



ANNUAL REPORT

2020-2021



**UNIVERSITY OF
CALGARY**
SPINE PROGRAM



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Introduction



***Dr. Brad Jacobs
Program Chair***

The University of Calgary Spine Program is a multidisciplinary clinical and academic group focused on the care of individuals affected by conditions and diseases of the spine and spinal cord. Our mission is to provide the highest quality health care to individuals with spinal disorders through the pursuit of excellence in research, teaching, and clinical care.



The program is centered at the Foothills Medical Centre and Alberta Children's Hospital within Alberta Health Services. Members of the Spine Program have appointments in the Division of Neurosurgery, Department of Clinical Neurosciences or the Section of Orthopaedic Surgery, Department of Surgery. Many members have joint appointments in both Departments.

The Spine Program provides care for patients with spinal cord and column injury, infection, neoplasia and degenerative disease. Clinical care is closely linked to clinical education and research in a supportive academic setting. The program has representation from Neurological Surgery, Orthopaedic Surgery, Nursing, and Orthotics. Active collaborations exist with physiatry and psychiatry.

Our program offers comprehensive Spinal Surgery Fellowship training under the leadership of Dr. Fred Nicholls. The Spinal Surgery Fellowship at the University of Calgary is a combined Orthopaedic and Neurosurgical clinical experience with the goal of training surgeons in the diagnosis and surgical management of diseases of the entire spine. Trainees gain experience in the surgical treatment of a wide array of conditions, ranging from common degenerative conditions to complex adult deformity and oncological surgical resections and reconstructions. Minimally invasive and anterior/anterolateral approaches are commonly employed in daily practice.

Dr. Ken Thomas leads our research program. There are currently numerous active research studies within the Spine Program that range from fundamental science experiments focused on intervertebral disc biology to advanced MR imaging and machine learning research to prospective randomized controlled clinical trials on acute spinal cord injury therapeutics. Basic science investigations are carried out via active collaborations with the McCaig Bone & Joint Research Institute and the Hotchkiss Brain Institute. Clinical research studies are active on many spinal surgery topics, with key activity focused on the Canadian Spine Outcomes & Research Network (CSORN) clinical registry.



Members

- Surgical Staff

- Dr. W. Bradley Jacobs, Program Chair
- Dr. Jacques Bouchard
- Dr. David Cadotte
- Dr. Steven Casha
- Dr. Roger Cho
- Dr. Stephan du Plessis
- Dr. Nathan Evaniew
- Dr. Fábio Ferri-de-Barros
- Dr. Richard Hu
- Dr. Peter Lewkonja
- Dr. Fred Nicholls, Fellowship Director
- Dr. David Parsons
- Dr. Paul Salo
- Dr. Alex Soroceanu
- Dr. Ganesh Swamy
- Dr. Ken Thomas, Research Director

- Allied Health

- Brooke Nowicki, Manager Clinical Neurosciences, AHS Liaison
- Ken Moghadam, Certified Orthotist (CO) Cascade Orthotics
- Rob Cameron, CO Cascade Orthotics
- Drew Anholt, CO Cascade Orthotics
- Jeff Wright, CO Cascade Orthotics

- Nursing Staff

- Bruce Chatterton, OR nurse clinician
- Erin Fischer, OR nurse clinician

- Nurse Practitioners

- Patti Long, Neurosurgery
- Carla Dean, Neurosurgery
- Erin Villard, Neurosurgery
- Ron Prince, Neurosurgery
- Nicole Miller, Orthopaedics



- Research Staff

- Tara Whittaker, Research Nurse
- Ish Bains, Research Coordinator
- Saswati Tripathy, Research Coordinator
- Victoria Smith, Research Coordinator

- Spine Fellows

- Dr. Vishwajeet Singh
- Dr. Marcelo Oppermann
- Dr. Andrew Bogle
- Dr. Abdul Kasmani
- Dr. Victor Yang
- Dr. Marina Rosa Filezio (ACH)

- Neurosurgery Residents 2020-2021

- | | |
|-------------------------|--|
| ○ Candice Poon (R6) | ○ Madeleine de Lotbiniere-Bassett (R4) |
| ○ Michael Yang (R6) | ○ Matthew Eagles (R4) |
| ○ Albert Isaacs (R5) | ○ Abdulrahman Albakr (R3) |
| ○ Stefan Lang (R5) | ○ Jenna Mann (R2) |
| ○ Rita Nguyen (R5) | ○ Branavan Manoranjan (R2) |
| ○ David Ben-Israel (R5) | ○ Richard Yu (R2) |
| ○ Magalie Cadieux (R5) | ○ Brij Karmur (R1) |
| ○ Sandeep Muram (R5) | ○ Catherine Veilleux (R1) |
| ○ Nicholas Sader (R5) | |

- Orthopaedic Residents 2020-2021

- | | |
|-------------------------|------------------------------|
| ○ Lee Fruson (R5) | ○ Annalise Abbott (Research) |
| ○ Joseph Kendal (R5) | ○ Laura Morrison (Research) |
| ○ Madison Litowski (R5) | ○ Erin Davison (R2) |
| ○ Sarup Sridharan (R5) | ○ Christopher Flanagan (R2) |
| ○ Michael James (R4) | ○ Bryan Heard (R2) |
| ○ Jennifer Purnell (R4) | ○ Christopher Hewison (R2) |
| ○ Daniel You (R4) | ○ Laura Collings (R1) |
| ○ Brent Benavides (R3) | ○ Jarrett Moore (R1) |
| ○ Taryn Ludwig (R3) | ○ Julian Rizoz (R1) |
| ○ Jayd Lukenchuk (R3) | ○ Logan Woods (R1) |
| ○ Murray Wong (R3) | |



Clinical Activity

Surgical Sites

Foothills Medical Centre

The Foothills Medical Centre is a level 1 trauma center serving more than two million people from the City of Calgary and the surrounding regions of southern Alberta, southeastern British Columbia and southern Saskatchewan. Approximately 2000 spinal procedures are performed per year at Foothills Medical Centre. All adult spinal cord injuries are seen and managed in the acute and rehabilitation stages at the Foothills.

Alberta Children's Hospital

Alberta Children's Hospital provides tertiary and quaternary care dedicated to pediatric spine surgery patients and their families. On average, 35,000 children per year attend our multidisciplinary orthopaedic clinics and over 1,000 orthopaedic operative procedures are performed each year. A dedicated spine team successfully manages spinal problems of diverse etiologies in all paediatric age groups, including scoliosis, kyphosis, spondylolisthesis and thoracic insufficiency syndrome. In 2020/2021 the paediatric spine team performed 99 spine surgeries.

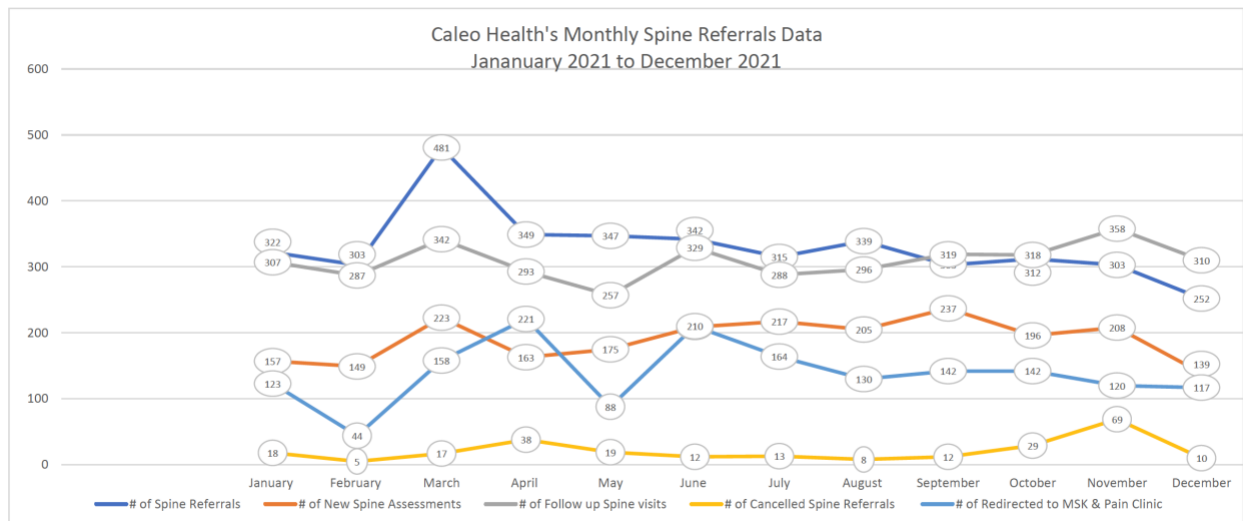
Canadian Surgery Solutions

Canadian Surgical Solutions is a non-hospital surgical facility equipped to perform a comprehensive range of orthopaedic surgical procedures, including total joint replacements and spinal procedures. Dr. Fred Nicholls, Dr. Roger Cho and Dr. Paul Salo perform spine cases for the Workers Compensation Board.



Consultation Services

Caleo Health



- Ten spine surgeons participate in clinic activity at the Caleo Health outpatient facility including Dr. Hu, Dr. Bouchard, Dr. Cho, Dr. du Plessis, Dr. Thomas, Dr. Swamy, Dr. Lewkonia, Dr. Nicholls and Dr. Soroceanu and Dr. Cundal.
- Spine Triage Physicians include Dr. Soumbasis, Dr. Eckenswiler, Dr. Meerholz, Dr. Fleck & Dr. Magown.
- Caleo received approximately 3900 referrals in 2021. The wait time for spine assessment was approximately 2-3 months on average in 2020(referenced from registration date to appointment date).
- On Average, in 2021 patients were provided their spine assessment appointment date within 5 -10 business days of completing the spine registration.
- On Average, in 2021 referring physicians/healthcare providers received a "Referral Received/Accepted Confirmation" within 1-2 weeks from the time the referral was received and accepted at Caleo Health.
- Approximately 45-50% of the patients assessed require further referral to a spine surgeon.



- In 2021, wait time from spine assessment to surgical consult was approximately 18-20 months.
- The pre-spine assessment in person education session were interrupted and replaced by a virtual education session in 2021 due to COVID-19. Patients that were not able to register for a spine assessment, were provided access to the MSK & Pain clinic based on e-Consultation review of their current referral information.

Dr. Mark Lewis
Clinical Director, Caleo Health







Spine Triage and Assessment Clinic (STAC)

The Spine Triage and Assessment Clinic (STAC) has now been operational for 17 years. Located on the 12th floor at the Foothills Medical Center as a Neurosurgery clinic, the primary function of STAC is to provide spine triage and assessment to residents of Southern Alberta; and to determine if patients are probable or possible surgical candidates.

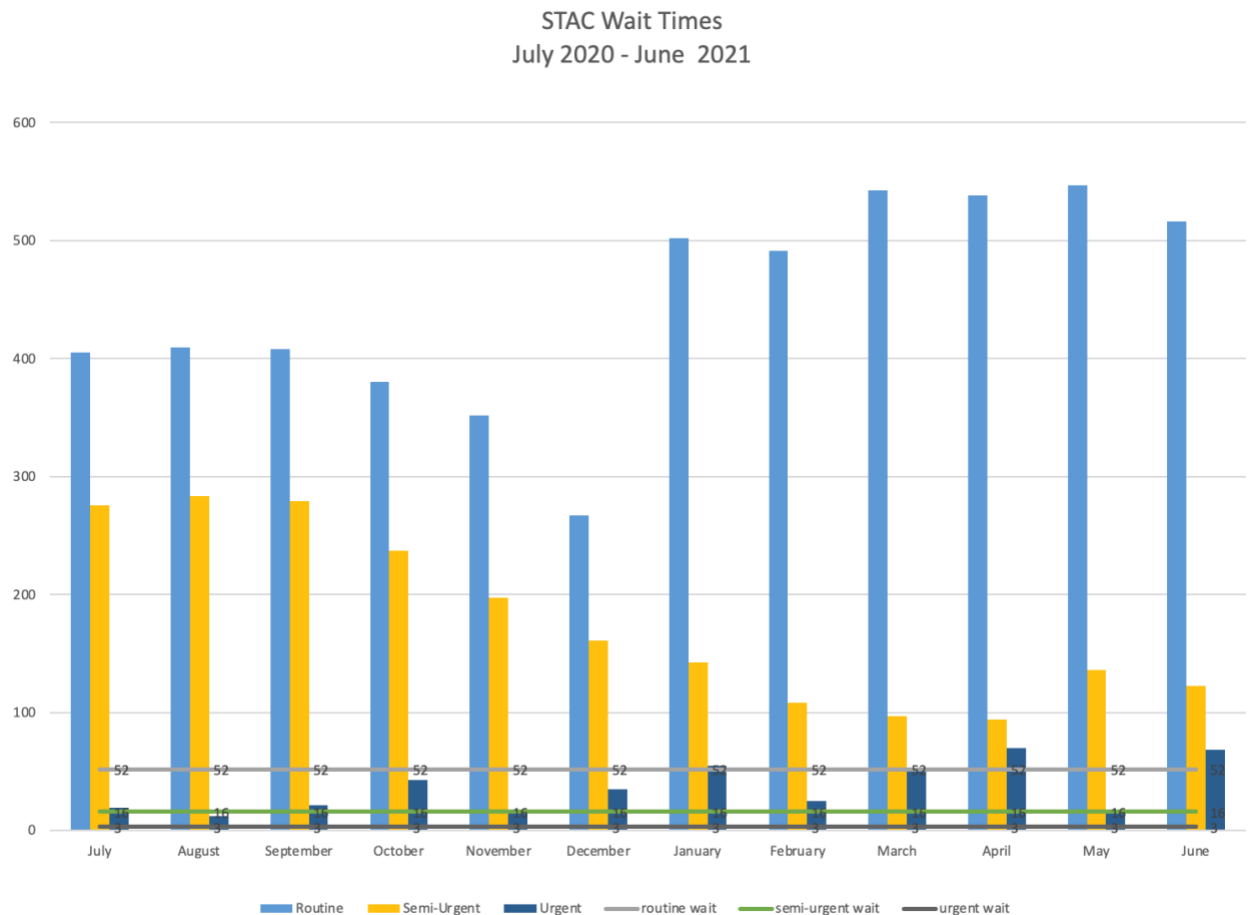
Early identification of both surgical and non-surgical candidates facilitates the management of both surgical and non-surgical patients. It leads to greater efficiency of care by promptly directing patients for appropriate care by the right provider.

