WEDNESDAY MORNING, MAY 2, 2018
REGISTRATION AND REFRESHMENTS
0700 - 0800
0800 - 0805 Welcome and Opening remarks
   — Dr. Bas Masri
Chair: Dr. Henry Broekhuysen
Moderators: Dr. P. Beaulé, Dr. J. Baumhauer,
           Dr. A. Veljkovic
Session 1: Research Presentations
(6 min. presentation + 4 min. discussion)
0805 - 0815 Can the Oxford Knee and Hip Score Identify
Patients that Don’t Require Total Knee or Hip Arthroplasty? — Dr. M. Neufeld - R4
0815 - 0825 Comparison of Functional Outcomes in One vs
Two Component Revision for Aseptic Loosening
in Revision Total Knee Arthroplasty — Dr. S. Ko - R4
0825 - 0835 Technical Considerations and Survivorship of
Unicompartmental Knee Replacements to
Total Knee Replacement Revisions in a
Single-Center — Dr. L. Howard - Fellow
0835 - 0845 A Pilot Study To Assess Dynamic Deformation
of the Femoral Head During Weight Bearing in
Perthes Disease — Dr. R. Lohre - R2
0845 - 0855 Independent Factors Associated with Patient
Surgical Outcomes in Complex Foot and Ankle
Surgery — Dr. L. Anderson - R3
0855 - 0905 Treatment of Dermatofibrosarcoma Protuberans
with Wide Local Excision — Dr. O. Zarnett - R2
0905 - 0915 Open MRI Measurements of Hip Kinematics
   — S. Zakani - Post-doctoral Fellow
0915 - 0925 Computerized Assessment of 3-D Ultrasound
Scan Adequacy to Enhance Reliability in
Evaluating Developmental Dysplasia of the Hip
   — O. Paserin - MSc. candidate
0925 - 0935 Individualized 3-D Printed Templates in
Corrective Osteotomy of the Femur and Pelvis:
   systematic review — Dr. C. Chapman - Fellow
0935 - 0945 Levels of Evidence at the Pediatric Orthopaedic
Society of North America Annual Meetings: an
update — Dr. K. Stampe - Fellow
0945 - 0955 Implementing an Interdisciplinary Electronic
Handover Tool for Vancouver General Hospital
   Trauma: a quality improvement initiative
   — Dr. H. Nazaroff - R1
0955 - 1005 Orthopedic Trauma and Case Based Learning at
   a Major Teaching Hospital: Resident Experience
   as the Primary Surgeon — Dr. J. Hunter - R2
1005 - 1015 University of British Columbia Orthopaedic
   Surgery resident selection: What is it based on,
   and how are we doing? — Dr. C. Day - R3
1015 - 1030 REFRESHMENT BREAK
WEDNESDAY MORNING, MAY 2, 2018
1030 - 1040 An Artificial Intelligence Framework for
   Intraoperative Assessment of Pedicle Screws
   — H. Esfandiari - PhD candidate
1040 - 1050 The Effect of Velocity and Timing of Residual
   Compression in a Rodent Dislocation Spinal Cord
   Injury Model — J. Speidel - MSc candidate
1050 - 1100 C-Arm Targeting for Ilio-Sacral Screws
   — I. McIntyre - R2
1100 - 1110 Surgical Versus Radiation Therapy for the
   Treatment of Cervical Metastases: from the
   epidemiology, process, and outcomes of spine
   oncology (EPOSO) cohort — Dr. M. Bond - R4
1110 - 1120 Safety and Efficacy of Silver Alloy Coated Urinary
   Catheters in Patients with Acute Traumatic
   Cervical Spinal Cord Injury
   — D. S. Review - R3
1120 - 1130 Adverse Events profile in EN BLOC RESECTION for
   Primary and Metastatic Bone Tumors of Spine
   — Dr. S. Hanbing-Zhou - Fellow
1130 - 1140 Interpreting Neurologic Recovery in Acute Spinal
   Cord Injury - Does the Timing of the Baseline
   Neurologic Examination Influence Outcome?
   — Dr. B. Sharifi - Fellow
1140 - 1150 Do Corticosteroids Used in Regional Blocks
   Result in Increased Rates of Nerve Injury?
   — A. Cheema - R3
1150 - 1200 The Other Adjacent Joint: Knee Pain in Ankle
   Arthroplasty and Ankle Arthrodesis: a COFAS
   Study — Dr. M. Symes - Fellow
1200 - 1245 LUNCH FOR ALL ATTENDEES
WEDNESDAY AFTERNOON, MAY 2, 2018
Session 2: Research Presentations
(6 min. presentation + 4 min. discussion)
1245 - 1255 The Efficacy of Repeated Closed Reduction Attempts
   of Distal Radius Fractures — Dr. A. Hoffer - R1
1255 - 1305 Coronoid Opening Angle: a novel radiographic
   technique to measure bone loss in coronoid
   fractures — Dr. M. Nitikman - R1
1305 - 1315 Assessing the Effects of Humeral Rotation on the
   Accuracy and Reliability of Radiographic
   Measurement of the Head-Shaft Angle Following
   Operative Fixation of Proximal Humerus Fractures
   — Dr. A. Sepehri - R2
1315 - 1325 Patient-Related Outcomes of Surgical Treatment
   of Ulno-Carpal Impaction
   — Dr. T. Mwaturura - Fellow
1325 - 1335 Ulnar Foveal Sign is Not a Specific Test for Foveal
   Detachment of the Triangular Fibrocartilage
   — Dr. G. Jarvie - Fellow
**Research Day**

