' nude backs captured using a depth camera and the whole spine X-ray images. Using the developed deep learning algorithm, a precise 3D spine model can be generated for the patients. The severity of the condition was assessed based on the generated spine model and compared with the gold standard obtained from X-ray results to analyze the feasibility and clinical significance of the proposed method.

**Results:**

The generated spine models were used to evaluate the severity of the condition, with prediction accuracy rates of 83.5% for 85 normal or mild patients, 93.5% for 184 moderate patients, and 90.9% for 33 severe patients. Visualizations of the generated spine model revealed a high prediction accuracy, fitting the geometric morphology of the patients' unclothed backs.

**Conclusions:**

This study explores the technical feasibility of accurately generating patients' spine models using their back geometric morphology data combined with deep learning algorithms. The obtained spine model can aid doctors in diagnosing the severity of the condition. This finding provides new research directions and practical support for non-radiation AIS assessment methods.

## 23

### The comparative effectiveness of lumbar fusion surgery and spinal decompression surgery for lumbar spinal stenosis: protocol for a target trial emulation

**Harrison J Hansford[2, 1], Margreth Grotle[3], James H McAuley[2, 1], Matthew D Jones[2, 1], Aidan G Cashin[2, 1]**

*1. Centre for Pain IMPACT, Neuroscience Research Australia, Sydney, Australia, Sydney, Australia*

*2. UNSW, Sydney, NSW, Australia*

*3. Center for Intelligent Musculoskeletal Health, Department of Rehabilitation Science and Health Technology, Oslo Metropolitan University, P.O. Box 4, St. Olavs plass, NO-0130, Oslo, Norway*

Aims: To emulate a pragmatic trial comparing spinal decompression surgery to additional spinal fusion surgery for people with spinal stenosis. We will also seek to identify whether treatment effects from spinal fusion surgery compared to decompression alone are superior within selected subgroups within this target trial emulation.

Methods: Data from the Norwegian registry for spine surgery (NORSpine) will be used to emulate a pragmatic randomised trial comparing spinal decompression surgery to additional spinal fusion surgery for people with spinal stenosis with spondylolisthesis. Participants will be adults diagnosed with lumbar spinal stenosis with spondylolisthesis of ≥3mm, reporting continuous pain in the back/legs for ≥3months, and a pain intensity ≥1 in the last week. Participants will be excluded if they have received diagnoses of cauda equina syndrome, isthmic spondylolisthesis, scoliosis/kyphosis, and previous surgery at the same level. We will use inverse probability weighting to emulate randomisation, with logistic regression including many clinical and sociodemographic characteristics. Our primary outcome will be the Oswestry disability index questionnaire v2. We will emulate the intention to treat and per-protocol effects.

Subgroups: We will conduct six subgroup analyses, selected for whom fusion surgery may be superior to decompression. These include patients with back pain intensity ≥5/10 compared to patients with back pain intensity <5/10; Patients with a BMI ≥30 compared to patients with a BMI <30; Patients who are female compared to patients who are male; Older patients (>65 years old) compared to younger patients (<65 years old); Patients who have an ASA grade ≥3 compared to patients with an ASA grade <3; and patients who have low anxiety and depression (i.e., less than moderately anxious/depressed) compared to patients with moderate to high anxiety and depression (i.e., moderately anxious/depression or more).

Sensitivity Analysis: to assess the robustness of our findings to potential violations of assumptions, we will use alternative modelling approaches to emulate randomisation and calculate e-values to identify the extent of residual confounding that would have to be present in our analysis to 'explain away' our findings.

Note: The aim is to discuss with the spinal health community whether other subgroups may be of interest

## 24

### The Association Between Inflammatory Biomarkers and Low Back Disorder: A Systematic Review and Meta-Analysis

**Stone Sima[1], Xiaolong Chen[2], Ashish Diwan[1]**

*1. Spine Service at St George and Sutherland Clinical School, Sydney, NSW, Australia*

*2. Spine Labs, St George and Sutherland Clinical School, Sydney, NSW, Australia*

**Background:** Low back disorder (LBD) is one of the greatest contributors to disability adjusted life years (DALYs) in the world. Inflammation results in proliferation of cytokines or consequent degradation products (collectively known as Inflammatory Biomarkers) that activate pain pathways which can result in non-specific LBD.

**Purpose:** Evaluate the relationship between inflammatory biomarkers, clinical presentation, disability and outcome of treatment in patients with LBD.

**Methods:** Three online databases were searched of randomized controlled trials (RCTs) and observational studies. The association between low back pain (LBP) and/or leg pain and/or back-specific disability scores and the expression of inflammatory biomarkers in patients with LBD were considered as primary outcomes. Standardized mean difference (SMD) and their 95% confidence intervals (CI) were evaluated. The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach was used to summarize the strength of evidence.

**Results:** Four RCTs and sixteen observational studies were included in the analysis of 1142 patients with LBD. There was a statistically significant reduction in back pain score (SMD=1.38 (95%CI=1.00 to 1.76)) and IL-1 beta (SMD=1.05 (95%CI=0.56 to 1.54)) and increase in the expression of CTX-1 (SMD=-0.54 (95%CI=-0.99 to -0.10)) and IL-10 (SMD=-0.91 (95%CI=-1.28 to -0.53)) levels post treatment. There was a significant relationship between increase in the expression of MCP-1 (r=4.46, (95%CI=2.72, 6.20), p=0.004) and reduction in the expression of hsCRP (r=-3.44, (95%CI=-5.16, -1.69), p=0.003) with increase in back pain. Significant relationship was also observed between increase in the expression of MCP-1 (r=4.34, (95%CI=1.30, 7.38), p=0.025) and reduction in the expression of IL-6 (r=-1.20, (95%CI=-1.20, -0.41), p=0.023) with increase in leg pain. Increase in the expression of IL-8 (r=3.36, (95%CI=2.71, 4.01), p<0.001) and reduction in the expression of hsCRP (r=-4.04, (95%CI=-4.54, -3.55), p<0.001) was also associated with increased disability score.

**Conclusions:** Inflammatory biomarkers play a significant role in the pathogenesis of LBD. CTX-1, IL-10 and IL-1 beta may be responsible for the decrease in back pain scores post treatment. There is a relationship between MCP-1, IL-6, IL-8 and hsCRP with clinical and functional assessments for LBD. Further studies will improve understanding of the pathogenesis of LBD and aid in targeted management strategies.

## 26

### Gut microbiome may predict spine surgery outcome: A pilot study

**Neha NC Chopra[1, 2], Stone SS Sima[2], Robert RL De La Lande[2], Thomas TJ Jeffries[3], Ashish AD Diwan[1, 2]**

*1. Spine Labs, Spine Service, Kogarah, NSW, Australia*

*2. St. George & Sutherland Clinical School, University of New South Wales, Sydney, NSW, Australia*

*3. School of Science , Western Sydney University, Penrith, New South Wales, Australia*

Often for unknown reasons, >10% of patients undergoing surgery for lumbar back pain experience 'failed back surgery syndrome' (FBSS). The recent discovery of pathobiont gut bacteria in degenerative intervertebral discs prompted a 'gut-disc axis' hypothesis. Should the microbiome-mediated inflammation and disc colonisation persist postoperatively, the surgery's success may be undermined. This pilot aims to determine whether the microbiome may therefore aid to explain FBSS. Following IRB approval, 8 participants completed the Visual Analogue pain Scale (VAS), Oswestry Disability Index (ODI), and EQ-5D, preoperatively and at 12 weeks and 6 months post-operatively. A faecal sample was collected pre-operatively and microbial DNA was extracted for species-level 16S rRNA amplicon sequencing. Associations between taxa abundance, alpha-diversity, percentage score change, and achievement of the minimum clinically important difference (MCID) were statistically investigated. There was notable phylogenetic clustering of successful and unsuccessful surgical outcomes. Shannon index was positively correlated with percentage improvement in ODI at 6 months' follow-up ($p<0.05$), but not with achievement of the VAS or ODI MCIDs. Mean abundance of the Proteobacteria phylum and Prevotella copri species was significantly higher among participants who failed to achieve the MCID for both VAS and ODI at 6 months' follow-up ($p<0.05$). This is the first study to implicate a Prevotella-dominant enterotype, elevated Proteobacteria abundance and low-diversity dysbiosis in a heightened risk of FBSS. Studies of higher power are required to estimate the effect sizes of these associations, investigate causation, and consider the viability of synbiotic therapy to improve spine surgery outcomes.