Educational initiatives about the indications for referral and diagnostic imaging requirements have been developed with community partners, and they attend onsite visits to STAC. In addition, Residents in Physiatry are being exposed to STAC with plans to involve Family medicine and Emergency medicine residents. Training and education in managing patients with spine-related problems would decrease the number of unnecessary referrals, reduce wait times and improve overall patient satisfaction.





From 1-Jul-2020 to 30-Jun-2021, the clinic received 3080 referrals from the community and other specialists. This is a 23% decrease from 2019; the decreased volume was due to many local doctors' offices being shut down due to COVID. From March 17, 2020, to July 6, 2020, the STAC clinic functioned at a substantially reduced capacity due to Covid, which significantly impacted our waitlist.





Wait times for routine patients increased from 12 to 18 months (a 6-month increase) as we worked on getting the semi-urgent patients through with a limited schedule capacity. The total number of new patients seen during this same time was 1197.

STAC's success is undoubtedly due to Randi and Katie's motivated administrative efforts and dedication of the spine triage physicians, Drs. Gaekwad, Shao and Kandil, and our physiatry partners at Kinesis.

We continue to look forward to improving efficiency in triage and assessment now that Covid appears to be almost on the back burner.

Dr. Stephan du Plessis



University of Calgary Outpatient Clinics

Several outpatient clinics take place at the University of Calgary including consultation and follow-up. It is also the site of basic science research, clinical research and many education activities provided by members of the spine program.

Urgent Consultations and Surgery

Patients presenting with neurologic deficits, fractures, dislocations and tumors are assessed and treated by a spine staff surgeon on call. Ten adult spine surgeons provide full-time on call services for the Foothills Hospital while similar coverage is provided at Alberta Children's Hospital. Physicians respond to enquiries for all Alberta Health Services hospitals including Calgary, Southern Alberta, Eastern British Columbia and Southwestern Saskatchewan.

Overall Surgical Wait Times

The wait time that elective surgical patients experience from initial referral by their primary care physician through until the surgical date is a difficult metric to quantify given the variability in individual clinic pathways and workflow. Considering patient wait lists for triage, surgical consultation as well as surgical waitlists the estimated patient wait time is up to 22 months.



Surgical Activity

Alberta Health Services (FMC, ACH)

Surgeries by procedure code from 1-Jul-2020 to 30-Jun-2021 listed for the following surgeons: Bouchard, Cadotte, Casha, Cho, du Plessis, Evaniew, Ferri-de-Barros, Gallagher, Jacobs, Lewkonja, Nicholls, Parsons, Phillips, Salo, Soroceanu, Swamy and Thomas.

Procedure Group	Case Count	Totals
Cerv Ant Decompression	2	
Cerv Ant Arthroplasty	16	
Cerv Ant Arthroplasty w/Fusion	3	
Cerv Ant Fusion/ACDF	224	
Cerv Postr Fusion/Inst	104	
Cerv Postr Decompression	37	
Cerv Postr Decompression MIS	37	
Cerv Postr Fusion/Laminoplasty	13	
Cervical 2 Stage	7	443
Tho/Lum 2 Stage	96	
Tho/Lum Ant Arthroplasty	14	
Tho/Lum Ant Arthroplasty w/Fusion	11	
Tho/Lum Ant Fusion	17	
Tho/Lum Postr Decompression	374	
Tho/Lum Postr Decompression MIS	386	
Tho/Lum Postr Fusion MIS	63	
Tho/Lum Postr Fusion/Inst	306	
Tho/Lum 3 Stage	24	
Tho/Lum Fusion DLIF short segment	5	
Tho/Lum Fusion OLIF short segment	2	
Tho/Lum Post Kyphoplasty	1	1299
Misc Spine (includes spine tumor, neuro spine shunt, cranial halo application, spine cord tumor/excision lipoma, spine lum pos detether fatty filum terminale, spine lum pos pseudo meningo/cystocele repair, spine pos laminoplasty with rhizotomy 1-2 levels & spine pos laminoplasty with rhizotomy 3+ levels)	131	
ACH Only Spine Codes	87	218
Totals	1960	1960



Canadian Surgery Solutions

Between 1-Jul-2020 and 30-Jun-2021, three of our spine surgeons, Dr. Cho, Dr. Nicholls and Dr. Salo completed a total of 53 lumbar cases at Canadian Surgery Solutions.

Inpatient Spine Care

Unit 101 – Foothills Medical Centre

The 2020-2021 year was very different than the normal Unit 101 operations. Surgical postponements due to COVID, and public health restrictions had a large impact on both the elective spine patient population, and spine trauma populations. For the first time since opening in 2005, there were many days where the unit held empty beds in the spring and summer of 2020. However, this decreased capacity was short-lived, and with the ongoing COVID waves our unit soon filled back up. We were really challenged in this year with supporting any improvement work; instead we focused on keeping our inpatients and staff as healthy and as protected from COVID as possible.

We had two significant operational leadership changes this year. Karolina Herold joined the team in June of 2020, as the new unit manager. She brought with her enthusiasm and drive for excellence. Julie Reader, the Clinical Nurse Educator, was successful in a temporary position with the Neuroscience Strategic Clinical Network, and was able to join that provincial team to support the standardization of specialized spine care across the province.

The operational work for this year was focused on maneuvering the peaks and troughs of the COVID waves, and preparing for the launch of Connect Care- which was later postponed to November 2022.

We hope that the worst of the pandemic is passed, regardless Unit 101 continues to provide excellent, highly specialized care, and will endeavor to do so long past the time where the threat of COVID-19 has waned. Thank you, 101!

Julie Reader
Brooke Nowicki



Adult Spinal Deformity

The Calgary Spine Program can be considered one of the biggest centres in Canada specialising in the surgical treatment of adult spinal deformity. These surgeries are long and complex, and the patients themselves can be just as complex, with many comorbidities and longstanding chronic pain. Dr. Swamy, Dr. Soroceanu, Dr. Thomas, Dr. Jacobs, and Dr. Nicholls meet regularly as a group in order to learn from each other and progress their standard of care for these patients.

Over the recent years, these meetings have been streamlined to focus on
1) discussing as a group the clinical treatment plan of the current patients and
2) reviewing patients and their outcomes 1-2 years post-surgery which has driven a number of clinical initiatives.

The most notable change with the deformity group is its new interdisciplinary nature. Along with the regular spine surgeons, regular attendees to these meetings now also include Nicole Miller, (nurse practitioner), Vicki Smith (research coordinator), and Dr. Sean Stacey and Dr. Kyle Rogan from anesthesiology. Dr. Stacey and Dr. Rogan have collaborated with the group to ensure these complex spine patients get seen in a pre-admission clinic well before their surgery, in order to assess and optimize any medical conditions that may put patients at risk for anesthesia-related complications and to help them in their recovery process following the lengthy surgical procedures. They are also working with the spine group to set up a research initiative examining fluid resuscitation practices at FMC with spine surgical cases that go over several hours and have extensive blood loss.

The group also continues to collaborate with the TOPPs program (pain management and peri-operative opioid use) and the majority of all deformity patients are referred through the program. In the last year, the spine unit nurses can attest to the improvements they see from patients who have gone through the TOPPS program. These patients require less narcotics and have a more positive approach to the post-op rehab process.

Another big initiative of the deformity group this year was developing a national prospective deformity module as part of the larger CSORN registry. 2021 was our first full year of enrolment in the CSORN deformity module. We hope to have an additional site (St. John) begin patient enrollment in early 2022.

Dr. Ganesh Swamy



Rehabilitation:

Calgary Spinal Cord Injury Program Data

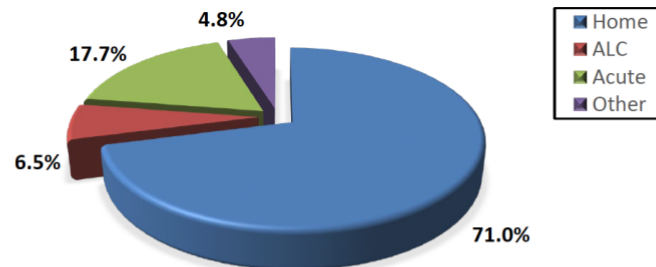
(July 2020 - June 2021)

BASIC DEMOGRAPHICS	Traumatic	Non-Traumatic	Total
Total # of patients discharged	26	36	62
	42%	58%	

ADDITIONAL DEMOGRAPHICS	Traumatic	Non-Traumatic	Total
Average age (years)	54.7	61.9	58.9
Males	69%	61%	65%
Females	31%	39%	35%

AVERAGE LENGTH OF STAY (LOS) (in # of days)	Traumatic	Non-Traumatic	Total
Acute LOS (Onset Days)	35.3	32.4	33.8
Tertiary Neuro Active LOS	68.7	51.2	59.8
Rehab Unit Total LOS	73.2	55.3	64.1
Total In-patient LOS	108.5	87.6	97.9

DISCHARGE DISPOSITION



Additional Notes re: Discharge Disposition

Home → Includes with and without additional health care services (i.e., home care)

ALC (Alternative Level of Care) → Includes long-term care, assisted living, personal care home, etc.

Acute → Includes acute medical units AND transitional units (urban or rural/home hospitals)

FUNCTION SCORES Functional Independence Measure ® FIM)	Traumatic	Non-Traumatic	Total
Average Admit FIM Score	70.6	85.4	79.5
Average Discharge FIM Score	89.9	99.7	95.6
Change in FIM Score	27.2%	17.1%	20.8%

*Provided by Magda Mouneimne MScOT
Quality Lead, FMC Tertiary Neurorehabilitation Program*



Education

Undergraduate

Surgeons take part in both scheduled didactic lectures as well as problem-based small-group learning environments. The orthopaedic and neurosurgeons play an active role in teaching medical students anatomy and physical examination techniques.

Postgraduate Resident

The orthopaedic and neurosurgical consultants provide both formal and informal teaching to the postgraduate residents in orthopaedics and neurosurgery. Formal teaching takes the form of lecture supervision and case discussion during the academic half days. Informal teaching takes place in the operating room and clinic setting. Dr. Peter Lewkonja is the Assistant Program Director for the orthopaedics residency program.

Each year the Calgary spine program offers a cadaveric dissection course to senior orthopaedic and neurosurgical residents enrolled in Canadian residency training programs. The course occurs under the direction of Dr. Brad Jacobs, with many faculty and spinal surgery fellows acting as course faculty and provides an opportunity to review spinal surgical techniques and implant systems.

Postgraduate MSc/PhD

Consultants within the spine program have supervised several graduate students at the University of Calgary. These graduate students have pursued training in both basic science and clinical research. We did not have any postgraduate students this academic year.



Rounds

Weekly Spine Rounds are typically held Wednesdays from 7-8 AM in the ICU Classroom. During COVID, we successfully adapted to a Zoom format.

Neurosurgery, Orthopaedic Surgery, Spine Fellows, Neurosurgery Residents, Orthopaedic Residents, Research Nurses and Industry Partners attend rounds. A variety of cases are presented by the Spine Fellows. The Neurosurgery and Orthopaedic Surgery residents are then asked for feedback under the guidance of the staff surgeons.

Spinal Surgery Fellow rounds take place each Tuesday in a didactic seminar series format.