**MAY 2, 2018**
**PAETZOLD AUDITORIUM**
**VANCOUVER GENERAL HOSPITAL**

**WEDNESDAY AFTERNOON, MAY 2, 2018**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1335</td>
<td>Does “Practice Make Perfect?” The Volume-Outcome Relationship in Orthopedic Surgery</td>
<td>Dr. D. Banaszek - Fellow</td>
</tr>
<tr>
<td>1345</td>
<td>Sexual and Urinary Function after Pelvic Fracture</td>
<td>Dr. D. Spence - Fellow</td>
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<tr>
<td>1355</td>
<td>Retrospective Review of Second-Generation Trabecular Metal Glenoid Total Shoulder Arthroplasties</td>
<td>Dr. Jane Yeoh - Fellow</td>
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<tr>
<td>1405</td>
<td>Prophylactic Antibiotics in Shoulder Arthroscopy</td>
<td>Dr. N. Baraza - Fellow</td>
</tr>
<tr>
<td>1415</td>
<td>REFRESHMENT BREAK</td>
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<tr>
<td>1430</td>
<td>Session 3: Research Presentations</td>
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<tr>
<td>1440</td>
<td>Institutional Costs Associated with Ankle Fusion Non-Union</td>
<td>Dr. O. Gagne - R3</td>
</tr>
<tr>
<td>1440</td>
<td>A Comparison of Outcomes of Ankle Arthritis Surgery Between MSP-funded, WCB-funded and Self-funded Surgery in Vancouver</td>
<td>Dr. J. Fairley - R3</td>
</tr>
<tr>
<td>1450</td>
<td>Regional Variation in Outcomes of Ankle Arthrodesis</td>
<td>Dr. A. Albaghdadi - R2</td>
</tr>
<tr>
<td>1500</td>
<td>Variability in the Reporting Terminology of Adverse Events in Ankle Fracture Fixation</td>
<td>Dr. S. St. George - R1</td>
</tr>
<tr>
<td>1510</td>
<td>Platelet-derived growth factor vs Autograft in ankle Fusions: a COFAS study</td>
<td>Dr. H. Al-Rumaih - Fellow</td>
</tr>
<tr>
<td>1520</td>
<td>A Proposed Radiographic Predictive Score for Failure in Total Ankle Arthroplasty: a COFAS study</td>
<td>Dr. M. Escudero - Fellow</td>
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<td>1530</td>
<td>Postoperative Coronal Alignment Predicts Total Ankle Replacement Failure: a COFAS study</td>
<td>Dr. Brian Le - Fellow</td>
</tr>
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<td>1540</td>
<td>A Randomized Prospective Study Comparing Ligament Reconstruction and Tendon Interposition (LRTI) with the Ascension® PyroDisk for Trapeziometacarpal Osteoarthritis</td>
<td>Dr. E. Villemare-Côté - Fellow</td>
</tr>
<tr>
<td>1550</td>
<td>Cemented and Uncemented Hemiarthroplasty for Hip Fractures: a 5 year experience</td>
<td>Dr. T. Abdullah - Fellow</td>
</tr>
<tr>
<td>1600</td>
<td>Hip Cartilage Damage in Adolescents With Healed Legg-Calve-Perthes Disease</td>
<td>C. Jones - MSc. candidate</td>
</tr>
<tr>
<td>1610</td>
<td>Understanding Musculoskeletal Literacy in an Orthopaedic Trauma Population: a cohort study</td>
<td>Dr. J. Nevin - R4</td>
</tr>
<tr>
<td>1620</td>
<td>Differences in Caregiver Perspective on Quality of Life of Children with Cerebral Palsy</td>
<td>Emily Schaeffer - Post-doctoral Fellow</td>
</tr>
<tr>
<td>1630</td>
<td>ADJOURN</td>
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</tr>
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THURSDAY MORNING, MAY 3, 2018 – MORRIS J. WOSK CENTRE
0700 - 0800 BREAKFAST AND REGISTRATION

Session 4: Improving Patient Care and Outcomes:
“Short-stay Total Hip/Knee Arthroplasty”

0800 - 0805 Chair/Opening remarks – Dr. B. Masri

0805 - 0820 Establishing a Successful “Same-Day Discharge” Total Joint Arthroplasty Program – Dr. P. Beaulé

0820 - 0835 Short-Stay Hip and Knee Arthroplasty – a practical approach with emphasis on safety/quality – Dr. B. Masri

0835 - 0850 The Anterior Approach: an essential technique for same-day discharge THA? – Dr. P. Beaulé

0850 - 0905 Minimal-Incision Posterolateral Approach: still the “gold standard” for short-stay THA? – Dr. N. Greidanus

0905 - 0920 Outcomes and Complications of MIS THA Approaches: an evidence-based evaluation – Dr. N. Greidanus

0920 - 0945 Panel Discussion

0945 - 1015 REFRESHMENT BREAK

Session 5: Improving Patient Care and Outcomes:
“The Relevance of Patient Reported Outcomes and Adverse Event Reporting to Clinical Practice”

1015 - 1035 Morton Lecture: Dr. Judy Baumhauer
Title: Patient Reported Outcomes: How They are Changing the Care We Provide to Our Patients – Dr. N. Greidanus

1035 - 1050 Incorporating Patient Reported Outcome Measurement in Routine Clinical Practice – Dr. A. Younger

1050 - 1105 Patient-Reported Outcomes Relevant to Care of the Pediatric Orthopaedic Patient – Dr. H. China

1105 - 1120 Improving Outcomes of Hip Arthroscopy in the Young Adult Population: lessons learned – Dr. Parth Lodia

1120 - 1140 Adverse Event Reporting and Developing a Framework for Continuous Quality Improvement (CQI) – Dr. P. Beaulé

1140 - 1150 Discussion

1150 - 1210 ALVAL after Metal on Polyethylene Hip Replacement: Update 2018 – Dr. C. Duncan

1210 - 1215 Discussion

1215 - 1300 LUNCH FOR ALL ATTENDEES

THURSDAY AFTERNOON, MAY 3, 2018 – MORRIS J. WOSK CENTRE

Session 6: Improving Patient Care and Outcomes:
“Joint Preservation and Optimization”
Chair – Dr. M. Gilbart

1300 - 1320 Patterson Lecture: Dr. P. Beaulé
Title: Unraveling the Pistol Grip/Cam Deformity of the Hip: Origins to Joint Degeneration – Dr. P. Beaulé

1320 - 1330 Mild Dysplasia and Hip Joint Preservation – Dr. K. Mulpuri

1330 - 1340 Hip Arthroscopy for Joint Preservation/Optimization – Dr. M. Gilbart

1340 - 1350 Joint preservation Surgery of the Knee: current status for 2018 – Dr. M. McConkey

1350 - 1400 Injection Therapy for Optimization of Joint Preservation – Myth or Magic – Dr. R. McCormack

1400 - 1410 Discussion

1410 - 1420 The Science Behind New Technologies for Forefoot Deformities – Dr. J. Baumhauer


1430 - 1440 Avoiding Complications in Shoulder Arthroplasty implant/technique considerations – Dr. P. Chin

1440 - 1450 Salvage options for the arthritic wrist - surgical options for 2018 – Dr. T. Goetz

1450 - 1500 The Role of the Intra-Pelvic Approach in Acetabulum Fracture Fixation in Young and Older Patients – Dr. P. Guy

1500 - 1515 Discussion

1515 - 1545 REFRESHMENT BREAK

Session 7: Breakout sessions / Case Discussions

1545 - 1700 Breakout Session #1: Complex Cases of Hip/Knee: preservation, optimization, reconstruction Case discussion
Chair: Dr. N. Greidanus
Faculty: Dr. P. Beaulé, Dr. C. Duncan, Dr. J. Potter, Dr. K. Mulpuri, Dr. R. McCormack, Dr. P. Chin, Dr. M. McConkey

1545 - 1700 Breakout Session #2: Complex Cases of Foot/Ankle Reconstruction and Trauma-solutions/controversies Case discussion
Chair: Dr. A. Younger
Faculty: Dr. J. Baumhauer, Dr. M. Penner, Dr. A. Veljkovic, Dr. D. Malish, Dr. K. Apostle