## 27

### Influence of BMI on disability outcomes in Spinal Endoscopic Surgery: a cohort study

**Froukje Koremans[1], Kyle Sheldrick [1], Neha Chopra[1], Prashanth Rao[2], Ashish D Diwan [1]**

*1. Spine Labs, Bondi Beach, NEW SOUTH WALES, Australia*

*2. Brain and Spine Surgery, Norwest Private Hospital, Bella Vista, NSW, Australia*

**Abstract**

**Study Design**: Retrospective case-series study

**Objectives**: This retrospective study aimed to assess the influence of BMI on the outcomes of endoscopic spinal surgery in a single-centre Neurosurgical practice in Australia, considering obesity as a significant growing global public health concern.

**Methods**: A total of 98 patients with spinal conditions who underwent endoscopic surgery between August 2021 and January 2022 were included. Patient data, including demographic information, preoperative clinical status, intraoperative details, clinical complications, and postoperative outcomes, were collected from electronic medical records. Surgical outcomes, include, Visual Analogue Scale (VAS) leg pain scores, VAS back pain scores, Oswestry Disability Index (ODI), Roland-Morris Disability Questionnaire (RMDQ) scores, and the Quality-of-life EuroQol-5 Dimensions Questionnaire (EQ5D) scores, were assessed. Descriptive statistics, Estimation-Stats package, and Spearman's rank correlations were used for statistical analysis, considering a P-value < 0.05 as statistically significant.

**Results**: The mean BMI of the patients was 29.72 ± 6.46, with 38.8% categorized as overweight. The analysis revealed significant negative correlations between BMI and Delta-ODI, Delta-RMDQ, and BMI category and Delta-ODI, Delta-RMDQ. Higher BMI categories were associated with less improvement in ODI-scores compared to a shared control. Improvement in ODI-scores was observed for all BMI categories postoperatively.

**Conclusion**: This study demonstrates that higher BMI is strongly negatively associated with postoperative improvement in disability for patients undergoing endoscopic surgical treatments. These findings emphasize the importance of addressing obesity as a modifiable risk factor to enhance patient outcomes after surgery. Surgeons should set realistic expectations for functional improvement when discussing endoscopic procedures with obese patients.

## 28

### Halo traction evaluation of Cranio-cervical instability in hereditary connective tissue disorder patients: Case series

**Hussain Bohra[1], Joseph Maalouly[2], Neha Chopra[1], Charmian Stewart[1], Ashish Diwan[1], Kevin Seex[3], Prashanth J Rao[2]**

*1. Spine Labs, Chippendale, NSW, Australia*

*2. Department of Nuerosurgery, Norwest Private Hospital, Bella Vista, NSW, Australia*

*3. Department of Nuerosurgery, Macquarie University Hospital, North Ryde, NSW, Australia*

Introduction: Cranio-cervical instability (CCI) is a condition commonly found in patients with connective tissue disorders such as Ehlers-Danlos Syndrome (EDS), leading to various symptoms. Assessing patients for surgical fusion as a treatment for CCI is challenging due to the complex nature of EDS-related symptoms. This study aimed to evaluate the role of pre-fusion Halo traction in alleviating symptoms and determining suitable candidates for fusion surgeries.

Methods: A case series of 15 EDS patients with neurological symptoms underwent halo traction between 2019 and 2022. Patients completed a CCI Questionnaire before and after the traction, reporting symptoms related to headache, vision, hearing, equilibrium, and performance. Symptom groups were assigned scores based on patient responses, with one point for each affirmative answer. The scores were statistically analyzed using a paired t-test. Patients experiencing over 50% improvement in the majority of symptoms were considered for fusion surgery, and 7 out of 12 patients subsequently underwent the procedure. Results: The average age of the patients was 38 years, with a female-to-male ratio of 14:1, consistent with existing literature. Significant improvements were observed in various symptom categories after halo traction, including headache (63% improvement, $p < 0.001$), brainstem functions (72% improvement, $p < 0.001$), cerebellar functions (59% improvement, $p < 0.001$), hearing (65% improvement, $p < 0.001$), motor functions (62% improvement, $p < 0.001$), vision (53% improvement, $p < 0.001$), cardiovascular functions (58% improvement, $p < 0.05$), sensory and pain (56% improvement, $p < 0.001$), high cortical functions (54% improvement, $p < 0.01$), GI functions (41% improvement, $p < 0.05$), bladder functions (55% improvement, $p < 0.001$), and Modified Karnofsky score (26% improvement, $p <$

0.05). Conclusion: halo traction proved to be a simple and effective method for both evaluating patients for surgery and providing symptomatic relief in EDS-related CCI cases. It also allows surgeons to monitor patients with stable cranio-cervical junctions before committing to surgery. However, the study's limitations include the small sample size and the absence of a validated questionnaire with a scoring system.

## 29

## Randomized placebo-controlled trial of opioid analgesia for acute low back pain and neck pain – the OPAL trial

**Caitlin Jones[1], Richard Day[2], Bart Koes[3], Jane Latimer[1], Christopher Maher[1], Andrew McLachlan[4], Laurent Billot[5], Sana Shan[5], Christine Lin[1]**

*1. Sydney Musculoskeletal Health, Institute for Musculoskeletal Health, The University of Sydney, Sydney Local Health District, Institute for Musculoskeletal Health, The University of Sydney, Camperdown, NSW, Australia*

*2. Department of Clinical Pharmacology & Toxicology, St Vincent's Hospital Sydney and St Vincent's Clinical Campus, Faculty of Medicine, University of New South Wales, Gadigal Country, Sydney, NSW, Australia*

*3. Department of General Practice, Erasmus MC, Rotterdam, The Netherlands and the Center for Muscle and Joint Health, University of Southern Denmark, Odense, Denmark, Rotterdam, The Netherlands*

*4. Sydney Pharmacy School, Faculty of Medicine and Health, The University of Sydney, Gadigal Country, Sydney, NSW, Australia*

*5. The George Institute for Global Health, Faculty of Medicine and Health, University of New South Wales, Gadigal Country, Sydney, NSW, Australia*

Background: Opioid analgesics are commonly used for acute low back pain and neck pain, but supporting efficacy data are lacking.