***Dr. Fred Nicholls
Fellowship Director***



Postgraduate Spine Fellowship Program

Spine Fellowship at the University of Calgary is a combined Orthopaedic and Neurosurgical clinical experience. The Goals of the fellowship are to train Orthopaedic and Neurosurgical surgeons in the diagnosis and management of diseases of the spine. The University of Calgary Spine Program is an AO sponsored fellowship program. Our fellows fully participate in the AO Spine fellow's curriculum, including attending the annual AO Spine fellows' course and forum and are exposed to other global leaders in spine surgery.

The Spine Program is a multidisciplinary group dedicated to the management of individuals with spinal disease. The emphasis of the fellowship is on the decision-making and surgical techniques relevant to spine surgery. At the end of the fellowship, the trainee will have the experience and ability to independently perform surgical approaches, decompressions, deformity correction and instrumentation in areas of the spine from the occiput to sacrum.



- Decompression techniques both anterior and posterior will be acquired. Exposure to multiple different instrumentation systems, including for anterior and posterior stabilization of the cervical spine, thoracic spine, and lumbar spine.
- Cervical and lumbar disc arthroplasty
- Open and less invasive procedures
- Image guidance/computer-assisted surgery
- An intra-operative MRI surgical suite that can perform cervical, thoracic, and lumbar intra-operative imaging.

The Spine Fellowship year runs from July 1 to June 30 of the following year. Time is equally divided between four combined Orthopaedic and Neurosurgical services. Combined teaching conferences occur twice weekly with discussion and presentation of both recent and complex cases. Monthly mortality and morbidity rounds occur with the full attendance of the Orthopaedic and Neurosurgical house staff and spine program attending staff. Fellows average three OR days per week, along with weekly outpatient clinics performed with attending staff. Informal teaching occurs in all settings with junior house staff and residents.

Spine service call occurs for each attending for one week in duration. During this time, the house staff and Fellows assigned to the attending surgeon form the spine team on call. The resident and fellow make initial assessments and management decisions, with close supervision by the attending staff. All fellow call is at-home call with no in-hospital responsibilities. During the course of the year, a clinical research project is required and must be completed prior to the conclusion of the training year. The fellow and supervisor of the fellow's choice mutually agree upon this research project.



- Dr. Vishwajeet Singh
- Dr. Marcelo Oppermann
- Dr. Andrew Bogle
- Dr. Abdul Kasmani
- Dr. Victor Yang
- Dr. Marina Rosa Filezio (Pediatric Spine)



Fellowship Testimonial



I was so excited to hear about my acceptance for the combined spine fellowship at the University of Calgary. I saw it as a great opportunity to work on my weaknesses and consolidate on the skills I had. I flew in from another side of the globe expecting a bumpy start but the support I received from residents, co-fellows and the staff was unbelievable. I started my first day in the OR assisting on direct lateral interbody fusion and a few months down the road, I was doing it.

The impact of this training was comprehensive; I acquired excellent operative skills and clinical judgement but what I enjoyed most was the engagement in research meetings, support from the preceptors in taking the research forward and thorough deliberations during fellow's rounds.

The program provided excellent autonomy in the development and execution of the treatment plan that has helped me tremendously in becoming an independent practitioner. I got the opportunity to work closely with both orthopaedic and neurosurgery residents and I enjoyed bringing interesting cases for them on the weekly spine rounds.

Calgary has a unique side - its proximity to the mountains. I explored the mountains during summer hikes and learned cross country and downhill skiing in winter, for the first time. It is amazing to reflect on so much happening in just one year and when I look back, I could not have asked for anything better. I developed lifelong relationships with my colleagues and mentors, and I will forever remain indebted to their love and support. I will be proud to flaunt I trained with the Calgary Spine Program.

Dr. Vishwajeet Singh



Research

Research Summary

The University of Calgary Spine Program had a very successful research year. Our faculty were principal investigators or collaborators on 10 externally funded research grants (worth over \$1.9 million). Faculty members authored 31 peer-reviewed publications. In addition, 13 research abstracts were presented at national or international meetings with authorship/co-authorship involvement from Calgary Spine Group faculty.

This research productivity was a direct result of our involvement in a multitude of clinical research initiatives. These research endeavors ranged from retrospective reviews of local clinical data on a wide range of spinal surgery topics to multicenter data analysis of large prospective spinal surgery patient registries. The University of Calgary continues to be the largest enrolling site for the Canadian Spine Society's national Canadian Spine Outcomes and Research Network (CSORN) prospective spine surgery registry, which includes participation in three CSORN sub-studies related to cervical spondylotic myelopathy, the surgical treatment of degenerative spondylolisthesis, and adult spinal deformity.

In addition to our clinical research efforts, Spine Group members (e.g., Paul Salo, Ganesh Swamy, Steve Casha) are also involved in active collaborations with basic scientists in musculoskeletal and neuroscience translational research projects through the McCaig Bone & Joint Institute and the Hotchkiss Brain Institute.

Finally, it is very important to note that all the recent research successes of the Calgary Spine Faculty are a direct result of our 4 excellent, efficient, and highly organized research associates: Tara Whittaker, Ish Bains, Saswati Tripathy and Victoria Smith.



Dr. Ken Thomas
Research Director



CURRENT RESEARCH PROJECTS

Prospective RCTs enrolling	PI	Status
Minocycline (MASC)	Casha	Enrolling/data collection
Nerve Transfer after Spinal Cord Injury - Multi Center	Casha/Midha	Enrolling/data collection
Immunotherapy for Acute SCI (Abbvie)	Jacobs	Enrolling/data collection

Prospective Randomized Clinical Trials in follow-up

INSTRuCT-SCI Study	Casha	In follow-up
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Clinical Studies - Observational

Cervical Myelopathy (CSM)	Cadotte	Enrolling/data collection
Degenerative Spondy Cohort Study (CSORN)	Fisher/Casha/Thomas	Enrolling/data collection
Surgical Treatment of ASD (CSORN Module, Non-module)	Soroceanu	Enrolling/data collection
qMRI & cervical myelopathy (CSORN)	Cadotte	Enrolling/data collection
Min Inv vs open lumbar discectomy: Obs Study (CSORN)	Evaniew/Bogle	Under Review
Mech difference in IVD of degen scoliosis & spondy (CSORN)	Swamy	Enrolling/data collection
Acceptance & empowerment after SCI	Lewkonja	Enrolling/data collection
Analysis of the Implications of Lumbopelvic Alignment on the Alignment of the Cervical Spine	Nicholls	Analysis
Normative EOS analysis of lower extremity alignment - acetabulum	Nicholls	Analysis
Can Systemic inflammatory profiles predict Natural history of lumbar disc herniations	Swamy/Salo	Enrolling/data collection
Quantifying in-vivo cervical spine motion and influence of cervical total disc arthroplasty	Swamy/Salo/Bouchard	Enrolling/data collection
Quantifying chronic opioid use in ASD patients	Soroceanu	Analysis
Optimal timing of surg for symptomatic lumbar disc hern	Thomas/Ben-Israel/Spackman	Under Review
Cervical alignment in cervical myelopathy	Evaniew/Dea	Under Review
Torus: Validation of Torus Software	Swamy	Enrolling/data collection
Effect of spec hosp care on 1 yr mortality in acute SCI	Evaniew/Kwon/Dvorak/Praxis	Analysis

Prospective Data Collection

PRAXIS - SCI database traumatic/non-traumatic patients	Casha	Enrolling/data collection
ISSG - Deformity (UCAPONY & non-UCAPONY pts)	Soroceanu	In follow-up
CSORN	Soroceanu	Enrolling/data collection

Fellows

Eval of Ability of Lateral Interbody Cages to Correct ASD	Singh, Swamy	Enrolling/data collection
Robotic Assessment of Cervical Myelopathy	Kassam/Cadotte/Dukelow	On hold - COVID
Ageism: is age an independent predictor of outcome after lumbar spine surgery	Bond/Aldebeyan/Nares/Thomas	Analysis
Midterm outcomes of m6l anterior lumb disc replacement	Bouchard/Taryn (resident)	Under review
Is the incidence of PJK & PJK declining over time? A 10 yr study of the Calgary Deformity Database	Oppermann/Swamy	Enrolling/data collection
Pull-out force of 8 different pedicle screw designs in 3 porcine bone densities	Oppermann/Swamy	With ethics



Published Manuscripts

*Peer-Reviewed Publications (Bold denotes Calgary Spine Program Faculty,
* denotes Calgary Spine Fellow):*

2021

1. Alnaghmoosh N, Urquhart J, Raj R, Abraham E, **Jacobs B**, Phan P, Johnson M, Paquet J, Nataraj A, McIntosh G, Fisher CG, Rampersaud YR, Manson N, Hall H, Rasoulinejad P, Bailey CS. Back Dominant Pain Has Equal Outcomes to Radicular Dominant Pain Following Posterior Lumbar Fusion in Adult Isthmic Spondylolisthesis: A CSORN Study. Global Spine Journal. 2021 Jan 7. DOI: [10.1177/2192568220985471](https://doi.org/10.1177/2192568220985471)
2. Aoude A, Litowski M, Aldebeyan S, Fisher C, Hall H, Manson N, Bailey CS, Ahn H, Abraham E, Nataraj A, Paquet J, Stratton A, Christie S, **Cadotte D**, **Nicholls F**, **Soroceanu A**, Rampersaud YR, **Thomas KC**. A Comparison of Patient and Surgeon Expectations of Spine Surgical Outcomes. Global Spine J. 2021 Apr;11(3):331-337. DOI: [10.1177/2192568220907603](https://doi.org/10.1177/2192568220907603)
3. Ayling OGS, Ailon T, Street JT, Dea N, McIntosh G, Abraham E, **Jacobs WB**, **Soroceanu A**, Johnson MG, Paquet J, Rasoulinejad P, Phan P, Yee A, Christie S, Nataraj A, Glennie RA, Hall H, Manson N, Rampersaud YR, **Thomas K**, Fisher CG. The Effect of Perioperative Adverse Events on Long-Term Patient-Reported Outcomes After Lumbar Spine Surgery. Neurosurgery. 2021 Jan 13;88(2):420-427. DOI: [10.1093/neuros/nyaa427](https://doi.org/10.1093/neuros/nyaa427)
4. Cadieux M, Tso M, Fox S, **Jacobs WB**. Spontaneous Spinal Subarachnoid Hemorrhage from a Ruptured Radiculopial Artery Aneurysm: A Case Report. World Neurosurgery. 2021 Jan; 145:114-118. DOI: [10.1016/j.wneu.2020.08.208](https://doi.org/10.1016/j.wneu.2020.08.208)
5. Cushnie D, Fisher C, Hall H, Johnson M, Christie S, Bailey C, Phan P, Abraham E, Glennie A, **Jacobs B**, Paquet J, **Thomas K**. Mental Health Improvements After Elective Spine Surgery: A Canadian Spine Outcome Research Network (CSORN) Study. Spine Journal. Spine J. Epub 2021 Apr 5. DOI: [10.1016/j.spinee.2021.03.032](https://doi.org/10.1016/j.spinee.2021.03.032)



6. **Evaniew N, Swamy G, Jacobs WB, Bouchard J, Cho R**, Manson NA, Rampersaud YR, Paquet J, Bailey CS, Johnson M, Attabib N, Fisher CG, McIntosh G, **Thomas KC**. Lumbar fusion surgery for patients with back pain and degenerative disc disease: An observational study from the Canadian Spine Outcomes and Research Network. *Global Spine Journal*: Jan 7, 2021 [epub ahead of print]. DOI: [10.1177/2192568220985470](https://doi.org/10.1177/2192568220985470)
7. Fehlings MG, Badhiwala JH, Ahn H, Farhadi HF, Shaffrey CI, Nassr A, Mummaneni P, Arnold PM, **Jacobs WB**, Riew KD, Kelly M, Brodke DS, Vaccaro AR, Hilibrand AS, Wilson J, Harrop JS, Yoon ST, Kim KD, Fourney DR, Santaguida C, Massicotte EM, Kopjar B. Safety and Efficacy of Riluzole in Patients Undergoing Decompressive Surgery for Degenerative Cervical Myelopathy (CSM-Protect): A Multicentre, Double-Blind Placebo-Controlled, Randomized, Phase 3 Trial. *Lancet Neurology*. 2021 Feb;20(2):98-106. DOI: [10.1016/S1474-4422\(20\)30407-5](https://doi.org/10.1016/S1474-4422(20)30407-5)
8. Glennie RA, Canizares M, Perruccio AV, Abraham E, **Nicholls F**, Nataraj A, Phan P, Attabib N, Johnson MG, Richardson E, McIntosh G, Ahn H, Fisher CG, Manson N, **Thomas K**, Rampersaud YR. The impact of pathoanatomical diagnosis on elective spine surgery patient expectations: Canadian Spine Outcomes and Research Network study. *J Neurosurg Spine*. 2021 May 21:1-8. DOI: [10.3171/2020.11.SPINE201490](https://doi.org/10.3171/2020.11.SPINE201490)
9. Lee M, Leda M, Buchan T, Malik A, Rigobon A, Chang D, Liu H, Vargas JD, O'Brien K, Stein M, Hing NNF, Seimeiniuk R, Sekercioglu N, **Evaniew N**, Foroutan F, Ross H, Alba CA. Prognostic Value of Blood Pressure in Ambulatory Heart Failure: A Meta-Analysis & Systematic Review. *Heart Fail Rev*. 2021 Mar 8. DOI: [10.1007/s10741-021-10086-w](https://doi.org/10.1007/s10741-021-10086-w)
10. **Lewkonja P**. Response to Surgical Triage in an Evolving Pandemic Based on Disease Classification and Predictive Modeling. *World Neurosurg*, 2021 May;149:513. doi: [10.1016/j.wneu.2021.02.018](https://doi.org/10.1016/j.wneu.2021.02.018). Epub 2021 Feb 25. DOI: [10.1016/j.wneu.2020.08.063](https://doi.org/10.1016/j.wneu.2020.08.063)
11. Mario Bressan-Neto, Marina Rosa Filezio, **Fabio Ferri-de-Barros**, Helton Luiz Aparecido Defino (Co-PI). Unmet Needs of Surgical Care for Children: A Case Study in the Brazilian Publicly-Financed Health System. *Rev Bras Ortop (Sao Paulo)*. 2021 Jun;56(3):360-367. DOI: [10.1055/s-0040-1721836](https://doi.org/10.1055/s-0040-1721836)