1700 ADJOURN
FRIDAY MORNING, MAY 4, 2018 – MORRIS J. WOSK CENTRE

0700 - 0800 BREAKFAST AND REGISTRATION

Session 8: Improving Patient Care and Outcomes: “Optimizing Patient Satisfaction and Minimizing Complaints/Risk/Malpractice”

0800 - 0805 Opening Remarks/Chair – Dr. B. Masri

0805 - 0835 For Orthopaedic Surgeons, Minimizing Patient Complaints is All About Communication: the CPSBC perspective – Dr. J.G. Wilson

0835 - 0900 Avoiding the Unhappy Patient—Perspectives on Risk Minimization and Risk Management: the hospital administrative perspective – S. Tam

0900 - 0915 Panel Discussion

0915 - 0930 Royal College Lecturer: Dr. Mike Moran

Title: What are your Patients Hearing?
The Noise Out There

0930 - 1000 REFRESHMENT BREAK

Session 9: Improving Patient Care and Outcomes: “Improving Outcome and Minimizing Complications/Adverse Events”

Chair – Dr. M. Moran

1000 - 1020 Prevention of Surgical Site Infection: what’s new for 2018? – Dr. B. Masri

1020 - 1040 Perioperative Optimization/Management of the Medically-Complex Orthopaedic Patient – Dr. E. Sloan

1040 - 1100 Strategies for Preventing Chronic Post-surgical Pain and Prolonged Opioid Use after Orthopaedic Surgery – Dr. A. Sutherland

1100 - 1110 Is it the Back or the Hip? Differentiating Spine vs Hip Pathologies: strategies for evaluation/treatment – Dr. J. Street

1110 - 1120 Adverse Event Reporting Improves Quality of Care – Dr. J. Street

1120 - 1130 Pediatric Musculoskeletal Infections: what to know and when to worry – Dr. C. Reilly

1130 - 1140 Osteoporotic Hip Fracture Management: prosthetic selection to minimize complications – Dr. H. Broekhuysen

1140 - 1150 Optimizing Outcome in Clavicle Fractures: What’s Gained By Doing Surgery? – Dr. B. Perey

1150 - 1200 Primum Non Nocere: A Paradigm Shift in Virtual Surgeon Education – Dr. D. Goel

1200 - 1220 McGraw Lecture: Dr. Andrea Veljkovic

Title: Management of Ankle Arthritis

FRIDAY AFTERNOON, MAY 4, 2018 – MORRIS J. WOSK CENTRE

1220 - 1315 LUNCH FOR ALL ATTENDEES & ALL BCOA MEMBERS

BCOA AFTERNOON SESSIONS

(ALL BCOA MEMBERS WELCOME)


Chair – Dr. A. Younger

1315 - 1325 Polyvinyl Alcohol Implant for Hallux Rigidus – Dr. J. Baumhauer

1325 - 1335 Custom 3-D Printing Prosthetic Implants for Complex Hip Reconstruction – Dr. B. Masri

1335 - 1345 The Dual-Mobility Hip Prosthesis: indications/techniques – Dr. D. Garbuz

1345 - 1355 Percutaneous Foot and Ankle Surgery: the way forward – Dr. A. Younger

1355 - 1405 New Techniques in Ankle Syndesmosis Fixation – Dr. K. Apostle

1405 - 1415 Distal Humerus Fractures – what’s hot, what’s not – Dr. P. Daneshvar

1415 - 1425 Targeted Muscle Re-innervation – rewriting an old chapter on Amputations of the Upper Limb – Dr. T. Goetz

1425 - 1435 Adolescent ACL Reconstruction: techniques for 2018 – Dr. C. Reilly

1435 - 1445 Innovative Techniques to manage Shoulder/Elbow Pathology – Dr. B. Regan

1445 - 1500 REFRESHMENT BREAK

1500 - 1530 UBC Department of Orthopaedics Faculty-wide Departmental Meeting

Chair – Dr. B. Masri

1530 - 1700 BCOA BUSINESS MEETING

CHAIR – DR. A. YOUNGER

1) BC INSTITUTE UPDATE

2) ACCESS TO CARE CAMPAIGN

3) CODING PRINCIPLES AND BEST PRACTICES

4) BUSINESS MEETING AGENDA

(AGENDA TO BE DISTRIBUTED ON-SITE)

1700 ADJOURN

FRIDAY EVENING, MAY 4, 2018

1830 UBC Department of Orthopaedics

Graduation, Alumni and Awards Banquet

Shaughnessy Golf and Country Club
Can the Oxford Knee and Hip Score Identify Patients that Don’t Require Total Knee or Hip Arthroplasty? - Dr. M. Neufeld – R4

**Background:** Delay in access to primary total knee (TKA) and hip (THA) arthroplasty continues to pose a substantial burden to patients and society in publicly funded healthcare systems. The majority of strategies to decrease wait times have focused on the time from surgical consult to surgery, however a large proportion of total wait time for these patients is the time from primary care referral to surgical consultation. Prioritization scoring tools and patient reported outcome measures are being used in an attempt to ration limited resources in the face of increasing demand. However, to our knowledge, no study has investigated whether a referral Oxford Knee or Hip Score (OKHS) could be used to triage non-surgical referrals appropriately, in an effort to increase timely access to specialists for patients that are candidates for total joint replacement (TJR).

**Purpose:** 1) To determine if a referral OKHS has the predictive ability to discriminate when a knee or hip patient will be deemed conservative versus surgical by the surgeon during their first consultation 2) To identify an OKHS cut-off point that can be used to accurately predict when a primary TKA or THA referral will be deemed conservative by the consultant surgeon during the first consultation.

**Methods:** We retrospectively reviewed all consecutive primary TKA and THA consultations from a single surgeon’s tertiary, high volume practice over a 3-year period. Patients with a pre-consultation OKHS, BMI <41, and no absolute contraindication to TJR were included. Consultation knees/hips were categorized into two groups based on surgeon’s decision, those that were offered TJR during their first consultation (operative) versus those that were not (conservative). Baseline demographic data and OKHS were abstracted. Variables of interest were compared between cohorts using the exact chi-square test and Wilcoxon rank-sum test. Spearman’s rank correlation coefficients were used to measure association between pre-consult OKHS and the surgeon’s decision. A receiver operator characteristic (ROC) curve analysis was used to calculate the area under the curve (AUC) and to identify a cut-off point for the pre-operative OKHS that identified whether or not a referral was deemed conservative. TKA and THA referrals were analyzed separately.

**Results:** The study included 1,436 knees (1,016 patients) with a median OKS of 25 (IQR 19-32) and 478 hips (388 patients) with a median OHS of 22 (IQR 16-29). Median pre-consultation OKHS demonstrated clinically and statistically significant differences between the surgical versus conservative cohorts (p<0.001). Spearman’s rank correlation coefficient between OKHS and a patient being deemed surgical or conservative was moderate for the OKS at -0.58 (95% CI -0.61 to -0.54), and strong for the OHS at -0.62 (95% CI -0.67 to -0.56). The ROC AUC values for knee (0.83, 95% CI 0.81-0.85) and hip consults (0.87, 95% CI 0.84-0.91) were good, indicating that pre-consult OKHS has predictive ability to discriminate surgeon’s decision of surgical versus conservative. One plausible conservative threshold that optimized sensitivity and NPV for knees is OKS >32 (sensitivity=0.997, NPV=0.992) and for hips is OHS >34 (sensitivity=0.997 NPV=0.978). ROC analysis identified several potential lower OKHS thresholds, depending on weight of prioritization of sensitivity, specificity, and NPV.