Methods: In a triple-blinded, placebo-controlled trial, participants presenting to one of 157 primary care or emergency departments sites in Australia with ≤12 weeks of low back and/or neck pain were randomized (1:1) to guideline-recommended care plus an opioid (oxycodone + naloxone, up to 20 mg oxycodone per day orally) or guideline-recommended care and an identical placebo for up to 6 weeks. The primary outcome was pain severity at 6 weeks measured with the pain severity subscale of the Brief Pain Inventory. Secondary outcomes included physical function, quality of life, adverse events, and risk of misuse. Outcomes were collected up to 52 weeks. All analyses were performed on an intention-to-treat basis. The trial was pre-registered (ACTRN12615000775516).

Results: 347 participants were recruited with a target sample size of 346 (the last two were recruited simultaneously)(n = 174 in opioid group, 173 in placebo group, between 29/02/16 and 10/03/21). There was no significant difference in pain between groups at 6-weeks (Mean Difference (MD) Opioid-Placebo 0·53 on a 10-point scale, 95% Confidence Interval (CI) -0·00 to 1·07, p = 0·051); but this increased over time and by 52-weeks there was a small difference favoring placebo (MD 0·57, 95% CI 0·02 to 1·11, p = 0·041). Taking opioids did not increase the risk of adverse events overall (61 (35%) participants in the opioid group reported at least one adverse event and 51 (30%) in the placebo group, p = 0·30), but more people in the opioid group reported opioid-related adverse events (e.g. constipation).

Conclusion: Opioids should not be recommended for acute non-specific low back pain or neck pain.

Funding: *National Health and Medical Research Council, University of Sydney Faculty of Medicine and Health, and ReturnToWorkSA.*

*Trial registration: ACTRN12615000775516*

## 30

## Use of intra-operative 3D fluoroscopy during open posterior instrumented lumbar spine fusions is associated with an increased risk of infection

**Lauren Barber[1], Yeo Eun (Ashley) Kim[1], Han Jo Kim[1]**

*1. UNSW, Mequon, WISCONSIN, United States*

Study Design: Retrospective study

Background: The fundamental goals of any surgery are to obtain the best outcomes while minimizing risks. In lumbar spine fusion, technological advancements, such as intraoperative three-dimensional (3D) fluoroscopy and navigation/robot use, have sought to improve surgical accuracy and decrease soft tissue trauma all while both directly and indirectly decreasing surgical risks. Surgical site infections (SSIs) are one such complication that can be a major cause of morbidity after lumbar fusions. The objective of this study was to evaluate if the use of these tools is associated with an increase in surgical site infections in patients undergoing instrumented posterior lumbar spine fusions.

Methods: A retrospective review of all adult (>18 years old) patients who underwent open or minimally invasive (MIS) instrumented posterior lumbar spine fusion at a single institution from January 2018 – March 2020 was conducted. Use of 3D fluoroscopy, open versus MIS, navigation/robot versus freehand pedicle screw placement, and infections within 2 years post-operatively were recorded. Additional collected data included demographics, including age, sex, body mass index (BMI), ASA, diagnosis, and operative data, including procedure, operative time, estimated blood loss (EBL), length of stay (LOS), and complications. Patients who underwent in situ fusions without p edicle screw placement were excluded from this study.

Fisher exact test was used to determine the association between 3D fluoroscopy use and incidence of infection in both open and MIS cases. Demographic data, ASA, operative time, EBL, and LOS were compared between 3D fluoroscopy and 2D fluoroscopy cohorts using Student's t test. Multivariate logistic regression analysis was performed to evaluate the relationship between usage of 3D fluoroscopy and occurrence of infection while controlling for confounding parameters, including EBL, operative time, revision surgery, and use of navigation/robot.

Results: 582 total open cases and 267 MIS cases were included, of which 14.6% and 45% used 3D fluoroscopy, respectively. 49.1% of the open cases were women while 45% of the MIS cases were women.

## 31

### Improvement of trunk muscle endurance in adolescents with idiopathic scoliosis treated with ScoliBrace and the ScoliBalance exercise approach to scoliosis

**Rosemary Marchese[1], Juan Du Plessis[1], Tamara Meuwese[1], Jeb McAviney [1]**

*1. ScoliCare, Kogarah, NSW, Australia*

Introduction: The impact of scoliosis bracing on trunk muscle endurance (TME) is unknown. ScoliBrace (SB) uses a 3D over corrective approach. ScoliBalance (SBE) is a scoliosis specific exercise program. SB and SBE were used to treat adolescents with idiopathic scoliosis (AIS) and results of TME testing are reported.

Objectives: To assess TME in AIS treated with SB and SBE.

Methods: A retrospective analysis of TME of 33 AIS, mean age 13.24 years (SD=1.64), mean Cobb angle 38.97.6° (SD= 9.49). Inclusion criteria: AIS, combined SB and SBE treatment. Exclusion criteria: spinal surgery, scoliosis ›60°. Trunk muscle extensor endurance (TE) and abdominal muscle endurance (AE) tests were performed at initial assessment and then at averages of 6.6 and 24.4 weeks of treatment. Data was analysed using Wilcoxon signed-rank test, Stata version 15.1.

Results: TE improved significantly (P<0.001) from a median of 87 seconds at both short and medium-term intervals. AE also showed significant improvement between baseline and short-term follow-up and non-significant improvement at medium-term.

Discussion: TME improved by 106% using SBE and SB. Although these findings cannot be attributed to either brace or exercises, it demonstrates that AIS can improve TE and AE while using SB and SBE. Future research is required to determine which part of treatment, or both, is contributing to this improvement.

Conclusion: TME improved in AIS using SB and SBE.

Significance: It is likely that trunk muscle function will not deteriorate in AIS with this combined treatment.

## 32

### Determining the effectiveness and feasibility of a virtual hospital model of care for low back pain

**Alla Melman[1], Christopher G Maher[1], Gustavo C Machado[1]**

*1. Sydney Musculoskeletal Health, Sydney Local Health District and University of Sydney, Sydney*

**INTRODUCTION:**

Low back pain was the 5th most common reason for an emergency department (ED) visit in 2020–21 in Australia, with >145,000 presentations; one third of these patients were subsequently admitted to hospital. Admitted patient care accounts for half of the total healthcare expenditure on low back pain in Australia.

**AIM:**

The primary aim of the Back@Home study is to assess the effectiveness and feasibility of implementing a virtual hospital model of care to reduce length of admission in people presenting to ED with musculoskeletal LBP. Secondary aims are to reduce rates of traditional hospital admission from the ED, as well as re-presentations and readmissions to the traditional hospital. We also aim to demonstrate non-inferiority of patient-reported outcomes, such as satisfaction with care.

**METHODS:**

We plan to conduct an interrupted time series study at three metropolitan hospitals in Sydney, New South Wales, Australia. Eligible patients will include those aged 16 years and over with a primary diagnosis of musculoskeletal low back pain presenting to emergency departments. The implementation strategy includes clinician education utilising multimedia resources, staff champions, and an 'audit and feedback' process. Implementation of 'Back@Home' will be evaluated over 12-months, and compared to a 48-month pre-implementation period, using monthly time-series trends in average length of hospital stay as the primary outcome. We will construct a plot of the observed and expected lines of trend based on the pre-implementation period. Linear segmented regression will identify changes in level and slope of fitted lines, indicating immediate effects of the intervention, as well as effect over time. Patient reported outcome and measures and experience measures will be collected.

**RESULTS:**

Preliminary results will be analysed 6 months post implementation and presented at the conference. As of July 2023, 43 patients have participated in the Back@Home service, avoiding hospital admission. None have required escalation of care, or experienced adverse events.