12. Ost K, Anderson D, **Jacobs WB**, **Evaniew N**, and **Cadotte D**. Spinal Cord Morphology in Degenerative Myelopathy Patients. *J Clin Med*, 2021 Feb 23;10(4):892. DOI: [10.3390/jcm10040892](https://doi.org/10.3390/jcm10040892)
13. Peiro-Garcia A, Bourget-Murray J, Suarez-Lorenzo I, **Ferri-De-Barros F**, **Parsons D**. Early Complications in Vertical Expandable Prosthetic Titanium Rib and Magnetically Controlled Growing Rods to Manage Early Onset Scoliosis. *International Journal of Spine Surgery*. April 2021, 8048. DOI: [10.14444/8048](https://doi.org/10.14444/8048)
14. Schneider N, Fisher C, Glennie A, Urquhart J, Street J, Dvorak M, Paquette S, Charest-Morin R, Ailon T, Manson N, **Thomas K**, Rasoulinejad P, Rampersaud R, Bailey C. Lumbar degenerative spondylolisthesis: factors associated with the decision to fuse. *Spine J*. 2021 May;21(5):821-828. DOI: [10.1016/j.spinee.2020.11.010](https://doi.org/10.1016/j.spinee.2020.11.010)
15. Yang MMH, **Jacobs WB**. Commentary: Impact of Frailty on Outcomes Following Spine Surgery: A Prospective Cohort Analysis of 668 Patients. *Neurosurgery*. 2021 Feb 16;88(3):552-557. DOI: [10.1093/neuros/nyaa510](https://doi.org/10.1093/neuros/nyaa510)
16. Zafeiris C, Lewkonja P, Jacobs WB. Atypical vertebral hemangioma: An aggressive form of a benign disease. Case report and literature review. *Journal of Musculoskeletal and Neuronal Interactions*. *J Musculoskelet Neuronal Interact*. 2021 Jun 1;21(2):317-321. PMCID: [PMC8185257](https://pubmed.ncbi.nlm.nih.gov/34185257/)

2020

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2. Curt A, Hsieh J, Schubert M, Hupp M, Friedl S, Freund P, Huber E, Pfyffer D, Sutter R, Jutzeler C, Wüthrich RP, Min K, S. **Casha S**, Fehlings MG, Guzman R. The damaged spinal cord is a suitable target for stem cell transplantation. *Neurorehabilitation & Neural Repair*. Neurorehabil Neural Repair. 2020 Aug;34(8):758-768. DOI: [10.1177/1545968320935815](https://doi.org/10.1177/1545968320935815)
3. **Evaniew N**. Comment on: The Fragility Index. *Global Spine Journal*, 2020 Dec;10(8):1077. DOI: <https://doi.org/10.1177/2192568220952746>
4. Fisher CG, Vaccaro AR, Patel AA, Whang PG, **Thomas KC**, Chi J, Mulpuri K, Prasad SK. Evidence-Based Recommendations for Spine Surgery. *Spine* 2020 Nov 1; 45(21):E1441-E1448. DOI: [10.1097/BRS.0000000000003512](https://doi.org/10.1097/BRS.0000000000003512)
5. Hatchell A, Aoude A, Aldebeyan S, McKenzie C, **Lewkonja P**, de Haas W. Use of an Omental Flow-Through Flap for Recipient Vessels in the Reconstruction of a Lumbar Spine Defect. A Case Report. *JBJS Case Connector*. 2020 Dec 4;10(4): e20.00156. DOI: [10.2106/JBJS.CC.20.00156](https://doi.org/10.2106/JBJS.CC.20.00156)
6. Hebert JJ, Abraham E, Wedderkopp N, Bigney E, Richardson E, Darling M, Hall H, Fisher CG, Rampersaud YR, **Thomas KC**, **Jacobs WB**, Johnson M, Paquet J, Attabib N, Jarzem P, Wai EK, Rasoulinejad P, Ahn H, Nataraj A, Stratton A and Manson N. Preoperative Factors Predict Postoperative Trajectories of Pain and Disability Following Surgery for Degenerative Lumbar Spinal Stenosis. *Spine (Phila Pa 1976)* 2020 Nov 1;45(21): E1421-E1430. DOI: [10.1097/BRS.0000000000003587](https://doi.org/10.1097/BRS.0000000000003587)
7. Inglis T, Banaszek D, Rivers C, Kurban D, **Evaniew N**, Fallah N, Waheed Z, Christie S, Fox R, Mac-Thiong J, Ethans K, Ho C, Linassi G, Ahn H, Attabib J, Bailey C, Fehlings M, Fournay D, Paquet J, Townson A, Tsai E, Cheng C, Noonan V, Dvorak M, Kwon BK. In-Hospital Mortality for the Elderly Suffering Acute Traumatic Spinal Cord Injury. *Journal of Neurotrauma*. 2020 Nov 1;37(21):2332-2342. DOI: [10.1089/neu.2019.6912](https://doi.org/10.1089/neu.2019.6912)
8. Kendal J, **Evaniew N**, **Swamy G**. Uremic Tumoral Calcinosis of the Cervical Spine. *CMAJ*. 2020 Sep 28;192(39): E1133. DOI: [10.1503/cmaj.200104](https://doi.org/10.1503/cmaj.200104)



9. Liu CS, Ademola A, Zhang M, Garven A, Kopka M, **Salo PT**, Hart DA, Befus AD, Hildebrand KA. Human serum mast cell tryptase levels in elbow fractures or dislocations and its association with injury severity. J Orthop Res. 2020 Sept 38:9. DOI: [10.1002/jor.24642](https://doi.org/10.1002/jor.24642)
10. Polsky Z, Dowling SK, **Jacobs WB**. Just the Facts: Risk Stratifying Non-traumatic Back Pain for Spinal Epidural Abscess in the Emergency Department. Canadian Journal of Emergency Medicine. 2020 Nov;22(6):753-755. DOI: [10.1017/cem.2020.422](https://doi.org/10.1017/cem.2020.422)
11. Romagna A, Wilson JR, **Jacobs WB**, Johnson MG, Bailey CS, Christie S, Paquet J, Nataraj A, **Cadotte DW**, Manson N, Hall H, **Thomas KC**, Schwartz C, Rampersaud YR, McIntosh G, Fisher CG, Dea N. Factors Associated With Return to Work After Surgery for Degenerative Cervical Spondylotic Myelopathy: Cohort Analysis from the Canadian Spine Outcomes and Research Network. Global Spine Journal. 2020 Oct 16. DOI: [10.1177/2192568220958669](https://doi.org/10.1177/2192568220958669)
12. Roop SC, Battié MC, Jhangri GS, **Hu RW**, Jones AC. Functional Recovery after Surgery for Lumbar Spinal Stenosis in Patients with Hypertension. Healthcare (Basel)2020 Nov 20;8(4):503. DOI: [10.3390/healthcare8040503](https://doi.org/10.3390/healthcare8040503)
13. Shah S, Mudigonda S, Mitha A, **Salo P**, Krawetz R. Epidural fat mesenchymal stem cells: Important microenvironmental regulators in health, disease, and regeneration: Do EF-MSCs play a role in dural homeostasis/maintenance? Bioessays. 2021 Feb;43(2): e2000215. DOI: [10.1002/bies.202000215](https://doi.org/10.1002/bies.202000215)
14. Xu Y, You D, Krzyzaniak H, Ponich B, Ronksley P, Skeith L, **Salo P**, Korley R, Schneider P, Carrier M. Effect of Oral Anticoagulants on Hemostatic and Thromboembolic Complications in Hip Fracture: A Systematic Review and Meta-analysis. Journal of Thrombosis and Haemostasis, 2020 Oct;18(10):2566-2581. DOI: [10.1111/jth.14977](https://doi.org/10.1111/jth.14977)
15. Yang MMH, Riva-Cambrin J, Cunningham J, Jetté N, Sajobi TT, **Soroceanu A, Lewkonja P, Jacobs WB, Casha S**. Development and validation of a clinical prediction score for poor postoperative pain control following elective spine surgery. J Neurosurg Spine. 2020 Sep 15;1-10. DOI: [10.3171/2020.5.SPINE20347](https://doi.org/10.3171/2020.5.SPINE20347)



Presentations

*(Bold denotes Calgary Spine Program Faculty, * denotes Calgary Spine Fellow)*

2021

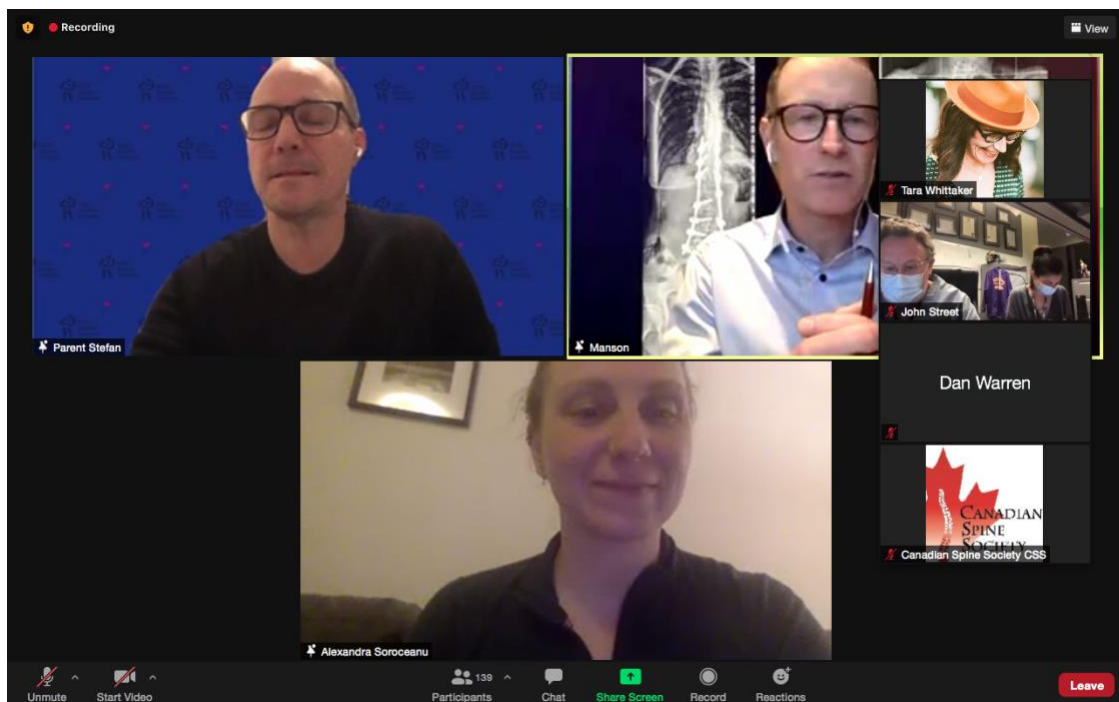
1. **Evaniew N**, *Bogle A, **Soroceanu A**, **Jacobs WB**, **Cho R**, Fisher CG, Rampersaud YR, Weber MH, Finkelstein JA, Attabib N, Kelly A, Stratton A, Bailey CS, Paquet J, Johnson M, Manson NA, Hall H, McIntosh G, **Thomas KC**. Minimally invasive tubular lumbar discectomy versus conventional open lumbar discectomy: An observational study from the Canadian Spine Outcomes and Research Network, 18th Annual AOSpine North America Fellows' Forum (online), May 2021.
2. **Evaniew N**, **Swamy G**, **Jacobs WB**, **Bouchard J**, **Cho R**, Manson N, Rampersaud R, Paquet J, Bailey C, Johnson M, Attabib N, Fisher C, McIntosh G, **Thomas K**. Lumbar fusion surgery for patients with back pain and degenerative disc disease: observational study from the Canadian Spine Outcomes and Research. Network Canadian Spine Society Annual Meeting. Virtual (Poster), Feb 2021.
3. *Filézio M, **Parsons D**, **Ferri-de-Barros F (PI)**. Peri-operative outcomes of Intra-operative Skull Femoral Traction (ISFT) and Navigated Sequential Drilling (NSD) for the Management of Neuromuscular Scoliosis in Cerebral Palsy Patients. Canadian Spine Society Annual Meeting. Virtual (Poster), Feb 2021.
4. *Filézio M, Peiró Garcia A, **Parsons D**, **Ferri-de-Barros F (PI)**. On-site Simulation Data on The Accuracy of Radiograph and Computed Tomography Grading in Comparison to Open Laminectomy to Evaluate Thoracic Pedicle Screws Positioning in Patients with Adolescent Idiopathic Scoliosis. Canadian Spine Society Annual Meeting. Virtual (Poster), Feb 2021.