**Conclusion:** Pre-referral OKS and OHS demonstrate good ability to discriminate when a knee or hip TJR referral will be deemed non-surgical versus surgical at their first consultation in a single surgeon’s practice. Multiple potential OKHS thresholds can be applied as a tool to decrease wait times for primary TJR. However, a cost analysis would aid in identifying the optimal cut-off score, and these findings need to be validated with multi-surgeon/center studies before they can be broadly applied.
0815 - 0825  Comparison of Functional Outcomes in One vs Two Component Revision for Aseptic Loosening in Revision Total Knee Arthroplasty – Dr. S. Ko - R4

**Background:** Aseptic loosening is a known complication after TKR, and is an indication for revision total knee arthroplasty. It may involve one component (either the femoral or tibial component) or both components, and therefore the revision procedure may involve revising one or both components. Occasionally, revision of both components is done, even though aseptic loosening was felt to involve one component. The reason for this is unclear. A possibility for this is that the loose component is from a specific vendor system that is unfamiliar to the treating surgeon, prompting the explant of both components to one compatible system. The evidence on comparing outcomes in patients who receive one vs two component revision for aseptic loosening in revision total knee arthroplasty is scarce.

**Specific Aims:** The primary aim of this study is to compare the functional outcomes in patients who receive one vs two component revision for aseptic loosening in revision total knee arthroplasty. A secondary aim of this study is to assess for any differences in operative implications (e.g., surgical time, complications, augments required) between these two patient groups.

**Hypotheses:** The available data will demonstrate better functional outcomes at minimum 2 year follow up in patients who receive one vs two component revision for aseptic loosening in revision total knee arthroplasty.

**Methods:** Retrospective review of a prospectively collected database with minimum 2 year follow up will be done. Functional outcome questionnaires include WOMAC, Oxford 12, and SF 12. Electronic chart review will also be used to assess patient demographics and variables related to surgery, such as surgical time and complications.

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0825 - 0835  Technical Considerations and Survivorship of Unicompartmental Knee Replacements to Total Knee Replacement Revisions in a Single-Center – Dr. L. Howard - Fellow

**Introduction:** The number of medial unicompartmental knee replacements (UKR) performed for arthritis has increased and as such, revisions to total knee replacement (TKR) is increasing. Previous studies have investigated survivorship of UKR to TKR and functional outcomes compared to TKR to TKR, but have failed to detail the surgical considerations involved in these revisions. Our objectives are to investigate the detailed surgical considerations involved in UKR to TKR revisions. In addition, we will determine the survivorship and functional outcomes of UKR to TKR compared to TKR to TKR and any subsequent revisions.

**Methods:** This study is a retrospective comparative analysis of a prospectively collected database. From 2005 to 2017, 61 revisions of UKR to TKR were completed at a single center. Our inclusion criteria include: revision of UKR to TKR or TKR to TKR with minimum 2 year follow-up. Our exclusion criteria include: partial revisions where neither the tibia nor femur were revised, revision for infection and liner exchange only. The 61 UKR to TKR revisions were matched 2:1 and compared to 122 TKR to TKR revisions. The use of the database as well as electronic and paper based charts were utilized for the following data collection: Indication for revision, time to revision, operative skin to skin surgical time, the use of specialized equipment (augment size/location, stem), intraoperative and postoperative complications and outcome scores (WOMAC, Oxford 12, SF 12, satisfaction score).

**Results:** The average age and BMI of the UKR to TKR group was 68 and 32, respectively. The average age and BMI of the TKR to TKR group was 60 and 33, respectively. Preliminary data shows the two most common reason for revisions of UKR to TKR was progression of arthritis (49%) and osteolysis/polyethylene wear (40%). In the TKR to TKR group, the two most common reasons for reversion was aseptic loosening (53%) and instability (18%). Augments, including femoral head allografts, were required in 11% of UKR to TKR revisions with the medial tibia being the most common location of augmentation. In the TKR to TKR group, 66% of overall operations required augments. The most common location requiring augmentation was posterolateral (23%) and distal lateral (23%). Tibial augments and trabecular metal cones were required in 19% and 6% of patients, respectively. Tibial stemmed components were required in 31% of cases of UNI to TKR revisions. In the TKR to TKR group, femoral stems were required in 51% of cases while tibial stems were required in 48% of cases. The survivorship and functional data in relation to UKR to TKR and TKR to TKR revisions is pending.
0825 - 0835 Cont’

Discussion: The results of our study show that the primary reasons for revisions within the two groups are different (progression of arthritis vs osteolysis). Augments were required in both groups, but more commonly in the TKR to TKR group. The most common locations of augmentation also different between two groups. The use of stems were required in both groups but more commonly in the TKR to TKR group. Although augmentation and stem use are required less commonly in UKR to TKR, surgeons should still be prepared for more advanced technical requirements during these revisions.

0835 - 0845 A Pilot Study To Assess Dynamic Deformation of the Femoral Head During Weight Bearing in Perthes Disease – Dr. R. Lohre - R2

1. British Columbia Children’s Hospital, Vancouver, Canada 2. Centre for Hip Health and Mobility, Vancouver, Canada 3. Southampton Children’s Hospital, UK

Purpose: This study utilizes an upright MRI scanner to image hips in children affected by Legg-Calve-Perthes Disease (LCPD). The aim of this study is to assess the feasibility and reproducibility of assessing for any dynamic deformation of the femoral head shape when the child is weight bearing compared to supine.

Methods: Protocols have been previously developed in this unique upright MRI scanner in healthy adult and child volunteers. Satisfactory image acquisition is possible with Coronal T1 GFE sequences, both hips in Field of View. 2.5min scans were performed, first with the child standing and then supine. Digital measurements were made to assess the bony and cartilaginous femoral head height, width, and lateral extrusion. Comparisons between standing and supine unaffected and affected hips were made by two-raters and reliability assessed using the intra-class correlation coefficient (ICC) for intra-and inter-rater reliability.

Results: Hips in eleven patients, five in early fragmentation stage and five in the revascularization stage of LCPD were imaged both supine and standing. One child could not tolerate the scan, resulting in images too blurred for measurement.