**CONCLUSION:**

A robust study design will be used to evaluate a novel model of care implementation for low back pain, combining an interrupted time series, patient reported outcomes, as well as process and cost effectiveness evaluations.

## 33

### Cooled radiofrequency ablation of the sacroiliac joint a retrospective series

**Joseph Maalouly[1], Prashanth Rao[1]**

*1. spine surgery, Brain and spine surgery, Bella vista, NSW, Australia*

**Background:** Sacroiliac (SI) joint dysfunction is a common source of back pain. Recent evidence from different parts of the world suggest that cooled radiofrequency ablation of sacral nerves supplying the SI joints has superior pain alleviating properties than currently available treatment options for SI joint dysfunction.

**Patients and methods:** After obtaining institutional review board approval, the medical records of 81 patients who underwent cooled radiofrequency ablation in a single institution and by a single surgeon were analyzed retrospectively. The recurrence of pain, progression to fusion and functional outcomes were noted. The patients were operated on between June 2020 and December 2021, they include 59 females and 22 males, the average age was 55.4 ± 17.3. Follow up was at least 6 months postoperative.

**Results:** 22 of the patients had previously underwent lumbar fusions. Follow up period ranged from 6 to 18 months. After radiofrequency ablation, 7 patients progressed to fusions, and 6 patients had to have the procedure done again to relieve their pain. Student t-test was used to compare between preoperative and postoperative values of NPRS (numerical pain rating score) and ODI (Oswestry disability index). It showed significance with P-value < 0.001 in both.

**Conclusions:** Sacroiliac joint radiofrequency ablation is a good option in the treatment of SI joint pain showing good results in the short term follow up period. It is a simple procedure that can be done in less than 30 min and is capable of providing significant pain relief for patients with sacroiliac joint dysfunction.

**34**

## Endoscopic lumbar discectomy early results and complications an Australian perspective

**Joseph Maalouly[1], Prashanth JV Rao[1]**

*1. spine surgery, Brain and spine surgery, Bella vista, NSW, Australia*

**Background:** Endoscopic spine surgery has been recently introduced in Australia. A comparison of endoscopic lumbar discectomy ,open or microscopic approach with learning curve is presented.

**Patients and methods:** A retrospective observational cohort study design of Uniportal endoscopic lumbar discectomy of a single surgeon series was conducted. All patients above 18 years of age with symptomatic disc herniation and who have failed non-surgical management were selected. This data represents the initial 100 consecutive uniportal endoscopic lumbar discectomy cases by the same surgeon. Demography, operative data, complications and postoperative results were collected.

**Results:** The mean age is 54.8 yrs. A significant difference in ODI (Oswestry disability index) and NPRS (numerical pain rating scale) improvement(P<0.001) was found. The average blood loss was 14mL and the average operative time was 88mins. Complication rates at 12 weeks included 3 CSF leaks and 6 recurrences, 5 of them underwent further surgery.

**Conclusion:** We present an Australian perspective of endoscopic lumbar discectomy. Early results reveal encouraging outcomes of endoscopic lumbar discectomy with respect to operative time, blood loss and complications. Further studies are required to evaluate long term outcomes and complications.

**35**

## The MYelopathy NAtural History (MYNAH) Registry: Protocol for Australian registry

**Nashwa Najib[2, 1, 3], Perminder Sachdev[4], Sanja Lujic[5], Nancy Briggs[6], Alper Yataganbaba[7], Lauren Barber[3], Prashanth Rao[8], Bhisham Singh[7], Brian Hsu[7], Ali Ghahreman[9], Mark Davies[2, 1, 9], Michael Johnson[10], Mitchell Hansen[11], Saeed Kohan[9], Ralph Mobbs[12], Sonia Bustamante[13], Valerie Wasinger[6], Alisha Sial[2, 1, 3], Neha Chopra[2], Ashish Diwan[2, 1, 3]**

*1. St George and Sutherland Clinical School, Sydney, NSW, Australia*

*2. University of New South Wales, Kogarah, NSW, Australia*

*3. Spine Labs & Spine Service, Department of Orthopaedic Surgery, Division of Surgery, St George Hospital, South Eastern Sydney Local Health District, Sydney, NSW, Australia*

*4. Centre for Healthy Brain Ageing (CHeBA), Discipline of Psychiatry and Mental Health, University of New South Wales, Sydney, NSW, Australia*

*5. Centre for Big Data Research in Health, University of New South Wales, Sydney, NSW, Australia*

*6. Mark Wainwright Analytical Centre, UNSW Sydney, Stats Central, Sydney, NSW, Australia*

*7. NSW Spine Specialists, Sydney, NSW, Australia*

*8. Brain and Spine Surgery, Norwest Private Hospital, Sydney, NSW, Australia*

*9. Department of Neurosurgery, St George Hospital, Sydney, NSW, Australia*

*10. Royal Childrens Hospital, Melbourne, Victoria, Australia*

*11. School of Medicine and Public Health, University of Newcastle, Newcastle, NSW, Australia*

*12. NeuroSpine Surgery Research Group (NSURG), Sydney, NSW, Australia*

*13. Mark Wainwright Analytical Centre, University of New South Wales, Sydney, NSW, Australia*

**Background**

Degenerative Cervical Myelopathy (DCM) is the commonest cause of chronic spinal cord dysfunction worldwide.[1] Existing evidence suggests that research on natural history of DCM remains inefficient with main focus being on evaluating surgical techniques and post-op outcomes of DCM patients.[2] Natural history of DCM is a priority research theme as established by AO Spine RE-CODE DCM.[3] A patient registry is an efficient approach to understand the natural history by systematically collecting patients' health data in a temporal pattern. Registries provide benchmarks for clinical performance and provide evidence-based good clinical practice.

**Aims**

1.To describe the natural history of DCM.

2.To describe the influence of age, gender, smoking and BMI on outcome of DCM.

3.To describe the demographics, comorbidities, disease severity, quality of life and prognosis of DCM.

4.To identify and describe the pathways involved in metabolomics and proteomics associated with DCM.

**Methodology**

The MYNAH (MYelopathy NAtural History) study is a multicenter, prospective, non-interventional, observational cohort study enrolling patients with DCM from 10 participating study sites across Australia.

**Inclusion criteria**

1)All patients with DCM diagnosed by spine/neurosurgeon from 1st January 2018 onwards

2)Patients recorded with ICD-10 Codes: M50.0+, M50.1, M50.3, M47.1, G99.2 in SESLHD EMR databases

3)Patients who provide informed consent

**Exclusion criteria**

1)Patients with a cognitive decline or intellectual disability

2)Patients who are unable to or unwilling to provide informed consent

**Shotgun proteomics**

A global peptide-centered quantification of proteomes in the human plasma conducted by tandem mass spectrometry. High abundant proteins removed followed by trypsin digestion prior to analysis in LC-MS.

**Global metabolomics**

Polar and non-polar metabolites extracted from human serum samples and metabolites separated using LC and detected using LC-MS.

**Conclusion**

The MYNAH Registry (Registry ID: ACSQHC-ARCR-258) is listed on the Australian Register of Clinical Registries (the Register). Patient recruitment is active and fifty DCM patients have been recruited from approved study sites across Australia. The MYNAH Registry is Australia's first patient registry to understand the natural history of DCM and analyses the metabolomics and proteomics holds potential for understanding the various pathways involved and in identifying possible biomarkers for DCM.