5. Ludwig T, Bourget-Murray J, Sridharan S, Frederick A, Johnston K, Edwards B, **Nicholls FH**. Establishing Normative Relationship of Spinopelvic Alignment to Femoroacetabular Orientation. Canadian Orthopaedic Association Annual Meeting. Virtual (Podium), June 2021.
6. Ludwig TE, **Soroceanu A, Bouchard J**. Clinical and radiographic outcomes of M6L disc arthroplasty at a single Canadian Centre, Canadian Spine Society Meeting. Virtual (Poster), Feb 2021.
7. Moskvén E, Street J, Fisher C, **Jacobs B**, Johnson M, Paquet J, Hall H, Bailey C, Christie S, Nataraj A, Manson N, Phan P, Rampersaud R, **Thomas K**, McIntosh G, Abraham E, Glennie A, Jarzem P, Ahn H, Blanchard J, Hogan G, Kelly A, Charest-Morin R. Factors associated with increased length of stay in degenerative cervical spine surgery: cohort analysis from the Canadian Spine Outcomes and Research Network (CSORN). Canadian Spine Society Annual Meeting, Virtual (Podium), Feb 2021.
8. *Oppermann M, **Swamy G, Nicholls F, Thomas K, Jacobs WB, Soroceanu A, Evaniew N**. Is the incidence of PJF and PJK declining over time? A 10-year study of the Calgary Deformity Database. Canadian Spine Society Annual Meeting, Virtual (Poster), Feb 2021.
9. Rampersaud R, Bailey C, **Casha S**, Glennie A, Fox R, McIntosh G, Yee A, Fisher C, Perruccio A. Decompression versus decompression and fusion for “stable” degenerative spondylolisthesis: a randomized clinical trial. Canadian Spine Society Annual Meeting, Virtual (Poster), Feb 2021.
10. Sadiq I, Frederick A, **Nicholls F, Lewkonja P, Thomas K, Jacobs B, Swamy G**, Miller M, Tanguay R, **Soroceanu A**. Use of preoperative opioids is a risk factor for persistent chronic postoperative opioid use in adult spinal deformity patients. Canadian Spine Society Annual Meeting, Virtual (Podium), Feb 2021.
11. *Singh V, **Evaniew N, Soroceanu A, Nicholls F, Jacobs WB, Thomas K, Cho R, Lewkonja P, Swamy G**. Assessment of spinal fusion rates in multilevel surgeries using lateral interbody cages and rhBMP-2. Canadian Spine Society Annual Meeting 2021, Virtual (Poster), Feb 2021.



- 12.*Singh V, Oppermann M, **Evaniew N, Soroceanu A, Nicholls F, Jacobs WB, Thomas K, and Swamy G**. The effects of anterior versus transforaminal interbody fusion on L5-S1 pseudoarthrosis in adult spinal deformity surgery. 18th Annual AOSpine North America Fellows' Forum (online), May 2021.
- 13.**Soroceanu A**, Scheer J, Protopsaltis T, Gupta M, Passias P, Gum J, Smith J, Bess S, Lafage V, Ames C, Klineberg E. Predicting massive intraoperative blood loss in adult spinal deformity surgery. Canadian Spine Society Annual Meeting, Virtual (Podium), Feb 2021.





Grants

Active Research Grants (Bold denotes Spine Program Faculty)

Cadotte D. Alberta Spine Foundation, Calgary Chapter: Delivering Precision Medicine to Patients with Degenerative Cervical Myelopathy. Principal Investigator. 2021. Amount \$25,000.00.

Cadotte D. Alberta Graduate Excellence Scholarships (AGES) - Master's Research, Tri-Council Canada Scholarship (NSERC, SSHRC, CIHR) Scholarship. Administered by the Faculty of Graduate Studies, University of Calgary. Student: K. Ost. 2021.

Cadotte D. Praxis Spinal Cord Institute. RHSCIR 3.0 Spinal Cord Injury data collection update. **Co-PI with Casha S.** July 2020- June 2021. Amount \$50,000.

Cadotte D. Alberta Spine Foundation. Spine Triage: Timely Access to Specialized Care. A Cloud Computing Solution to Improve Diagnostic Efficiency for Spinal Disorders. Principal Investigator. 2020.

Cadotte D. The Institute for Data Valorization: A Scientific and Economic Data Science Hub (IVADO). Physics-informed deep learning architecture to generalize medical imaging tasks. Co-Investigator (PI: Julien Cohen-Adad, Montreal). 2020. Amount \$225 000.

Cadotte D. Canadian Institutes of Health Research (CIHR) Project Grant: Defining the Natural History and Predictors of Disease Progression in Mild Degenerative Cervical Myelopathy: A Longitudinal Multicenter Prospective Cohort Study. Co-Principal Investigator (Lead: J.Wilson, University of Toronto). 2019-present. Amount \$700,000

Casha S. Rick Hansen Spinal Cord Injury Registry Project. Principal Investigator. 2017-2020. Amount \$60-72,000/yr renewable



Ferri-de Barros F (CO-PI), Thull-Freedman, J, Thompson, B Improving Patient-Centred Care and Value in the Management of Low-Risk Fractures by Incorporating a Shared Decision Making Model at the Alberta Children's Hospital. Alberta Health Services CAD\$ 21,439

Gross D, Macedo L, Carlesso L, **Thomas K**, Rampersaud R, Schneider G, Slomp F, Miciak M, Rushton A, Katz L, Saxton E, Dorley S. Development and feasibility testing of a pre-surgical rehabilitation (Prehab) program for patients with lumbar spinal stenosis. 2020 Alberta Spine Foundation Pilot Grant Competition. Amount \$20,000

Krawetz R & **Salo P**. Alberta Spine Foundation, The Regenerative Potential of Epidural Fat Stem Cells: An in vivo Study to Determine How These Cells Respond to Injury. 10/2018-09/2019. Amount \$20,000

Matos MA (PI), **Ferri-de-Barros F** (International consultant), et al. Critical approach about the waiting line for Adolescent Idiopathic scoliosis surgery in the Brazilian Health System. Brazilian Ministry of Health, Brazilian Ministry of Science and Technology, Brazilian National Council of Research (CNPq), Brazilian Spine Society (SBC). Amount R\$ 228,000 (\$55,723 CAD)

Meves R (PI), Matos MA (National consultant) **Ferri-de-Barros F** (International consultant), et al. National registry of scoliosis in children (Brazil). Medtronic. Brazilian Spine Society. Amount R\$ 240,000 (\$58,655 CAD)

Nicholls F. Analysis of the Implications of Lumbopelvic Alignment on the Alignment of the Cervical Spine:

- Fraternal Order of Eagles Spine Grant \$20,000.00
- McCaig Catalyst Grant \$30,000.00
- Division of Orthopaedic Surgery \$30,000.00
- Total Funding: \$80,000.00

Nicholls F. Normative Relationship of Spino-Pelvic Alignment to Femoral-Acetabular Orientation:

- Alberta Spine Foundation Grant \$20,000.00
- COREF Grant \$9,875.00
- Total Funding: \$29,875.00



Noel, M (PI), Brindle M, Chorney J, Katz J, Lebel C, Moayed M, Mychasiuk R, Rasic N, Sumpton J, Vinall J, Williamson T, **Ferri de Barros F, Parsons D**. Elucidating the Role of Memory in the Transition from Acute to Chronic Pediatric Pain. Canadian Institutes of Health Research Project Scheme Grant. 2020-2025. Amount \$661,725

Swamy G, Duncan N, Matyas J, **Salo P**, Hart D. Are Sex-Differences in Degenerative Spondylolisthesis and Degenerative Scoliosis Explainable by Mechanical Differences in the Post-Menopausal Intervertebral Disc? Amount \$210,000.

- Alberta Spine Foundation & McCaig Institute Clinician-Scientist Grant (\$20000)
- Fraternal Order of Eagles Grant – to supervise B. Heard (\$20000)
- Faculty Seed Grant Div Orthopaedics (\$20000)
- Pathways to Success, Dept of Surgery, U of Calgary (\$150 000) [2021]

Swamy G. M6 vs Prodisc-C Kinematics

- McCaig Institute Encore Grant (\$25 000) [2017]
- Alberta Spine Foundation (\$20 000) [2021]

Swamy G & Salo P. Can Systemic Inflammatory Profiles predict natural history of lumbar disc herniations?

- Alberta Spine Foundation & McCaig Institute Encore Grant (awarded to co-author P. Salo) (\$60 000) [2018]
- Alberta Spine Foundation (\$20 000) [2021]

Swamy G. Can automated imaging analysis of multi-modality spinal imaging be more reliable than human assessors in the CSORN degenerative spondylolisthesis investigation?

- Alberta Spine Foundation (\$20 000) [2018]

Thomas K, Ben-Israel D, Spackman E. Alberta Spine Foundation: Annual Grant Competition 2019. Evaluating the optimal timing of surgery for symptomatic lumbar disc herniation: a cost-effectiveness analysis. Amount \$20,000



Administrative Contributions

Regional

Bouchard J. Ombudsman, University of Calgary Orthopaedic Surgery Residency Program (2021 to present)

Bouchard J. Faculty advisor University of Calgary (2001 to 2021)

Bouchard J. Medical student Appeals Committee (2009 to 2021)

Bouchard J. Postgraduate Medical Education Committee (2019 to 2021)

Bouchard J. Surgical Foundations Competence Committee (2018 to 2021)

Bouchard J. Orthopaedic Surgery Competence Committee (2018 to 2021)

Bouchard J. Orthopaedic Surgery Residency Training Committee (2018 to 2021)

Bouchard J. Surgical Foundations Faculty Advisor (2018 to present)

Cadotte D. Spinal Cord Injury Advisory Committee, Alberta Health Services, Foothills Medical Centre (September 2020 to present)

Cadotte D. Alberta Spine Foundation, Member and Web communications advisor (Sept 2017 to present)

Cadotte D. Brain and Mental Health Research Committee, Hotchkiss Brain Institute, University of Calgary (2017 to present)



Casha S. Head, Division of Neurosurgery, Department of Clinical Neurosciences, University of Calgary (2020 to present)

Ferri-de-Barros F. Division of Paediatric Surgery Quality and Safety Lead August (2021-present)

Ferri-de-Barros F. Pediatric spine fellowship director, Alberta Children's Hospital, University of Calgary (2011 to present)

Jacobs WB. Chairperson, University of Calgary Spine Program, Calgary, Alberta, Canada (2019 to present)

Jacobs WB. Associate Residency Program Director, Division of Neurosurgery, Department of Clinical Neuroscience, Faculty of Medicine, University of Calgary (2018 to 2020)

Jacobs WB. Neurosurgery Residency Competency by Design Director, Division of Neurosurgery, Department of Clinical Neuroscience, Faculty of Medicine, University of Calgary (2018 to 2020)

Jacobs WB. Chair, Division of Neurosurgery Competence Committee (2019 to present)

Jacobs WB. Member, Division of Neurosurgery Residency Program Committee (2016 to 2020)

Jacobs WB. Member, Surgical Undergraduate Medical Education Committee, Faculty of Medicine, University of Calgary (2013 to 2020)

Jacobs WB. Organizing Committee, Chair, University of Calgary Spinal & Peripheral Nerve Anatomy and Surgery Annual National Residents Course (2009 to present)

Lewkonja P. Clinical lead, ERAS, Calgary spine program (2021 to present)

Lewkonja P. Co-Chair Alberta Surgery Initiative (Calgary Zone, Orthopaedics) (2021-present)



Lewkonja P. Foothills Medical Centre Orthopaedics Quality Improvement Co-Lead (2020-present)

Lewkonja P. Orthopaedic Surgery Residency Assistant Program Director (2020 to present)

Lewkonja P. RCPSC Orthopaedic Surgery examiner (2019 to present)