Preliminary analysis demonstrated dynamic deformity of the femoral head on weight bearing. Femoral epiphysis height in early or fragmentation stage decreased on standing (0.85 SD ±0.48 mm) width increased on standing (1.89 ± SD 1.92 mm) and lateral extrusion increased on standing (1.60 ± 1.48 mm). In the revascularization stage epiphyseal height decreased on standing (1.71 ± 1.84 mm), width increased on standing (1.42 ± 1.20mm), and lateral extrusion increased on standing (1.39 ± 0.944mm). Differences were demonstrated in all parameters of femoral epiphyseal height, width and lateral extrusion when the child stood and loaded the LCPD hip. Contra-lateral unaffected hips did not deform. The study size was too small to determine statistical significance.

Reliability was determined using the intra-class correlation coefficient (ICC) for intra-and inter-rater reliability. Standing measurements of affected hips demonstrated excellent intra-rater reliability for width (ICC=0.99, 95%CI = 0.98-0.99) and height (ICC = 0.98, 95%CI = 0.95-0.99), and extrusion (ICC = 0.78, 95%CI = 0.40-0.92) demonstrated good intra-rater reliability. Inter-rater reliability demonstrated moderate reliability for standing width (ICC = 0.73, 95%CI = 0.51-5.02), with poor to moderate reliability for standing height (ICC = 0.46, 95%CI = -0.792 – 0.843) and lateral extrusion (ICC = 0.043, 95%CI = -2.32 – 0.73).

Conclusion: This is the first reported use of standing weight bearing MRI in LCPD. A dynamic deformity has been demonstrated in the early fragmentation stage, with flattening, widening and worsened lateral extrusion on weight bearing. The developed protocol demonstrates reproducibility and reliability. The use of standing MRI is feasible in the assessment of LCPD and supports further investigation with larger numbers of patients.

Level of Evidence: 2, Prospective comparative study
0845 - 0855  Independent Factors Associated with Patient Surgical Outcomes in Complex Foot and Ankle Surgery – Dr. L. Anderson - (R3)

A previous database analysis of surgical outcomes in complex foot and ankle patients looked at pre-operative PCS scores as a predictor for poor outcomes; neither the immediate or the 1 year post-op assessments demonstrated any correlation. Further investigation to identify factors associated with patient surgical outcomes is necessary.

A database of 46 complex foot and ankle surgery patients was analyzed. Four pre-selected factors were included in the analysis. Outcomes were quantified using validated outcome scoring scales including FAOS, AOS, LEFS and SF36. Linear regression model was used to assess the association between pre-selected factors and patient surgical outcomes. Univariate analysis was performed for each factor. Multivariable analysis was performed on factors found to be significant in the univariate analysis in addition to baseline patient characteristics that included age, gender, and baseline surgical measures.

The results of this analysis may help guide selection of surgical and non-surgical treatment pathways for patients presenting with similar pathologies based on identification of pre-existing patient factors that are predictive of surgical outcomes.

0855 - 0905  Treatment of Dermatofibrosarcoma Protruberans with Wide Local Excision – Dr. O. Zarnett - R2

Introduction: Dermatofibrosarcoma protuberans (DFSP) is a locally aggressive cutaneous sarcoma. Local recurrence is generally associated with positive margins and microscopic residual disease. There remains controversy as to the optimal surgical margins, with different centres using different gross margins with varying rates of success. The aim of our study is to report our institution’s experience with wide local excision and to review the recent literature for local recurrence rates as they relate to surgical margin size.

Methods: We performed a systematic review of articles that provided data on local recurrence rates of DFSP following wide local excision. We specifically identified studies that reported surgical margins as they related to local recurrence. We also performed a review of DFSP cases from our institution between 2000 and 2017 looking at local recurrence rates. Results: We identified twenty-seven cases of DFSP from our institution with two local recurrences. There was one additional case of late metastasis. Our literature search identified twenty-nine articles that reported rates of local recurrence following wide local excision. From our search, there were 2106 cases of DFSP with an overall local recurrence rate of 9.8%. We found 702 cases of dermatofibrosarcoma protuberans treated with surgical margins between 1 and 3 cm (Group A), and 287 cases treated with margins between 3 and 5 cm (Group B). Group A and group B had 9.5% and 7.6% local recurrence rate, respectively. The odds ratio of local recurrence in Group B compared to group A was 0.79 (95%CI: 0.48-1.3), with a p value of 0.34 (Pearson’s chi square test).

Conclusions: While there was a trend towards lower recurrence rates with larger margins, we could not find conclusive evidence that treating patients with >3cm margins decreased local recurrence rates.

0905 - 0915  Open MRI Measurements of Hip Kinematics – S. Zakani - Post-doctoral Fellow

Purpose: Our objective was to investigate whether radiographic presence of cam femoroacetabular impingement (FAI) and/or pain would reduce or exacerbate translational motion of the hip in a clinically relevant movement.

Method: Nineteen participants, ages 20-50, were recruited by telephone survey and characterized as having FAI or not using x-ray, using a protocol approved by our institution’s research ethics board. Lateral center edge angle, alpha angle and intrusion were recorded for further analysis. Hip pain was assessed using a standardized hip questionnaire and a clinical exam. Participants were divided into four groups: four healthy controls; five without FAI, with hip pain; five with FAI and no hip pain; and five with FAI and hip pain.
Each participant was scanned in a 0.5 Tesla upright MR scanner (MR Open, Paramed, Italy) with a T1-weighted gradient echo sequence with TR/TE=942.5/12ms, a slice thickness of 2.5 mm and a gap of 0.5 mm, scan matrix 256*256, 34 slices, imaging time 6 min 7 sec. The scanner allows scanning in different clinically relevant or load bearing positions, ranging from supine to standing. Here, participants were scanned in a supine position and a FADIR (Flexion, Adduction, Internal Rotation) position which is used to assess impingement.

Relative position and orientation of the femoral head with respect to acetabular coordinates were calculated using three dimensional digital models of each participant’s hip segmented from MR images in the two poses. Hip joint translation was defined as the Euclidean distance between the femoral head center in the two positions.

Femoral translations in each group were compared to healthy controls using a non-parametric rank-sum statistical test. Pearson’s correlation was used to determine correlation between rotational and translational range of motion.

Results: We found translational motion in every participant’s hip. Control hips underwent absolute translations of (mean SD). Compared to control subjects, participants with FAI and/or pain did not have significantly different translations. Participants with hip pain and no FAI translated by (p=0.09). Participants with radiographic FAI and no pain translated by (p= 0.95). Participants with radiographic FAI and hip pain translated by (p=0.9). There was a moderate positive correlation between flexion and anterior translation in the FADIR pose (R=0.5, p=0.03).

Conclusion: Our findings support the idea that the femoral head translates during large hip movements in normal and pathological hips. These findings are consistent with recent findings on translational motion of normal cadaveric human hips. Translation of the femoral head challenges the ball and socket model of the human hip, which implies that the joint surfaces are limited to rotation and any translations between the acetabulum and femur is a sign of some pathological condition. Application of this approach in a larger cohort could help better explain the mechanical changes at the hip associated with FAI and hip pain.