**37**

## NUDG-ED: A randomised trial using behavioural nudges to reduce low-value care in Emergency Department clinical practice

**Gemma Altinger[1], Sweekriti Sharma[1], Louise Cullen, Kirsten McCaffery[2], Jeffrey A Linder[3], Rachelle Buchbinder[4], Ian Harris[1, 5], Enrico Coiera[6], Qiang Li[7, 8], Kirsten Howard[9], Andrew Coggins[10], Paul Middleton[10, 11], Naren Gunja[12], Trevor Chan[13], Ian Ferguson[14], Chris G Maher[1], Adrian C Traeger[1], Karen Tambree[15]**

*1. Institute for Musculoskeletal Health, Sydney Local Health District and The University of Sydney, Sydney*

*2. Sydney Health Literacy Lab, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney, Sydney*

*3. Division of General Internal Medicine, Northwestern University Feinberg School of Medicine, Chicago*

*4. School of Public Health and Preventive Medicine, Monash University, Melbourne*

*5. Whitlam Orthopaedic Research Centre, Ingham Institute for Applied Medical Research, Sydney*

*6. Centre for Health Informatics, Macquarie University, Sydney*

*7. The George Institute for Global Health, UNSW , Sydney*

*8. The George Institute for Global Health, UNSW , Sydney*

*9. Menzies Centre for Health Policy and Economics, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney, Sydney*

*10. Discipline of Emergency Medicine, Sydney Medical School, The University of Sydney, Sydney*

*11. South Western Emergency Research Institute, Liverpool Hospital, Liverpool*

*12. Department of Clinical Pharmacology & Toxicology, Western Sydney Health, Sydney*

*13. Emergency Care Institute, The Agency for Clinical Innovation, St Leonards, Sydney*

*14. Emergency Department, Liverpool Hospital, Liverpool*

*15. NUDG-ED Consumer Advisor, Sydney*

BACKGROUND:

- In busy Australian emergency departments (ED), 75% of patients presenting with low back pain without red flags will receive unnecessary imaging, opioids, or both.
- Neither is recommended as they offer little benefit and have short- and long-term harms and are considered low-value in this context.
- This is the first study to test if visual and social cues (nudges) reduce imaging and opioid prescribing for uncomplicated low back pain in ED.

METHODS:

- **Design**: A 2x2 factorial, open label, before-after, cluster randomised controlled trial design measuring the effectiveness of nudges in reducing low-value care.

- **Participants**: ED clinicians who manage back pain, and approx. 2416 patients 18 years or over presenting to ED with uncomplicated back pain will be recruited from 8 hospitals across 3 Sydney local health districts.

- **Interventions**: Hospitals will be randomised into 1 of 4 groups:
    - Clinician nudges in the electronic medical record
    - Patient nudges in the ED waiting room
    - Both nudges combined
    - No intervention

- There will be a 3-month before period, followed by a 6-month intervention period.
- **Outcomes**: The primary outcome will be the proportion of low back pain encounters where a person received low-value imaging tests in ED or an opioid prescription at discharge, assessed by chart review.
- Secondary outcomes include clinician knowledge; patient reported outcomes; and cost-effectiveness of the intervention.

RESULTS:

- The trial will commence in early 2024. We will discuss the complexity of designing a trial of behavioural interventions to reduce low-value care.

CONCLUSION:

- This study will be the first to test the impact of clinician and patient nudges on reducing low-value care. NUDG-ED has the potential to improve health outcomes for patients presenting to the ED with low back pain, reducing overdiagnosis, overtreatment and improving the stewardship of health resources.

**38**

## Non-pharmacological and non-surgical treatments for low back pain in adults: an overview of Cochrane Reviews

**Rodrigo Rizzo[1, 2], Aidan Cashin[1, 2], Benedict Wand[3], Neil O'Connell[4], Michael Ferraro[1, 2], Saurab Sharma[1, 2], Hopin Lee[5], Edel O'Hagan[1, 2], Christopher Maher[6], Andrea Furlan[7], Maurits W van Tulder[8], James McAuley[1, 2]**

*1. University of New South Wales, Sydneyy, NSW, Australia*

*2. Centre for Pain IMPACT , Neuroscience Research Australia, Sydney, NSW, Australia*

*3. School of Health Sciences and Physiotherapy, The University of Notre Dame Australia, Fremantle, Australia*

*4. Department of Health Sciences, Centre for Health and Wellbeing Across the Lifecourse, Brunel University London, Uxbridge, London, UK*

*5. Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences (NDORMS), University of Oxford, Oxford , UK*

*6. Sydney Musculoskeletal Health, The University of Sydney, Sydney, NSW, Australia*

*7. Institute for Work & Health, Toronto, Canada*

*8. Department of Human Movement Sciences, Faculty of Behavioural and Movement Sciences, Vrije Universiteit Amsterdam, Amsterdam, Amsterdam, Netherlands*

Clinical guidelines recommend non-pharmacological and non-surgical interventions for managing low back pain (LBP). We aimed to summarise the evidence from Cochrane reviews on the efficacy and safety of non-pharmacological and non-surgical interventions for adults with non-specific LBP. We searched randomised controlled trials in the Cochrane Database (up to 15 April 2023). We assessed the quality of the reviews and the certainty of the evidence (AMSTAR-2/GRADE). We included 31 Cochrane reviews of 644 trials that randomised 97,183 adults. There is high confidence in the findings of 19 reviews. The effects were classified into small (less than 10 points on a 0-100 scale or 0.2-0.5 SMD), medium: (>10-20 points on a 0-100 scale or >0.5-0.8 SMD), large effect (≥20 points on a 0-100 scale or ≥0.8 SMD). The best available evidence had moderate certainty. *Acute/subacute LBP:* Compared to placebo, there is no difference in function in the short term for spinal manipulation. *Chronic LBP: Acupuncture*: Compared to sham, it provides a small improvement in function in the short term. Compared to no treatment, it provides a medium reduction in pain intensity in the short term and a small improvement in function in the short term. Compared to usual care, it provides a small improvement in function in the short term. *Exercise:* Compared to no treatment/usual care, it provides a small to medium reduction in pain intensity in the short term and a small improvement in function in the short term.*Manual therapies*: Compared to sham traction, there is no difference in pain intensity in the short term for traction. *Multidisciplinary:* Compared to usual care, it provides a medium reduction in pain intensity in the short term and a small improvement in function in the short term. *Psychological:* Compared to usual care, it reduces pain intensity in the short term, but there is no evidence of it on function in the short term. There is only low certainty evidence that non-pharmacological interventions may not be associated with serious adverse events. **In the absence of high-certainty evidence, providers should prioritise 'effective/low risks' interventions with moderate certainty evidence for people with low back pain.**

**39**

## Low back pain care in 32 low- and middle-income countries

**Saurab Sharma[1, 2], James McAuley[1, 2], On Behalf of Consortium for Low Back Pain in LMICs[1]**

*1. UNSW, Randwick, NSW, Australia*

*2. Centre for Pain IMPACT, Neuroscience Research Australia, Randwick, NSW, Australia*

Introduction

Low back pain (LBP) is the greatest cause of disability in the low- and middle-income countries (LMICs). To develop and optimise LBP care, research on the current models of LBP care, i.e., 'what' care is currently being provided and 'how' this care is being delivered is critical but currently lacking for LMICs. The aim of the paper is to describe how LBP is currently being delivered in LMICs and how.

Methods

A Consortium of LBP in LMICs was developed with 65 members from 35 LMICs. Fifty five members were invited to complete an online survey with closed and open-ended questions. Questions included top three commonly delivered treatments for acute and chronic LBP; primary setting where acute/chronic LBP is typically managed; first contact professional who manage LBP in each country.