Lewkonja P. Orthopaedic Surgery Residency Program Spine Education Lead (2018-present)

Lewkonja P. Division of Spine Surgery Lead, Section of Orthopaedics (2018 to present)

Lewkonja P. Neuroscience, Rehabilitation and Vision Strategic Clinical Network QI Steering Committee member, Alberta Health Services (2021 to present)

Salo P. Site Chief, Section of Orthopaedics, Foothills Medical Centre (2011 to present)

Salo P. Acting Chair, McCaig Institute Research Committee (2018 to present)

Salo P. Faculty Research Director, Section of Orthopaedics (2014 to present)

Salo P. Co-Chair Research Portfolio, Section of Orthopaedics, Foothills Medical Centre

Salo P. Member, Operations Committee, Section of Orthopaedics, Foothills Medical Centre

Salo P. Member, Research Committee, McCaig Institute for Bone and Joint Health (1998 to present)

Salo P. Member, Clinical Investigator Program Residency Training Committee (2015 to present)



Soroceanu A. Orthopaedic Research Portfolio Committee – Spine representative (2014 to present)

Soroceanu A. COREF research grant reviewer (2014 to present)

Soroceanu A. Adult Spinal Deformity Committee, Foothills Medical Centre (2014 to present)

Thomas K. Orthopaedic Residency Ombudsman (2006 to present)

Thomas K. Chair of Spine Research, University of Calgary Spine Program (2018 to present)

Thomas K. University of Calgary Department of Surgery Peer Support Member (Oct 2020 to present)

Provincial

Jacobs WB. President - Calgary Chapter, Alberta Spine Foundation (2020 to present)

Lewkonja P. Alberta Health Evidence and Review Panel (Back Pain), Alberta Health (2020 to present)

Lewkonja P. Clinical Systems Design Clinical Lead, Connect Care (Orthopaedics), Alberta Health Services (2018 to present)

Lewkonja P. Surgery Area Council, Connect Care, Alberta Health Services (2018 to present)

Lewkonja P. Alberta Pain Strategy Spine Representative, Alberta Health Services (2018 to present)

Thomas K. Low Back Pain Expert Advisory Group for Alberta Health (2020 to present)

Thomas K. Tri-lead of the Bone and Joint Health Strategic Clinical Network – MSK Transformation- Spine Health Work Group (2019 to present)



National

Bouchard J. Royal College of Physicians and Surgeons of Canada: Vice-chair, Orthopaedic Surgery Specialty Committee (June 2016 to June 2021)

Cadotte D. National Technical Advisory Committee, Rick Hansen Institute (Praxis) and Canadian Spine Outcomes Research Network (2020 to present)

Casha S. CIHR Collaborative Health Research Projects – NSERC Partnered peer review panel member (2014 to present)

Casha S. Rick Hansen Institute Cure Program Advisory Committee member (2013 to 2019)

Ferri-de-Barros F. Canadian Pediatric Spine Society, President (2019 to 2021)

Ferri-de-Barros F. Member of the subcommittee of the Canadian Pediatric Spine Study Group for the pediatric spine registry initiative (March 2014 to present)

Jacobs WB. Examiner, Royal College of Physicians and Surgeons of Canada Neurosurgery Examination Board (2021 – present)

Jacobs WB. Education Chair, Canadian Spine Society (2021 to present)

Soroceanu A. Canadian Spine Society (CSS), Executive Committee – Member at large (2020 to present)

Soroceanu A. Canadian Spine Outcomes and Research Network (CSORN), Lead Data Quality Taskforce (2018 to present)

Soroceanu A. Canadian Spine Society, Scientific Program Committee (2016 to present)

Thomas K. Canadian Spine Society Secretary/Treasurer Designate (2020 to 2022)



Thomas K. RCPSC Orthopaedic Surgery Speciality Committee, Member (2019 to present)

Thomas K. Canadian Spine Research Outcomes Network (CSORN), Board Member (2012 to present)

International

Bouchard J. Member, Research Committee, SAS (Society for the Advancement of Spine, Spine Arthroplasty Society).

Bouchard J. Member, International Competency Based Medical Education study group.

Bouchard J. Continuing Medical Development Committee, North American Spine Society.

Cadotte D. FIENS, the Federation for International Education in Neurological Surgery Communications committee (March 2013 to present)

Casha S. AANS and CNS joint guidelines committee member (2011 to present)

Ferri-de-Barros F. Member of the POSNA Paediatric Orthopaedics Global Outreach committee (2020 to present)

Jacobs WB. Chair, AOSpine Global Diploma Training Program Cervical Degeneration Learning Module (2021)

Jacobs WB. Member, AOSpine Global Diploma Training Program Committee (2018 to present)

Jacobs WB. Member, Research & Awards Committee, AANS/CNS Section of Disorders of the Spine and Peripheral Nerves (2018 to 2021)



Jacobs WB. Member, AOSpine North America Curriculum Planning Committee (2017 to present)

Jacobs WB. Member, Executive Committee, AANS/CNS Section of Disorders of the Spine and Peripheral Nerves (2015 to present)

Lewkonja P. AO Spine North American Faculty (2018 to present)

Soroceanu, A. SRS/CSRS Cervical Deformity Task Force (2020 to present)

Soroceanu, A. International Spine Study Group (ISSG), University of Calgary site lead, (2017 to present)

Soroceanu, A. International Spine Study Group (ISSG), Complications Committee – member, Cervical Deformity Committee – member, Realignment Committee – member (2013 to present)



Alberta Children's Hospital



Dr. Marina Rosa Filezio Fellowship Highlight

I completed Medical School at Faculdade de Ciencias Medicas de Santos, and both Orthopaedic and Trauma Residency and my first fellowship in Adult Spine at Faculdade de Medicina do ABC. I am very interested in improving information delivery and patient/guardian education, as well as ways to improve access of care.

I am currently a MSc candidate under the Surgeon Scientist Program, and I hope to continue working on my academic career and possibly pursue a PhD in the future. I am also hoping to complete a Paediatric Orthopaedic fellowship after this current fellowship, in order to finish my surgical training.



Ongoing Research at ACH

Title: Arthrodiastasis for the treatment of avascular necrosis in paediatric patient following a traumatic femoral neck fracture

Authors: Kara Sidhu, Marina Filezio, Marcel Abouassaly, Fabio Ferri-de-Barros

Abstract: Avascular necrosis (AVN) is a serious complication following femoral neck fractures in paediatrics and no effective treatment currently exists for managing AVN in paediatric patients. We report a case of AVN presenting as a complication of a displaced Delbet type II traumatic femoral neck fracture in a nine-year-old Caucasian boy. The diagnosis of AVN was made six months following the fracture, which was initially treated with closed reduction and internal fixation. Arthrodiastasis in combination with multiple epiphyseal drilling was performed to manage the AVN. Seventeen months following the removal of the external fixation hardware, MRI studies demonstrated increased vascularity of the femoral head alongside normal range of motion and no symptoms of pain. In conclusion, arthrodiastasis served as a successful intervention in terms of preventing the progression of AVN in a healthy paediatric patient who developed AVN as a complication following a femoral neck fracture.

Title: Radiographic reporting in adolescent idiopathic scoliosis: is there a discrepancy comparing radiologists' reports and surgeons' assessments?

Authors: Kara Sidhu, Marina Rosa Filezio, Vishwajeet Singh, Fabio Ferri-de-Barros

Abstract: Scoliosis is a three-dimensional spinal deformity involving one or more spinal curves with lateral deviation and axial rotation of the vertebrae. Adolescent idiopathic scoliosis (AIS) is the most common form of scoliosis that occurs in children during puberty, a period of rapid skeletal growth. Cobb angle measurement is a standard method for quantifying the degree of scoliosis and helps guide screening and decision-making for treatment in patients clinically diagnosed with AIS and is recognized by the Scoliosis Research Society (SRS). In our setting, primary care physicians rely on radiology reports to follow guidelines provided by specialists to facilitate priority setting of referrals at the tertiary care level. Accurate clinical and radiographic assessments at the primary care level are key to ensure timely referral tertiary care. Cobb angle measurements are also used for surgical planning and evaluating the effectiveness of treatment.



Radiologists play an essential role in the screening and referral of children with scoliosis to tertiary care centres. They are responsible for measuring Cobb angle and reporting them to primary care physicians, who are then responsible for making decisions on referral to tertiary care. Therefore, not only is the accuracy and reliability of Cobb angle measurement important, but also the agreement of this measurement between radiologist and treating spine surgeons. High agreement between these two groups would ensure patients have timely access to tertiary care while they remain candidates for non-invasive therapy. The purpose of this study is to improve screening at the primary care level by investigating the agreement of Cobb angle measurement between community radiologist, paediatric radiologists, and treating paediatric spine surgeons.

Title: Systematic review of the use of external fixation devices in the paediatric hip, with a special focus on the use of arthrodiastasis for treatment of avascular necrosis

Authors: Kara Sidhu, Marina Filezio, Marcel Abouassaly, Fabio Ferri-de-Barros

Abstract: There is limited data on the best practices to treat avascular necrosis of the hip following traumatic femoral neck fracture in paediatrics. Joint preserving procedures explored for the treatment of avascular necrosis of the femoral head include core decompression, osteotomy, and bone grafting. Unfortunately, literature on the success of these procedures in terms of survival years is poorly defined in paediatrics and most of our understanding of survival of these procedures comes from adult data. Arthrodiastasis in combination with multiple epiphyseal drilling has been proposed for the treatment of AVN in paediatric patients who develop AVN as a complication following traumatic femoral neck fractures. Arthrodiastasis is a surgical procedure that involves the distraction of the femoral head from the acetabulum, allowing the articular cartilages of the two surfaces to heal, as well as diverting the mechanical stresses of weight-bearing from the hip joint to the external fixation hardware. Multiple epiphyseal drilling is the procedure of drilling a tunnel to the centre of ischemic or necrotic bone and has been previously utilized as a joint preservation procedure for Legg-Calvé-Perthes disease. Using a systematic approach, we reviewed the literature in goals of answering three objectives: (1) Investigate the application of hip arthrodiastasis for the treatment of AVN in paediatrics as a complication of femoral neck fractures, (2) Investigate the methods for treatment of AVN in paediatrics as a complication of femoral neck fractures, (3) Investigate the most common uses of external fixation devices at the hip in paediatrics.



Events & Initiatives

Canadian Spine Society

In 2021, the Canadian Spine Society (CSS) meeting transitioned to a virtual format in response to the COVID-19 pandemic. Sessions took place on a series of Wednesday evenings throughout the month of February and included live podium presentations, symposiums, debates, and virtual exhibits. In fine CSS tradition, each evening began with a virtual tour of Canada's Wine Making regions guided Master Sommelier, Veronique Rivest.

We were pleased to have several Faculty Members, Residents, Fellows, and Students represent the program including:

- **Evaniew N, Swamy G, Jacobs WB, Bouchard J, Cho R**, Manson N, Rampersaud R, Paquet J, Bailey C, Johnson M, Attabib N, Fisher C, McIntosh G, **Thomas K**. Lumbar fusion surgery for patients with back pain and degenerative disc disease: observational study from the Canadian Spine Outcomes and Research Network (Poster).
- *Filézio M, **Parsons D, Ferri-de-Barros F (PI)**. Peri-operative outcomes of Intra-operative Skull Femoral Traction (ISFT) and Navigated Sequential Drilling (NSD) for the Management of Neuromuscular Scoliosis in Cerebral Palsy Patients (Poster).
- *Filézio M, Peiró Garcia A, **Parsons D, Ferri-de-Barros F (PI)**. On-site Simulation Data on The Accuracy of Radiograph and Computed Tomography Grading in Comparison to Open Laminectomy to Evaluate Thoracic Pedicle Screws Positioning in Patients with Adolescent Idiopathic Scoliosis (Poster).
- Ludwig TE, **Soroceanu A, Bouchard J**. Clinical and radiographic outcomes of M6L disc arthroplasty at a single Canadian Centre (Poster).



- Moskven E, Street J, Fisher C, **Jacobs B**, Johnson M, Paquet J, Hall H, Bailey C, Christie S, Nataraj A, Manson N, Phan P, Rampersaud R, **Thomas K**, McIntosh G, Abraham E, Glennie A, Jarzem P, Ahn H, Blanchard J, Hogan G, Kelly A, Charest-Morin R. Factors associated with increased length of stay in degenerative cervical spine surgery: cohort analysis from the Canadian Spine Outcomes and Research Network (Podium).
- *Oppermann M, **Swamy G, Nicholls F, Thomas K, Jacobs WB, Soroceanu A, Evaniew N**. Is the incidence of PJF and PJK declining over time? A 10-year study of the Calgary Deformity Database (Poster).
- Rampersaud R, Bailey C, **Casha S**, Glennie A, Fox R, McIntosh G, Yee A, Fisher C, Perruccio A. Decompression versus decompression and fusion for “stable” degenerative spondylolisthesis: a randomized clinical trial (Poster).
- Sadiq I, Frederick A, **Nicholls F, Lewkonian P, Thomas K, Jacobs B, Swamy G**, Miller M, Tanguay R, **Soroceanu A**. Use of preoperative opioids is a risk factor for persistent chronic postoperative opioid use in adult spinal deformity patients (Podium).
- *Singh V, **Evaniew N, Soroceanu A, Nicholls F, Jacobs WB, Thomas K, Cho R, Lewkonian P, Swamy G**. Assessment of spinal fusion rates in multilevel surgeries using lateral (Poster).
- **Soroceanu A**, Scheer J, Protopsaltis T, Gupta M, Passias P, Gum J, Smith J, Bess S, Lafage V, Ames C, Klineberg E. Predicting massive intraoperative blood loss in adult spinal deformity surgery (Podium).