Computerized Assessment of 3-D Ultrasound Scan Adequacy to Enhance Reliability in Evaluating Developmental Dysplasia of the Hip – O. Paserin - MSc. candidate

Developmental dysplasia of the hip (DDH), a condition affecting the stability of the hip joint, is the most common hip disorder among infants. Accurate detection of DDH relies heavily on acquiring adequate ultrasound (US) image data. Although 2D US is the standard modality used for DDH screening, 3D US has recently been considered as well. Presently, the acquisition of high quality US deemed adequate for diagnostic measurement requires thorough knowledge of infant hip anatomy as well as extensive experience in interpreting such scans. This work aims to provide rapid assurance to the operator, automatically at the time of acquisition, that the data acquired are suitable for accurate diagnosis. To this end, we propose a deep learning model for automatic, near real-time assessment of 3D US scans for DDH screening. We validate our approach on 40 datasets from 15 pediatric patients and demonstrate a slice classification rate of 93% with average processing time of 2 seconds per US volume. We expect automatic US scan adequacy assessment to have significant clinical impact with the potential to help in imaging standardization, improving efficiency of measuring DDH metrics, and improving accuracy of clinical decision making.

Individualized 3-D Printed Templates in Corrective Osteotomy of the Femur and Pelvis: systematic review – Dr. C. Chapman - Fellow

Background: The pediatric patient population has considerable variation in anatomy. The use of Computed Tomography (CT) generated digital models to design three dimensionally printed individualized templates has recently been to be applied for correction of deformity in orthopedic surgery. The purpose of this study was to (1) determine the existing application of this technology in current use, and (2) determine the benefits that this may provide to the patient and to the surgeon.
Methods: A systematic review of MEDLINE, EMBASE, and CENTRAL for published literature as well as Web of Science and clinicaltrials.gov for grey literature was performed. The search strategy was formed from the research question: “What is the effect of 3D printed individualized template use for proximal femoral or pelvic osteotomy?” One reviewer, in consultation with a reference librarian, performed the literature search. Two reviewers, using the predetermined inclusion criteria, independently performed abstract review in order to select articles for full text review. The included studies were assessed for quality. All included studies were combined in a narrative synthesis, findings were not pooled statistically given the diversity of study designs and interventions examined in the body of included literature.

Results: Pending

Conclusion: Pending

Levels of Evidence at the Pediatric Orthopaedic Society of North America Annual Meetings: an update - Dr. K. Stampe - Fellow

Background: In 2010 an article detailing the levels of evidence in scientific papers presented at the Pediatric Orthopaedic Society of North America (POSNA) meetings. The purpose of this study is to determine if there have been any improvements to the level of research presented at the annual meetings since our last publication.

Methods: The abstracts of all papers presented orally at the POSNA meetings from 2011 to 2016 were collected for review. A total of 564 abstracts were identified as appropriate for review. The abstracts were then independently blinded and randomized. Two nonepidemiologically trained orthopaedic trainees, one fellow and one resident, independently assigned a study type and level of evidence to each article. Disagreement between observers was settled by consensus opinion with an epidemiologically trained orthopaedic surgeon. 50 articles were randomly selected for reanalysis for each observer. The interobserver and intraobserver was calculated for the study type and level of evidence.

Results: Final results including statistical analysis are not yet available at the time of this writing. In assessing the preliminary data the majority of studies fell within the therapeutic category, followed by prognostic study type. Over half of the presented papers were of level 4 evidence. No results were available for inter and intraobserver reliability.

Conclusions: In comparison to the results published in 2010 our findings are very similar in the level of evidence and type of studies being presented. There would appear that despite efforts to fund higher levels of evidence in pediatric orthopaedics that there has been no significant changes since 2010. Improvements could be made to the level of evidence being published with the use of a control group for comparison purposes as opposed to case series publications.

Implementing an Interdisciplinary Electronic Handover Tool for Vancouver General Hospital Trauma: a quality improvement initiative – Dr. H. Nazaroff - R1

Communication in medicine has been identified as a critical factor in quality assurance and a large source of preventable error. “Handover,” an inherently communication-based event, has been shown to be a crucial process that is very susceptible to communication failures. This is especially true with interdisciplinary handover, such as what occurs between various specialties involved in the care of trauma patients with multiple injuries. Handover tools designed and implemented across various specialties hold promise in reducing preventable communication errors. The purpose of this quality improvement study is to evaluate the potential benefit of standardizing handover between General Surgery Trauma and Orthopaedic Trauma at Vancouver General Hospital (VGH).
0945 - 0955 Cont’

We hypothesize that residents and staff from both General Surgery Trauma and Orthopaedic Trauma services at VGH will identify pitfalls of current handover practices and recognize potential benefits in the implementation of a more structured interdisciplinary handover protocol. Methods involve creation of a survey to assess current handover practices between General Surgery Trauma and Orthopaedic Trauma services at VGH. The survey has been distributed to staff and residents involved in both services. If conclusions from this survey confirm the hypothesis, it will affirm the potential value of implementing such an electronic handover quality improvement initiative.

0955 – 1005 Orthopedic Trauma and Case Based Learning at a Major Teaching Hospital: Resident Experience as the Primary Surgeon
– Dr. J. Hunter - R2

Intro: Orthopaedic surgical education is ever evolving; yet, the goals of residency education remain to train surgeons who are competent orthopaedic generalists by graduation. In their progression to becoming competent physicians and surgeons, residents must learn the critical steps of operative orthopaedics. This study was developed to assess resident operative educational experience during their orthopaedic trauma portion of residency training. We asked residents to identify what are the critical steps in surgical fracture management according to them and how often do they participate in the critical steps in a surgery? Does this participation change with advancement through a 5-year orthopaedic training program?

Materials & Methods: To facilitate this study, a survey was created to assess resident identification and participation in the critical steps of 5 common operative fractures in orthopaedic trauma. UBC residents completed this study during protected academic time. Alphanumeric data was entered into excel and text responses were also coded for excel entry. Results were analyzed using descriptive statistic measures.

Results: At the time of survey completion the average number of blocks of orthopaedic trauma completed were as follows: R1 – 2.4, R2 – 8, R3 – 11, R4 – 8.25, R5 – 10 blocks. Residents were likely to rank many of the sample operative steps as critical, with the more junior residents marking more steps critical. In particular, 100% of residents identified “obtain a reduction” as a critical step in all 5 fracture patterns.

Regarding resident participation in the steps they have identified as critical, we did see the participation vary by fracture type as well as training year. There was significant advancement in stated participation with the biggest gap between R3-R4. Specifically considering the “fracture reduction” step, by the R5 year of training the range of participation in this step was 47-83% across all fracture groups.

Discussion: It is not unexpected to find residents feel that many operative steps are critical, and to see progression over their training years in their operative involvement. However, we note that there remained large variability in operative involvement even at the senior resident level. Also, that the number of blocks of trauma training was not commensurate with the progression of responsibility. This may reflect the changes to the orthopaedic training program that have occurred over the last 5 years. The study results will lend to further the two-way feedback that occurs between trainees and instructors. It also allows us to consider if there are other opportunities for residents to gain experience in performing the “critical steps” of operative fixation in a learning venue outside of the operative theatre.