Results

Fourty nine members from 32 countries responded to the survey. Pharmacotherapies and electrotherapies are the most common management approaches for both acute and chronic LBP, followed by thermotherapy and manual therapy for acute LBP, and active therapies (exercise) and interventional pain management approaches for chronic LBP. Acute LBP is typically managed in primary care settings and chronic LBP is typically managed in tertiary care settings. General physicians, orthopaedic surgeons, physiotherapists and traditional healers are commonly involved in LBP management. Qualitative data reveal that self-management was commonly used in many countries by people with LBP as the first treatment, however, it is not frequently prescribed by treating clinicians. Variability in how low back pain is managed within and between countries exists.

Discussion and conclusions

The findings provide interesting insights on LBP care in 32 LMICs which can serve as a foundation for developing LBP models of care for these countries. The Consortium can be used as a platform for sharing research expertise and resources for future research on LBP in LMICs.

**40**

## Radiological Factors Associated with Increased Intramedullary Signal Intensity Based on X-ray and MRI – Implications in our understanding of Degenerative Spondylomyelopathy

**Alisha Wafa Dr Sial[1], Stone Dr Sima[1], Xiaolong Dr Chen[1], Jeff Dr Kuan[2], Mark Dr Davies[1], Ashish Dr Diwan[1]**

*1. St George and Sutherland Clinical school, Sydney, NSW, Australia*

*2. St George Private Hospital, Waterloo, NSW, Australia*

**Purpose:** Increased intramedullary signal intensity (IISI) on T2 weighted MRI scan (T2WI) in patients with Degenerative Cervical Myelopathy (DCM) can be a radiological feature of spinal cord damage. However, the association of IISI to degeneration of the spinal column remains unclear in literature. The purpose of this study was to determine the prevalence of IISI and analyze the independent relationship between IISI and cervical degenerative parameters in patients with and without DCM.

**Methods**: A retrospective review of MRI, X-ray, and radiology data for 144 adult patients with DCM with both cervical MRI and X-ray scans was conducted. A total of 39 patients with IISI was identified. The remaining 105 patients without IISI made up the control group.

**Results**: IISI was prevalent in 27.1% of patients and most frequent in C6-C7 cervical levels. The likelihood of having IISI was 1.947 (Exp(B) 1.947, 95%CI [1.004-3.776]) times higher in segmental levels with facet joint degeneration. There was an increased likelihood of IISI within the spinal cord with increasing age (Exp(B) 1.034, 95%CI [1.008-1.060]), maximum spinal cord compression (MSCC) (Exp(B) 1.038, 95%CI [1.003-1.075]), rotational angle (Exp(B) 1.082, 95%CI [1.020-1.148]) and posterior herniation width (Exp(B) 1.333, 95%CI [1.017-1.747]) and decreasing Torg-Pavlov ratio (Exp(B) 0.010, 95%CI [0.001-0.068]).

**Conclusion**: IISI had a prevalence in 27.1% of DCM patients. Increased age, facet joint degeneration, MSCC, rotational angle, posterior herniation width and decreasing Torg-Pavlov angle were found to be independently associated with IISI. Radiological degenerative changes associated with IISI indicate value in the assessment of patients with possible DCM.

**42**

## A scoping review on swimming for low back pain

**Deborah M Wareham[1], Joel T Fuller[1], Tayla J Douglas[1], Christopher S Han[2], Mark J Hancock[1]**

*1. Department of Health Sciences, Macquarie University, Sydney, NSW, Australia*

*2. Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, NSW, Australia*

**OBJECTIVE:** To map the extent and characteristics of research investigating relationships between swimming and low back pain, and summarize these relationships.

**DESIGN:** Scoping review.

**LITERATURE SEARCH:** MEDLINE, EMBASE, CINAHL, and SPORT Discus were searched from inception to February 2023. **STUDY SELECTION CRITERIA:** We included primary studies and reviews that reported an association between swimming and low back pain, including any age group. Hydrotherapy studies were excluded.

**DATA SYNTHESIS:** We extracted study characteristics (including population, swimming exposure and comparator type) for qualitative synthesis. We also extracted measures of association, including 2 x 2 data when available.

**RESULTS:** 3093 articles were identified, and 44 studies included. Only one randomized controlled trial and one longitudinal cohort study were included. Most studies were cross-sectional (37/44; 84%), included competitive athletes (23/39; 59%), and did not primarily focus on the association between swimming and low back pain (41/44; 93%). The reported associations between swimming and low back pain were highly variable regardless of whether the comparison was to other sports (odds ratio: 0.17 to 17.92) or no sport (odds ratio: 0.54 to 3.01)

**CONCLUSION:** We could not identify any clear pattern of association between swimming and low back pain. There is an urgent need for high-quality studies that directly assess the association between swimming and low back pain, including randomized controlled trials and cohort studies, especially given that swimming is a commonly recommended exercise for management of low back pain.

**43**

## A qualitative study of participant perspectives of a walking program for preventing low back pain recurrences

**Natasha C Pocovi[1], Julie Ayre[2], Simon French[3], Christine Chung-Wei Lin[4], Anne Tiedemann[4], Christopher Maher[4], Dafna Merom[5], Kirsten McCaffery[2], Mark Hancock[1]**

*1. Department of Health Sciences, Macquarie University, Sydney, NSW, Australia*

*2. Sydney Health Literacy Lab, University of Sydney, Sydney, NSW, Australia*

*3. Department of Chiropractic, Macquarie University, Sydney, NSW, Australia*

*4. Institute for Musculoskeletal Health, University of Sydney, Sydney, NSW, Australia*

*5. School of Science and Health, Western Sydney University, Sydney, NSW, Australia*

**Aims:** The primary aims of this study were to; 1) Identify what motivates individuals to start a walking program for the prevention of low back pain, 2) Identify which strategies optimise short-term and long-term adherence to a walking program, and 3) Develop a set of recommendations to aid clinicians (in this case physiotherapists) in promoting a walking-based exercise program.

**Methods:** The WalkBack trial is a randomised controlled trial examining the effectiveness of a six-month, progressive, and individualised walking program for low back pain prevention. The intervention is delivered by a physiotherapist trained in health-coaching. This qualitative study was undertaken on a sample of WalkBack participants. Semi-structured focus groups were conducted following completion of the walking program. Interview questions explored: primary motivations for starting a walking program; and the identification of elements useful in optimising adherence. Audio was transcribed, and thematic analysis followed.

**Results:** Twenty-two participants provided data across five focus groups. Three major themes were identified. Theme one identified that strong motivators to start a walking program were anticipated improvements in low back pain management and the added general health benefits of a more active lifestyle. Theme two identified that fear of high-impact exercises led to avoidance; however, walking was considered a safe exercise option. Theme three identified accountability, enjoyment of exercise and health benefits were critical to adherence.

**Conclusions:** Participants recently recovered from low back pain reflected positively on a physiotherapist-prescribed walking program. Participants described what elements of the program were crucial to starting exercise and optimising adherence. These findings have informed a list of practical recommendations for physiotherapists to improve patient commencement and adherence to exercise.