The evenings were highlighted by rousing debates amongst Canadian Spine experts, including our own Dr. Alex Soroceanu and Dr. Brad Jacobs. Debates were moderated by peers and topped off with an online vote. These light-hearted yet highly informative sessions gave us a taste of the collegiality we hope to experience in-person next year.



THE SPINE DEBATERS
Debate #3
February 17, 2021

NEIL **ALEX**

Deformity Open vs. MIS
Neil Manson vs. Alex Soroceanu

Moderator: Stefan Parent

Participants (149)

Search

Canadian Spine Soc... (Host) ☐ ☐

Canadian Spine Soc... (Co-host) ☐ ☐

Jeff Wilson ☐ ☐

nicolasdea ☐ ☐

Brad Jacobs ☐ ☐

a.wakasani@yahoo.com ☐ ☐

aaronhockley ☐ ☐

Abdulmajed Alahmari ☐ ☐

Adam Pratt ☐ ☐

Invite Unmute Me

Chat

and everything swelled up massively!

Adrienne Kelly to Everyone 7:07 PM

Great points, Drew. Some patients might even need both approaches. And though I'm not doing cervical surgery anymore, my posterior wounds were a much bigger issue than anything else

Joel Finkelstein to Everyone 7:08 PM

Jeff, when would you go posteriorly and Brad when would you go anteriorly.

Jerome Paquet to Everyone 7:13 PM

If patient is B2? With Parkinson?

Edward Abraham to Everyone 7:13 PM

Is Jeff in a prison cell? ...

Brad 68

Jerome Paquet to Everyone 7:17 PM

To Everyone

Type message here...

Host is sharing poll results

1. Who won the debate?

Dr. Brad Jacobs	49%
Dr. Jeff Wilson	51%

Close



Alberta Spine Foundation

The Alberta Spine Foundation (ASF) is a non-profit organization that was established by the members of the University of Calgary Spine Program and the members of the University of Alberta Spine Program. The objective of the ASF is to advance the delivery of spine care in Alberta through innovative clinical care, focused education, and academic collaboration.

The ASF is committed to appropriate high-quality spine care through the development of innovative patient care and referral modes.

Through our fellowship positions, we offer newly qualified orthopaedic surgeons and neurosurgeons, the opportunity to develop advanced management of complex spine disorders.

The ASF is actively involved in research through its members. The ASF financially supports clinical and basic science research. The ASF supports research where multiple care providers collaborate.

***Dr. Brad Jacobs
President,
Calgary Chapter***

Canadian Spine Outcomes Research Network (CSORN)

Under the guidance of Local PI, Dr. Alex Soroceanu, the program continues to contribute to the Canadian Spine Outcomes Research Network (CSORN), the national spine registry of the Canadian Spine Society. CSORN now contains 13,285 enrolments with 1351 added in 2021. The Network contains a variety of spine diagnoses and surgical procedures and reflects a predominantly stenotic cohort of patients. There were 373 enrollments added to the prospective studies in 2021. Our cervical spondylotic myelopathy study is now the largest single CSM dataset in the world.

There were 10 studies published in peer-review medical journals this year; an average of one publication every 5 weeks is tremendous productivity. In total, we have produced 40 in-print/in-press publications. The CSORN website is now live: csornccs.ca



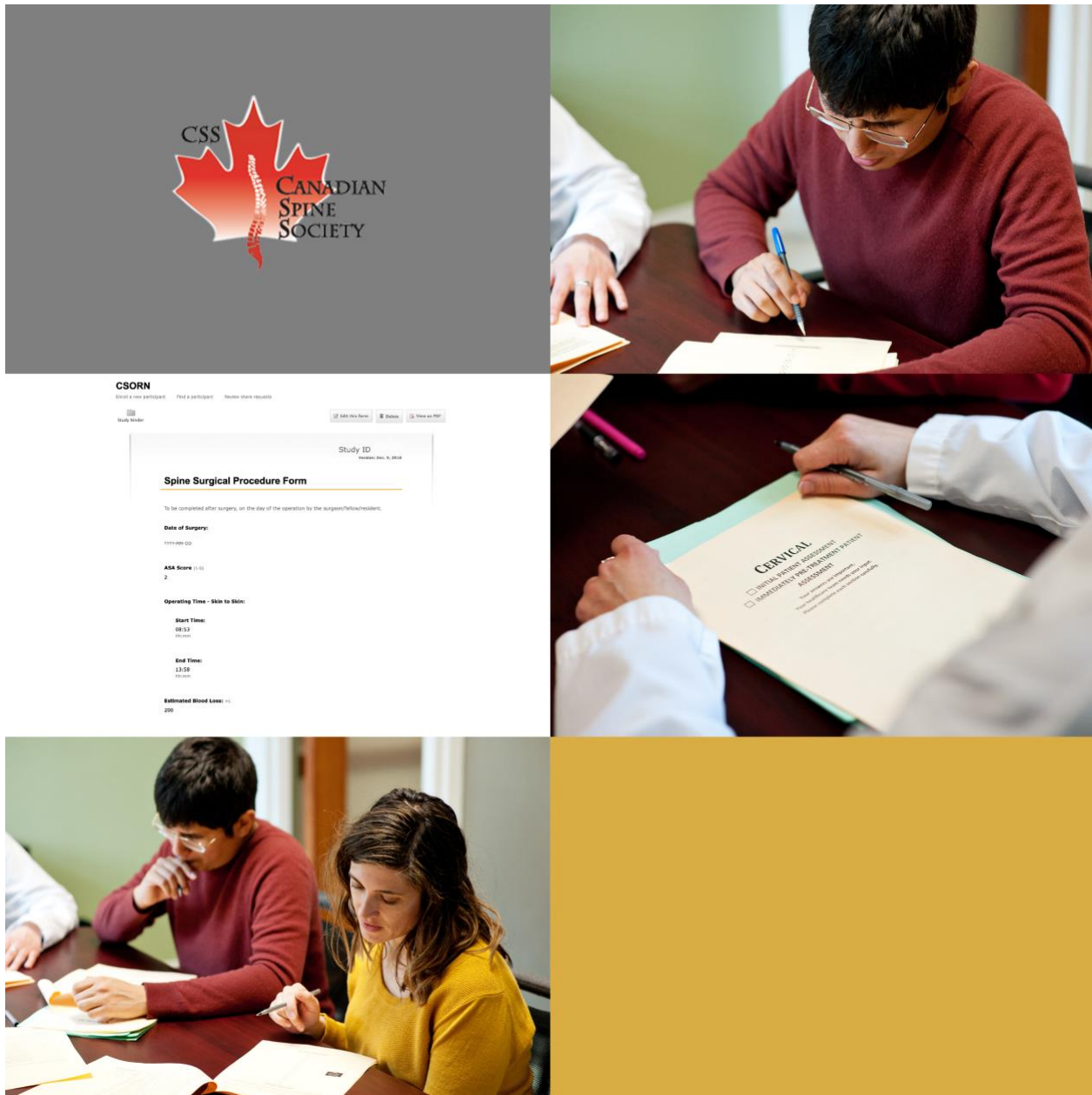
Our site enrolled 531 patients into CSORN over the last year with 13 surgeons enrolling consecutive patients. Some are enrolling all eligible surgical patients and others for specific diagnoses only (i.e. CSM). Last year, 70% of our CSORN patients were enrolled from Caleo health, a multi-disciplinary clinic in the Northwest. 30% of our CSORN patients were enrolled from clinics at Foothills Medical Centre or University of Calgary.

We continue to focus on collecting high quality data, prioritizing form completion and ongoing patient follow-up with good results. Our completion rates are as follows:

- 6-18-week follow-up 96%
- 1-year follow-up 92%
- 2-year follow-up 93%

In addition to our participation in national CSORN sub-studies (cervical myelopathy, degenerative spondylolisthesis, and adult spinal deformity), several local prospective and retrospective studies are also underway/completed including:

- Natural History of Mild Degenerative Cervical Myelopathy: an observational study.
Dr. David Cadotte
- Personalized decision making after a diagnosis of cervical myelopathy: quantitative MRI within an artificial intelligence framework
Dr. David Cadotte
- Midterm outcomes of anterior lumbar disc replacement: a comparison between stand-alone disc replacement and hybrid anterior fusion and disc replacement.
Dr. Jacques Bouchard





Rick Hansen Spinal Cord Injury Registry

The University of Calgary combined spine program has been an active participant in the Rick Hansen Spinal Cord Injury Registry (RHSCIR) since 2014. Eight hundred and twenty-five new patients have been enrolled through this site, contributing data on acute care and rehabilitation metrics and outcomes. Our program is also an active participant in multi-site sub-study collaborations within the registry, recruiting patients specifically to these initiatives and collecting additional data for those research questions. Recent and on-going projects include Gastrointestinal and Urinary Tract Microbiome after Spinal Cord Injury, Acceptance and Empowerment after Spinal Cord Injury, Liberation from Mechanical Ventilation and implementation of registry collected key performance indicators in spinal cord injury care in Alberta. In addition, the Calgary program has undertaken new studies and innovations in this patient population including: the phase III Minocycline in Acute Spinal Cord Injury (MASC) clinical trial, and the creation of a cerebrospinal fluid and serum tissue bank for the study of biomarkers. Current new activities in this initiative include participation in a multicenter study examining the use of Nerve Transfers to Improve Upper Extremity Function and Quality of Life in Tetraplegic Patients and application of epidural stimulation to restore hemodynamic stability following spinal cord injury.

Dr. Steve Casha



Innovations

Alberta Obesity Centre

The Alberta Obesity Centre (AOC) is a program that primarily focuses on multidisciplinary care of individuals living with obesity. It follows the Canadian practice guidelines to help patients reach their goals and improve their overall health at no cost to patients.

AOC is a program that primarily focuses on multidisciplinary care of individuals living with obesity. It follows the Canadian practice guidelines to help patients reach their goals and improve their overall health at no cost to patients.

AOC care pathway:

The Alberta Obesity Centre has a pre-operative program focusing on the prehabilitation of individuals living with obesity that may undergo spinal surgery with the Calgary Spine Program. This involves a multidisciplinary program focusing on nutrition, physical activity, behavioral therapy, and medical weight management.

How can AOC add to the care of spinal surgery patients?

Our goal at the Alberta Obesity Centre is to optimize patient's health focusing on weight management prior to surgery in the hopes of reducing possible obesity-related complications and to improve the durability of surgical repairs and ultimately the quality of life of patients.

***Dr. Richdeep Gill,
Co-Director: Alberta Obesity Centre***



A Data Strategy for the Study of Spinal Disorders

Just over one year ago we launched our new program website, www.calgaryspine.ca, describing who we are, our leadership structure, a recruitment tool for national and international fellows and how we approach disorders of the human spine. We are unique in the world and have much to offer the global community in terms of understanding spinal disorders and how our surgical treatment decisions affect quality of life and patient-focused outcomes. Collectively, our surgeons, fellows and residents formulate treatment plans based on complex multivariate data integrating a patient's unique history with physical examination, laboratory, and imaging data to propose cutting edge surgical techniques that offer the promise of pain relief, increased mobility and an improved quality of life.

Over the next few years, our website will undergo a dramatic transformation becoming the world's first 'living scientific registry' for the study of spinal disorders. Behind the scenes, this web-based application will use cutting edge artificial intelligence techniques and document database technology to deliver precision medicine reports to patients who suffer from a spinal disorder. Our aim is to improve our patient's understanding of spinal disorders and how modern surgical techniques can impact their life. We do this by delivering precision medicine reports that summarize complex information collected by our teams and deliver it in a structured way to patients and surgeons. Our collective, anonymous data is used to construct information graphics about specific spinal disorders. This educational information is available on our interactive and continuously updated web page. We offer national and international patients a source of information on conditions that are effectively treated with surgery and a gateway to participate in registries or clinical trials that stand to improve quality of life. Our program offers information as a product of our collective efforts to treat spinal disorders.