1005 - 1015 University of British Columbia Orthopaedic Surgery resident selection: What is it based on, and how are we doing? – Dr. C. Day - R3

It is important for Orthopaedic Surgery programs to identify and select the best residents possible for their program. Classically in Canada, applications to residency have been based on letters of reference, personal letters, medical school performance records, medical school transcripts, interview performance, and information submitted to in the online Canadian Residency Matching Service (CaRMS) application.
In the United States of America, academic factors that are considered important in selecting residents include United States Medical Licensing Examination Step 1 score, Alpha Omega Alpha Honor Medical Society membership, and medical school class rank, which are not available in Canada’s binary pass/fail grading system. This can make ranking applications for Canadian residency programs a challenge. Yearly data from 2010-2018 University of British Columbia’s (UBC) Orthopaedic CaRMS Interview Committee were reviewed. Scores for the panel interview, multiple mini interview (MMI), and R1 Orthopaedics In-Training Examination (OITE) were compared among applicants in each year to determine whether the panel of MMI interview correlated best with final applicant rank, and whether successfully matched applicant rank correlated with R1 OITE scores.

Average rank of successfully matched applicants were also calculated by year. Results show that overall, the panel interview had a stronger correlation (rho = 0.706) with final applicant rank than did MMI (rho = 0.605). Matched applicant rank did not correlate well with R1 OITE score (rho = -0.132). Over a nine year average, UBC successfully matched their applicants in the top third of their overall rank list. It is postulated that improved correlation with panel interviewing may be due to the incorporation of each applicant’s full file, or that scoring individuals in this interview style may be more accurate than a short interview format such as the MMI. Poor OITE score correlation with applicant rank may be due to inexperience of applicants at the time of taking the examination. Before deciding on the best and most efficient methods for selecting applicants for orthopaedic surgery residency positions, further data should be collected and analyzed from the various programs across Canada.

An Artificial Intelligence Framework for Intraoperative Assessment of Pedicle Screws – H. Esfandiari - PhD candidate

Pedicle screw fixation is a common, yet technically demanding procedure in a number of spinal surgeries. The current intraoperative standard for position assessment of the inserted implants is to acquire a set of two dimensional radiographs to visually assess the three dimensional implants’ position, which can be cumbersome and error-prone. The objective of this research is to incorporate the preoperative volumetric images along with the intraoperative X-rays to accurately and automatically estimate the implant position in a three dimensional domain. An artificial intelligence system was developed that could segment and localize the position of inserted implants automatically and with an accuracy range of 1.93° ± 0.64° and 1.92 mm ± 0.55 mm. The proposed system can help to provide an intraoperative pedicle screw insertion assessment protocol with sufficient accuracy and minimal interference with the existing surgical routines. Such a system can potentially reduce the rate of revision surgeries and the radiation exposure to the surgical staff.

The Effect of Velocity and Timing of Residual Compression in a Rodent Dislocation Spinal Cord Injury Model – J. Speidel - MSc candidate

The effect of timing of decompression following traumatic spinal cord injury (SCI) remains unclear, as clinical and pre-clinical studies have demonstrated varying results. There remains a question of whether certain sub-groups of SCI could see greater benefits than others from early decompression. Dislocation is the most commonly seen injury mechanism but has never been investigated with respect to residual compression in an animal model.

The goal of this project was add residual compression to an existing rat cervical dislocation model and to examine the effect of time of residual compression and velocity of injury with this model.
Dislocation injuries were conducted on forty-six male, Sprague-Dawley rats in four groups: two timings of decompression (24 minutes, 240 minutes) and two velocities (10mm/s, 500mm/s). All injuries involved dislocation between the C5/C6 vertebrae in an anterior-posterior direction to 1.45mm and residual compression of 0.8mm. Animals were evaluated for motor function using the Martinez open field, grip strength, and grooming tests for 6 weeks post-injury.

High velocities consistently produced more severe injuries than low velocity. Correlation coefficients between 0.46 and 0.58 (p<0.05) were seen between velocity and injury severity. Longer time of residual compression did not produce more severe injuries and no significant correlations were seen between timing of residual compression and injury severity.

These findings demonstrate that velocity is a more important factor than timing of residual compression in determining injury severity in a dislocation model of SCI.

Background: The increased use of intra-operative fluoroscopy as part of a minimally invasive approach in fracture surgery has raised the concern of radiation exposure to health care workers. While ‘as low as reasonably achievable’ (ALARA) recommendations prevail, exposure to radiation continuously increases as does the concern regarding radiation induced cancer1,2,3. Even though strategies such as increasing distance away from the c-arm help reduce exposure4, limiting the number of images, at the source, must be an ongoing quest.

Methods: This is an observational study of 5 orthopedic surgeons performing C-arm imaging of a human mannequin. The surgeons will specifically attempt to obtain the various images they acquire during percutaneous posterior pelvis fixation using ilio-sacral screws. The study will measure the amount of C-arm base translation and the number of exposures required for surgeons to obtain the specific views.

This study will take measurements regarding how much the base of the C-arm is translated when obtaining standard views (AP, inlet and outlet) of the pelvis during placement of ilio-sacral screw. The underlying assumption is that movement of the C-arm base takes extra OR time and increases the likelihood that extra shots will be taken while “hunting” for the optimal views. There will be three hypotheses tested:

1. Does isocentric (IC) C-arm allow for capture of all standard views while diminishing the need to translate the base when compared to a non-isocentric (NIC) C-arm? We will attempt to quantify the amount of movement necessary for each C-arm geometry type.
2. Is there a method that can mitigate the movement of the C-arm base when obtaining standard views and changing between them?
3. Does increased movement of the C-arm base correlate with an increased number of shots and increased time required to obtain standard views?

The experiment used a standardized mannequin with embedded radio-opaque pelvis and lower extremity sawbones® (SKU #1301-96) placed on a radio-lucent Jackson Table from the Centre for Hip health and Mobility’s simulated OR suite. We will use a Siemens ‘Arcadis Orbic’ (IC) C-arm as well as a Phillips ‘Veradius Unity’ (NIC) fluoroscopic C-arm machines to acquire images.

Results: Movement of the C-arm base was measured to be 12.7cm (±3.2cm 95% CI) from the initial AP position to obtain pelvic inlet view and 10.4cm (±4.2cm 95% CI) from the initial AP position to obtain pelvic outlet view when using the NIC C-arm. The IC did not require any displacement to obtain views. Furthermore, when an initial lateral view of the sacrum was obtained, there were fewer ‘hunting’ shots taken to obtain views with both C-arms. Increased movement of the C-arm base was associated with an average of 3 extra ‘hunting’ shots.