**44**

## Opioid analgesics for Osteoarthritis: Systematic Review and Meta-analysis

**Christina CA Abdel Shaheed[1], Wasim WA Awal[2], Geoffrey GZ Zhang[3], Gilbert SG Steve[1], Daniel DG Gallacher[4], Andrew AM McLachlan[1], Ric RD Day[5], Giovanni GF Ferreira[1], Caitlin CJ Jones[1], Harbeer HA Ahedi[1], Mamata MT Tamrakar[1], Fiona FB Blyth[1], Fiona FS Stanaway[1], Chris CM Maher[1]**

*1. University of Sydney, Camperdown, NSW, Australia*

*2. Griffith University, Birtinya, Qld, Australia*

*3. Royal Prince Alfred Hospital, Sydney, NSW, Australia*

*4. Warwick Medical School, Coventry, Warwick, England*

*5. University of New South Wales, Sydney, NSW, Australia*

**Aims:** Opioid analgesics are commonly prescribed for osteoarthritis. Guidelines provide inconsistent recommendations on the use of opioid analgesics in osteoarthritis and previous reviews are limited in scope, warranting a comprehensive assessment of the evidence in this area.

**Methods:** This was a systematic review and meta-analysis evaluating the efficacy and safety of opioids for osteoarthritis (knee, hand, hip, spine) compared with placebo. Electronic databases including MEDLINE, EMBASE, CINAHL, PsycINFO, CENTRAL were searched from their inception to October 2020 for eligible randomised placebo-controlled trials evaluating any opioid analgesic for osteoarthritis. The primary outcome was pain at the medium term (≥6 weeks but <12 months). Continuous pain and disability outcomes were converted to a 0 to 100 scale. Effects <10 points were considered very small, 10-19 points small, 20-29 points moderate and >30 points large. Dichotomous outcomes were presented as risk ratios (and 95% confidence intervals). Four authors extracted data and assessed risk of bias. Data were pooled using a random effects model. Quality of evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE).

**Results:** Thirty-six trials (dose range: 10-210 oral morphine milligram equivalent units/day) were included. For the *medium term*, there was low quality evidence from 19 trials (n=8965) of a very small effect of opioids compared to placebo for pain; mean difference (MD) -4.59 (95% CI -7.17, -2.02) and low quality evidence from 16 trials (n=6882) of a very small effect on disability; MD -4.15 (95% CI -6.94, -1.35). Meta-regression didn't show a significant association of dose with adverse events or pain relief. Opioids increased the risk of adverse events; RR: 1.43 (1.29, 1.59), but evidence was of very low quality. There were no long-term outcomes data.

**Conclusions:** For people with osteoarthritis, opioids may provide very small effects on pain and disability, and may increase the risk of adverse events.

**45**

## Proposed objective scoring algorithm for assessment and intervention recovery following surgery for lumbar spinal stenosis based on relevant gait metrics from wearable devices: the Gait Posture index (GPi)

**Ralph J Mobbs[1], Redmond R Mobbs[2, 3], Wen Jie J Choy[1, 2, 4], Lianne koinis[1]**

*1. Wearables and Gait Assessment Research (WAGAR), Randwick, NSW, Australia*

*2. NeuroSpine Surgery Research Group (NSURG), Sydney, Australia*

*3. School of Mathematics, University of New South Wales, Randwick, NSW, Australia*

*4. Faculty of Medicine, University of New South Wales, Sydney, NSW, Australia*

Background. Lumbar spinal stenosis (LSS) results in significant pain and disability. As spine healthcare providers, monitoring patient's outcomes is of the highest importance, and guides everything we do. However, a large amount of our data has been based solely on subjective, single time-point outcome tools limited by their subjective nature.

Methods. We herein propose a novel, simple objective scoring system, the Gait Posture index (GPi). Four key objective health metrics, which can be measured using wearable devices have been identified to correlate with health status: (I) step count; (II) gait velocity; (III) step length; (IV) posture. An algorithm combining the above metrics was established to 'score' patient's ambulation from 0 (bed bound)–100 (excellent mobility and gait function). Thirteen surgical patients were assigned to the GPi scoring algorithm and compared with traditional subjective scoring systems Oswestry Disability Index (ODI) and Patient Satisfaction Index (PSI) as a proof of concept and confirmation of validity.

Results. At 3 months, 11 out of 13 patients following decompression for LSS had an improvement with their GPi 20.79±17.44, P=0.001. In addition, Pearson correlation revealed positive correlation between change in GPi with change in ODI (r=0.682, n=13, P=0.01) and negative correlation between change in GPi with PSI (r=−0.618, n=13, P=0.024).

Conclusions. The GPi algorithm correlates accurately with preoperative and post-operative mobility which are comparable to traditional subjective scoring systems. GPi affords the health care provider with a relevant measure of patient outcome, and real-time recovery dynamics following decompression for LSS.

**46**

## Socioeconomic Status and Race Do Not Influence Inpatient Opioid Use in One-Level Posterior Lumbar Fusions for Degenerative Spondylolisthesis

**Lauren Barber[1, 2], S Hickle[3], S.D. Nelms[4], H Fraser[5], K.A. Easley[6], D Ananthakrishnan[2]**

*1. UNSW, Mequon, WISCONSIN, United States*

*2. Division of Spine Surgery, Emory Orthopaedics and Spine Hospital, Atlanta, Georgia, United States*

*3. Division of Neuropsychology, Department of Rehabilitation Medicine, Emory University School of Medicine, Atlanta, Georgia, United States*

*4. Department of Rehabilitation Medicine, Emory University School of Medicine, Atlanta, Georgia, United States*

*5. Department of Orthopedic Surgery, Emory University School of Medicine, Atlanta, Georgia, United States*

*6. Department of Biostatistics and Bioinformatics, Rollins School of Public Health, Emory University, Atlanta, Georgia, United States*

Introduction:
As the opioid epidemic continues, research has shown that opioid use in patients with spinal conditions may differ based on demographic factors, including race and socioeconomic status (SES). However, the majority of studies have evaluated pre-operative and post-operative opioid use; demographic differences in opioid use during the hospitalization is underexplored.

Methods:
This is a retrospective review of patients who underwent one-level lumbar spinal fusion for degenerative spondylolisthesis at a single tertiary academic center from October 2004 – April 2012. Procedure, patient demographics, length of stay (LOS), and inpatient opioid use (morphine milligram equivalents – MMEs) were recorded, as well as whether or not benzodiazepines, steroids, and gabapentin were used. Patients were classified by their distressed communities index (DCI) and environmental designation according to zip code. The DCI is a composite score of 7 metrics (high school education, housing vacancies, employment level and rate, poverty rate, median income ratio, and business growth) used as a proxy for SES developed by the Economic Innovation Group. DCI scores range from 0 (no distress) to 100 (severe distress) and are divided by quartiles, categorized from Prosperous to Distressed. Kruskal-Wallis tests were used to determine whether inpatient opioid utilization differed based on 1) SES (based on the DCI), and 2) steroid, gabapentin, and benzodiazepine use. Exact Chi-square tests were used to evaluate general associations between race and SES (i.e., DCI and environmental designation). Alpha was set at $p < 0.05$.

Results:
A total of 116 patients were included, 65% female and 35% male. The average age (SD) was 65 (8) years. 1.5% of patients were Asian, 22% Black, 73% White, and 3.5% unknown. 73% of procedures included a transforaminal lumbar interbody fusion (TLIF). 91 patients had documentation on Patient-Controlled Analgesia (PCA) usage. 91% of patients were prescribed a PCA. 100% of patients received opioids while inpatient. The median total MME during the hospitalization was 155 with PCA use and 131 without PCA. The average LOS was 4 ± 1 day. There were no statistically significant differences in inpatient opioid usage based on DCI (p=0.985) or environmental designation (p=0.765). There were statistically significant differences in inpatient opioid usage in patients with steroid (p=0.001) and benzodiazepine use (p<0.001) – more opioid use with steroid or benzodiazepine use. There were no significant differences in inpatient opioid usage between TLIF and non-TLIF patients (p=0.168) or between White and Black patients (p=0.448). Additionally, race was not independently associated with DCI (p=0.065) or environmental designation (p=0.307).