To accomplish this goal, I have assembled a team of software developers at the Clinical Research Unit, University of Calgary, initiated a graduate student program with a focus on designing patient-focused precision medicine reports, and developed a working relationship with Dave Anderson, PhD, director of the Cumming School of Medicine “AI Applications in Precision Health” program. Together, we have set the foundation for a custom software platform to collect, store, analyze and compile precision medicine reports for patients and surgeons.

Two pilot programs will soon launch: A quality improvement initiative that focuses on spinal triage and an advanced analytical research study focusing on cervical myelopathy (based on data from over 400 patients that our surgeons have enrolled into the CSORN registry). From a patient's perspective, this will result in a precision medicine report being offered to them at the completion of the triage process or along the continuum of care after a diagnosis of cervical spondylotic myelopathy. From a surgeon's perspective, we want to keep you aware of the data that we've collected in our clinics and hope this information, compiled in a consistent and regimented way, will help improve the efficiency of your practice and aid in decision making. We will offer data that is difficult to collect during a standard clinic visit, such as grip strength or assembling quality of life metrics that take approximately 30 minutes to acquire.

The University of Calgary Spine Program has a long history of assembling the right people to deliver the world's best care for the surgical treatment of spinal disorders. The integration of novel technology into our clinical care program will enhance our ability to educate patients about spinal disorders and deliver precision medicine reports to those with complex disease processes that require a rich understanding of multivariate data to optimize outcomes.

Dr. David Cadotte



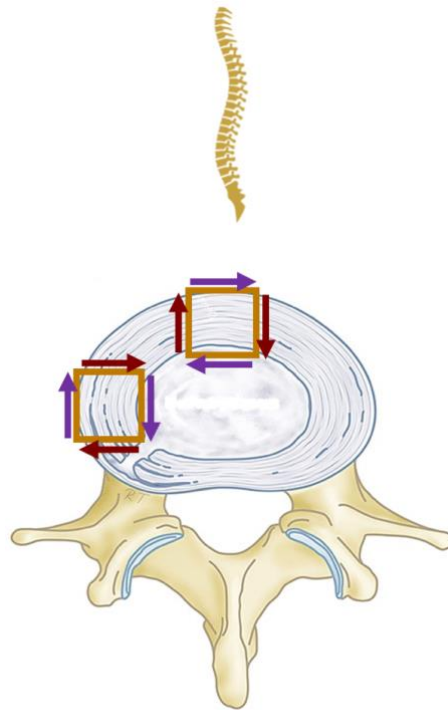
dScoli / dSpondy study

Scoliosis occurs in adolescents (Adolescent Idiopathic Scoliosis - AIS) and in adults (degenerative Scoliosis (dScoli)), and the etiology is unknown. While a mechanical hypothesis exists for both AIS and dScoli, the predominantly female prevalence (~90% for both) remains underexplored. In addition, approximately 70-75% of patients with degenerative Spondylolisthesis (dSpondy) are women. There are some suggestions of sex hormone involvement, but the basic molecular mechanisms are unknown. dScoli/dSpondy also occur around the time of menopause, which further raises sex hormone involvement.

The central tenet of our investigations is to understand why some females are predisposed to this problem. We feel that there should be a mechanical difference in the intervertebral disc (IVD).

Our center is well-suited for such an investigation. With engineers and scientists of the McCaig Institute for Bone and Joint Health a walk away, surgeons can collaborate to answer questions.

To date, Taylor, our second-year graduate student in this study, has collected nearly 60 anterior and lateral annulus fibrosus samples from the operating room. These samples are cut into 5mm³ cubes and mounted in the axial plane to mimic the translation seen in dScoli and dSpondy patients (Figure 1). Working with degenerated tissue has resulted in many iterations of the biomechanical testing, but a final protocol is now being implemented. Pilot data shows a noticeable decrease in stiffness in female and deformity samples (Figure 2). Taylor will continue to collect surgical samples for the remainder of this year, while also beginning to collect normal controls through the Southern Alberta Tissue Donation Program.



(NCBI, 2018)

Figure 1

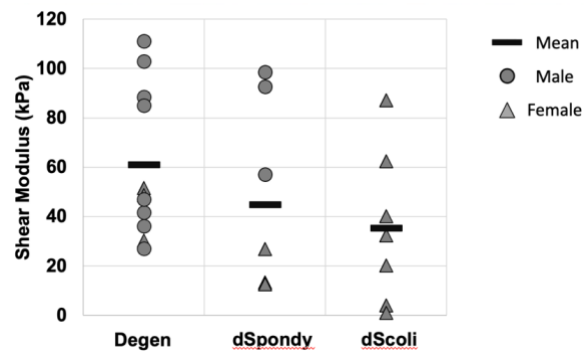


Figure 2

We will be using histomorphology to grade the IVDs, and then query the tissues with optical coherence tomography (OCT) immunohistochemistry (for estrogen receptors), histochemistry (for collagen breaks and elastin distribution) and gene expression analyses (Figure 3). We have also received some funding to evaluate for epigenetic changes and examine differential gene methylation in these tissues.

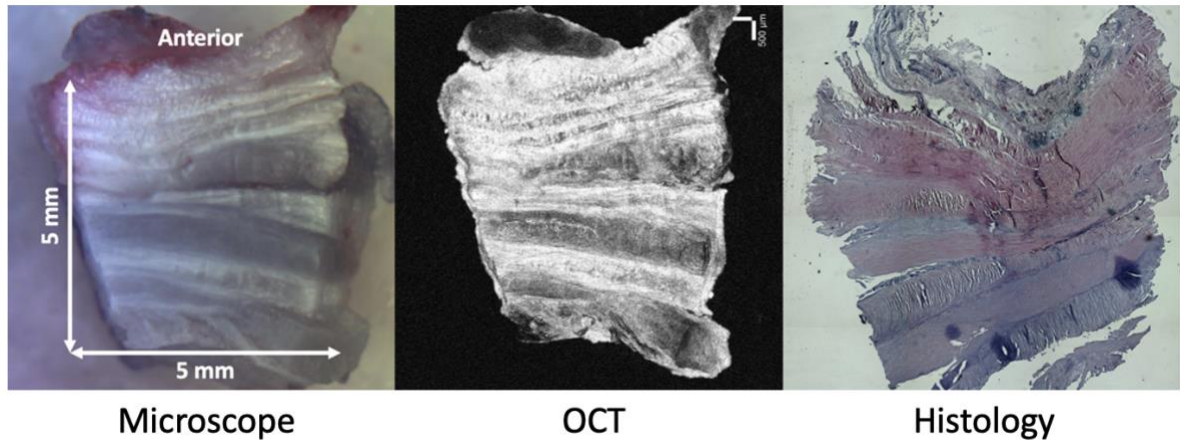


Figure 3

We hope that his project will set the stage for further, more hypothesis-driven investigations to understand why this sexual dimorphism exists. By the time Taylor finishes in 2023, we will have established possibly the largest IVD tissue bank for dScoli and dSpondy tissues. Hopefully with further collaborations with David Cadotte and his informatics team, this tissue bank will be a valuable resource for researchers.

	Degenerated	Deformity	dSpondy	dScoli
Shear Modulus (kPa)	60.81±30.2	39.97±33.8	44.74±38.1	35.2±31.2

Dr. Ganesh Swamy



Transitional Outpatient Pain Program (TOPPS) Update: Acceptance Commitment Therapy for Spine Pain

The Transitional Outpatient Pain Program for Spine Surgery (TOPPS) is an interdisciplinary outpatient transitional pain program based at Caleo Health in Calgary. Patient centered individual care is provided through a team-based model involving pain physicians, surgeons, addiction medicine specialists, psychiatrists, nurse practitioners, physiotherapists, and kinesiologists. Where possible the program is started prior to elective surgery and has pre-operative and post-operative components.

The pre-operative phase is 12 to 24 weeks in duration, and includes an educational session and 4 weeks of Acceptance and Commitment Therapy (ACT) with the following goals:

1. Opioid tapering (reduction or cessation)
2. Reduction of pain behaviors
3. Reduction of kinesiophobia
4. Treatment of Psychiatric Co-morbidities

Acceptance Commitment Therapy (ACT) is a relational frame form of cognitive behavioral therapy that aims at changing an individual's relationship with their thoughts by flexibly engaging in values-based behaviors to establish a meaningful life in the presence of painful experiences (1). A number of programs are utilizing ACT as a psychotherapeutic treatment approach for chronic pain. In fact, a randomized control study by Dindo et al (2018) supported a moderating positive effect of a one-day ACT workshop on post-operative pain and opioid cessation in veterans undergoing joint arthroplasty (2).



Locally, TOPPS was developed as a pilot project for degenerative spine patients undergoing decompressions and short-segment fusions. Analysis of our local data prior to implementation of the TOPPS program showed that chronic opioid use was prevalent among adult spinal deformity patients, with 64.3% of patients being on opioid analgesia prior to surgical intervention (average dose 125.6 MED). Chronic opioid use had a negative impact in spine surgery patients, and was associated with more frequent involvement of the acute pain service, more frequent use of lidocaine and ketamine infusions, higher post-operative opioid use, and a higher incidence of peri-operative complications. Two years after surgery, 59% of patients who were on chronic opioids prior to surgical intervention were still relying on opioid analgesia.

These results have shown that adult spinal deformity patients are a group that is often on high doses of opioid analgesia prior to surgery. Thus, spine surgery patients were identified as a high priority population in whom to implement a pre-operative opioid tapering program. As a result, TOPPS has now been implemented as standard of care for many selected patients undergoing surgery at the Foothills Hospital. More recently, Tanguay et al. (2020) have also shown a significant reduction in post-operative opioid use, pain disability, and pain catastrophizing in post-operative spine patients who engage in a transitional pain program where ACT is a component (3).

Evolution of ACT for Spine Pain TOPPS

2018-2020

- 8 weekly in-person sessions
- Psychiatrist/Physician/Psychologist led
- Attended supported by pain and addiction physicians, psychologists and kinesiologists
- Issues - attrition, scheduling pressures, remote patients

2020

- Modified - 1 week education, 4 weekly sessions
- Delivery – online, reduced attrition, improved access
- Currently limited to priority, surgical spine patients pre-operatively, with risk factors for poor outcomes



2021

- Dr. Ganesh Swamy, Dr. Alex Soroceanu, Dr. Denise Eckenswiler, Dr. Robert Tanguay and Dr. Elias Soumbasis are planning a prospective observational study to begin in 2022. The study aim is to evaluate the TOPPS program, including a 5-week ACT group therapy program, implemented prior to elective spine surgery, and specifically assess its impact on improving psychosocial measures, patient reported pain and disability outcomes, and peri-operative resource utilization.
 - Hypothesis: A multi-disciplinary Transitional Outpatient Pain Program, including psychoeducational ACT group therapy sessions, will decrease opioid use pre-operatively, leading to decreased peri-operative resource utilization in spine surgery patients, along with decreased post-operative pain scores, improved patient outcome measures, and significant cost savings.
1. Dindo L, Zimmerman MB, et al. Acceptance and commitment therapy for prevention of chronic post-surgical pain and opioid use in at-risk veterans: a pilot randomized control study. J Pain 2018; 19(10): 1211-1221.
 2. Azam MA, Weinrib AZ, et al. Acceptance and commitment therapy to manage pain and opioid use after major surgery: Preliminary outcomes from Toronto General Hospital Transitional Pain Service. Canadian Journal of Pain. 2017; 1:37-49.
 3. Tanguay RT, Eckenswiler DM, et al. A QI/QA assessment of the Transitional Outpatient Program for Spine (TOPPS) to improve spine surgery outcomes. Submitted. 2020.

Dr. Denise Eckenswiler



Staff Updates



Dr. Nathan Evaniew

Dr. Nathan Evaniew is an orthopaedic spine surgeon who joined the Calgary Spine Program in the Fall of 2020. He completed medical school at the University of Calgary, an orthopaedic surgery residency and PhD in Clinical Epidemiology and Biostatistics at McMaster University, and combined orthopaedic and neurosurgical spine surgery fellowships at the University of British Columbia and the University of Calgary. His clinical practice will include the breadth of degenerative, traumatic, neoplastic, and deformity referrals common to a tertiary care center, and his research will aim to improve the lives of patients with spinal disorders via the paradigm of evidence-based medicine. He plans to pursue an academic focus on pivotal clinical trials and major collaborative studies via established relationships with the Canadian Spine Outcomes and Research Network, the Rick Hansen Spinal Cord Injury Registry, and the AOSpine Knowledge Forum for Spinal Cord Injury.



Corinna Walker Photography

Tara Whittaker
appointed as
Research Manager

Tara Whittaker joined the U of C Spine Program in 2002 as one of two Research Nurses. Since that time, the program has undergone countless changes and seen much growth. The scope of our research has expanded to include Spinal Cord Injury, Cervical Myelopathy, Adult Spinal Deformity and participation in a Canada-wide registry.

Tara assumed the role of Research Manager in February of 2021 to oversee the team of 4 coordinators. Her knowledge and insight will serve her well as she focuses on team development.