**47**

## Characterising the pathological gait signatures of degenerative lumbar spine diseases using inertial wearable sensors: an observational study

**Pragadesh Natarajan[2, 1, 3], R Dineth Fonseka[2, 3], Monish M Maharaj[2, 1, 4], Lianne Koinis[2], Ralph J Mobbs[2, 1, 4, 3]**

*1. NeuroSpine Surgery Research Group (NSURG), Sydney, Australia*

*2. Wearables and Gait Assessment Research (WAGAR), Randwick, NSW, Australia*

*3. Faculty of Medicine, University of New South Wales, Sydney, NSW, Australia*

*4. Neurospine Clinic, Prince of Wales Private Hospital, Randwick, NSW, Australia*

Introduction
Degenerative diseases of the lumbar spine are associated with quantitatively altered gait patterns. Recent advances in wearable

accelerometry provide an inexpensive and convenient means of objectivelyassessing gait in the clinical setting. Pathological 'gait signatures' are yet to be established for lumbar spine pathologies by wearable sensor-based quantitative gait analysis.

Purpose
To examine the quantitative gait patterns associated with lumbar disc herniation (LDH), lumbar spinal stenosis (LSS) and mechanical low back pain (MLBP) using a chest-based inertial wearable sensor. 'Gait signatures' compared to an age-matched control population, and reported as statistically significant mean difference (%) from 'normative' gait parameters.

Methodology

Procedure: Participants fitted at the sternal angle with inertial measurement unit (MetaMotionC, Mbientlab Inc.) and walked unobserved at a self-selected pace for 120m along an obstacle-free, carpeted hospital corridor.
Gait metrics: Spatial, temporal, asymmetry and variability parameters of gait were compared with age-matched (+/- 2 years) control participants recruited from the community. Sensor accuracy: Validated in LSS and healthy controls.

Results
No significant differences in age, body mass index, smoking and diabetes between lumbar spine and control groups. All lumbar spine groups had spatiotemporal increases to step time, stance time, swing-time, double-support time and single-support time with decreases in gait velocity and step length. Pathological gait signatures were unique between groups (Figure 2). LDH group involved marked asymmetry, with step length asymmetry (+39.1%, p=0.018), step time asymmetry (+23.0%, p=0.026), singlesupport asymmetry (+35.1%, p=0.016). LDH group also involved variation in step length (+29.0%, p=0.029). CMLBP group involved no asymmetry but marked variability in particular metric: single support time (+49.0%, p=0.031).LSS group involved both asymmetry (+24.9%, p=0.039) and variability (+36.3%, p=0.043) in step length.

Conclusions
Wearable-based gait analysis is capable of detecting gait abnormalities in lumbar spine pathologies such as LDH, LSS and CMLBP. Subtypes have unique 'pathological signatures' of gait impairment.

**48**

## Is Degenerative Cervical Myelopathy being Missed in Primary Healthcare?

**Rohil Chauhan[1], Joanne Kennedy[2], Steve G White[3]**

*1. Auckland Spine Surgery Centre, Newmarket, AUCKLAND, New Zealand*

*2. Emergency Department, Christchurch Public Hospital, Christchurch, New Zealand*

*3. Auckland University of Technology, Auckland, New Zealand*

Degenerative cervical myelopathy is the most common cause of spinal cord impairment internationally and estimated to affect 5% of adults over the age of 40 years. Unfortunately, it is thought to be significantly underdiagnosed due to the lack of condition awareness and highly non-specific presentations and disease trajectory. The present survey aimed to establish the current level of condition awareness and screening confidence amongst primary healthcare clinicians in New Zealand.

Methods:

Cross-sectional, electronic survey methodology was employed to collect responses on perceived awareness, confidence and DCM understanding from primary healthcare clinicians in NZ, including: general medical practitioners (GP), nurse practitioners (NP), physiotherapists, chiropractors and osteopaths. Upon review of the literature, a 12-question survey was developed and modified upon piloting it. Ethics approval was granted by the Auckland University of Technology Ethics Committee (23/113) and descriptive analytics were utilised to review survey data.

Results:

255 clinicians responded to the survey. Of these, 28% were GPs, 44% physiotherapists, 16% chiropractors, 12% nurse practitioners and 2% osteopaths. Respondents had an average of 14.5 years of clinical experience (SD=8.52). Our findings revealed that only 20% reported that they had a high level of awareness of DCM and only 16% were confident to screen for the condition. Notably, 54% indicated a lack of prior education of DCM. GPs were less likely to have had prior education when compared to physiotherapists and chiropractors (p=0.05) and unsurprisingly, had lower levels of awareness and confidence in screening for DCM (p=0.05).

Amongst clinicians with higher levels of screening confidence, the following percentages of respondents recognised specific symptoms as characteristic of DCM: upper limb pain/paraesthesia (96.5%), neck pain and stiffness (91.9%), hand dexterity decline (87.3%), and gait disturbance (74%). There was less consistency in regard to characteristic signs of DCM, with 65.9% of respondents selecting tandem gait disturbance, 61.9% selected patient age > 45 years, 57.2% selected Babinski sign and 49.7% selected Hoffmans sign. Importantly, the majority of respondents (88%) indicated that they were interested in receiving further education about DCM.

Conclusion

Even in this diverse group of primary healthcare clinicians with significant clinical experience, this study has demonstrated relatively low levels of both awareness and ability to screen for DCM. Of those that reported higher levels of confidence, we have shown that there is no clear agreement in regard to which signs and symptoms have the most diagnostic value. These findings suggest that this condition may well be under-diagnosed and that a delayed diagnosis is likely for many patients. Unfortunately, both scenarios impact the outcome for DCM sufferers due to the known progressive nature of the condition, and educational strategies targeted to primary healthcare should be considered.

**49**

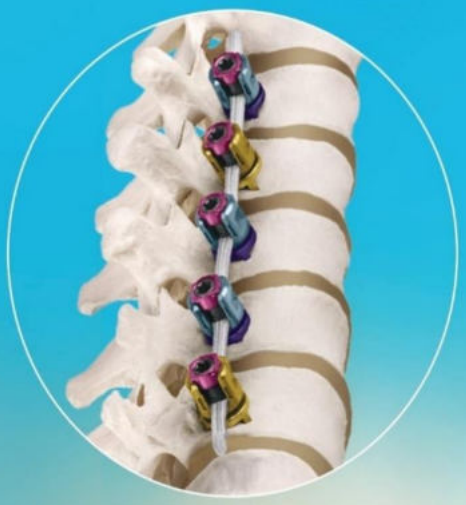
## Not available

**Ashish Diwan[1]**

*1. The University of New South Wales, Kogarah SYDNEY, NSW, Australia*

Abstract not available

# HELP HIM DREAM BIG AND REACH HIGHER



## REFLECT™

A fusionless technique for adolescent idiopathic scoliosis designed to drive deformity correction and preserve flexibility in the growing spine

GLOBUS MEDICAL

GlobusMedical.com/REFLECT

REFLECT™ is not available for sale or distribution in the U.S.