Conclusion: The results of this study reveal that an IC C-arm geometry allows for reduced movement of the C-arm base and lower radiation exposure when obtaining standard views of the pelvis for ilio-sacral screw placement. There was also a benefit shown in reduced number of ‘hunting’ shots when an initial lateral alignment view was obtained. Further study in actual surgical procedures is required to determine whether a statistically significant reduction in radiation exposure to the patient and surgeon will result from adaptation of IC C-arm geometry and initial lateral alignment techniques.

Level of Evidence: Observational study, Level V.
1100 - 1110 Surgical Versus Radiation Therapy for the Treatment of Cervical Metastases: from the epidemiology, process, and outcomes of spine oncology (EPOSO) cohort – Dr. M. Bond - R4

Introduction: Cervical metastases have distinct clinical considerations and potentially devastating implications because of the complex anatomy, and the unique biomechanics of the cervical spine. The literature is sparse and limited to retrospective case series. The aim of this study is to determine the impact of surgical intervention ( +/- radiotherapy) or radiotherapy alone on Health-Related Quality of Life Outcomes in patients treated for cervical metastatic tumours.

Materials and Methods: Patients treated with surgery and/or radiotherapy for cervical metastases between August 2013 and February 2017 were identified from the Epidemiology, Process and Outcomes of Spine Oncology (EPOSO) multicentre prospective cohort study. Demographic, diagnostic, treatment and health related quality of life (HRQOL) (NRS Pain, EQ-5D, SF-36v2, and SOSGOQ) measures were prospectively collected at baseline, 6 weeks, 3 months, and 6 months post-intervention.

Results: Fifty-five patients treated for cervical metastases were identified: 38 underwent surgery +/- radiation and 17 received radiation alone. Surgically treated patients had higher mean SINS scores compared to the radiation-alone group (13.0 vs. 8.0, p<0.001) and were more likely to have mechanical neck pain (89.5% vs. 37.5%, p<0.001). Surgically treated patients had higher NRS pain scores and lower HRQOL scores compared to the radiation alone group (p<0.05). From baseline to 6 months post-treatment, surgically treated patients demonstrated statistically significant improvements in NRS pain, EQ-5D and SOSGOQ2.0 compared to non-significant improvements in the radiotherapy only group.

Conclusions: Surgically treated patients presented with worse baseline pain and HRQOL scores compared to patients who underwent radiotherapy only. Significant improvements in pain and HRQOL were noted for those patients who received surgical intervention. While, small or no improvements were found in those treated with radiotherapy alone.

1110 - 1120 Safety and Efficacy of Silver Alloy Coated Urinary Catheters in Patients with Acute Traumatic Cervical Spinal Cord Injury – Dr. S. Hanbing-Zhou - Fellow

Objectives: Patients with acute traumatic cervical spinal cord injury (ATCSCI) have an increased risk of catheter associated urinary tract infection (CAUTI). The safety and efficacy of antiseptic silver alloy-coated silicone urinary catheters (SACC) in CSCI is unknown. This study examined the safety and efficacy of SACC versus LIC for preventing CAUTI in patients with ATCSCI.

Methods: A longitudinal observational study examining all CAUTI incidents in all patients undergoing spine surgery at a single quaternary centre from January 2014 to December 2016 inclusive. Prior to July 2015, all patients received a latex indwelling catheter (LIC). After July 2015 SACC was used in all patients with ATCSCI only. Duration of catheterization, microbiology, duration of infection, antibiotic susceptibility and catheter associated adverse events were recorded prospectively, as was the occurrence of other non-catheter adverse events and length of stay. The safety and efficacy of SACC versus LIC is reported.

Results: 3081 patients were studied of which 302 (9.8%) were ATCSCI. 63% of ATCSCI patients were AIS A or B. The overall rate of CAUTI was 19% (585 of 3081), with 38% (116 of 302) in patients with ATCSCI. Of 178 ATCSCI patients with LIC 100 (56%) developed a CAUTI compared to 28 of 124 (23%) with SACC (p<0.05). The median time of urethral catheterization was 27 days in the SACC group and 28 days in the LIC group (p=0.602). Polymicrobial and gram positive infection was more common in LIC than in SACC groups (p<0.05). The median duration of infection was 9 days in the SACC group and 12 days in the LIC group (p=.08). Resistance to Trimethoprim (p<0.001) and to Ciprofloxacin (p<0.05) were more common in LIC group. There was no difference in catheter associated adverse events or length of stay between the groups.

Conclusions: This study illustrates the safety and efficacy of antiseptic silver alloy-coated silicone urinary catheters in acute traumatic cervical spinal cord injured patients. The use of SACC reduces the incidence and duration of catheter associated urinary tract infection and the incidence of antibiotic resistance. This study provides the preliminary data for a prospective randomized controlled trial in patients with neurogenic bladder.
1120 - 1130  Adverse Events profile in EN BLOC RESECTION for Primary and Metastatic Bone Tumors of Spine – Dr. S. Srinivas - Fellow

**Introduction:** En bloc resection is uncommonly performed in the spine and this study aims to determine adverse event (AE) profile in those undergoing en bloc resection for spinal metastases or surgery for primary bone tumor of the spine.

**Materials and Methods:** This is a prospective cohort study in a single quaternary care referral center of consecutive patients (Jan 2009 to July 2017) who underwent en bloc resection for spinal metastases or surgery for primary bone tumor of the spine. AE were collected on a standardized form (Spine AdVerse Events Severity System, version 2 [SAVES V2] forms) at weekly-dedicated morbidity and mortality rounds. Data collected included patient demographics, primary tumor histology, neurological status, surgical intervention details, marginal status, Enneking appropriateness and all AEs (perioperative and post-operative).

**Results:** We treated 112 patients (64 female, 40 male, median age 51 years, 116 procedures) with primary bone tumor (96) and metastatic lesions (16). In the primary tumors, surgical resection was Enneking appropriate (EA) resection in 73% and Enneking inappropriate (EI) in 27% of procedures.

At least 1 AE occurred in 70.6% of patients and nil 30 day mortality. Intraoperative AEs occurred in 27.7% and common surgical complications seen were massive blood loss (23 %) dural tear (19.5%), visceral or neuro vascular injury (20.7%). Post operative AE incidence was 65.5 % and due to systemic infection (39.5 %);cardiac event (35.5%); delirium (23.6%) and thromboembolic events ( 10.5%). Overall implant related complications was low (12%). Post operative AE occurrence increased length of stay. Risk factors for AE included female gender, malignant subtype, staged procedure and EI resection margin. Wound related complications (22.4%) was higher in lesions around occiput or sacrum (64%) than mobile spine (10%).

**Conclusion:** Enbloc resection for metastatic tumours and surgery for primary bone tumors is associated with high incidence of AE. This should be of significant consideration when counselling these patients for surgical intervention and should be confronted to the curative intent of the procedure. A better understanding of this AE profile will benefit the surgeon and oncologist in developing preventative strategies in this patient cohort.


**Objectives:** Predicting neurologic recovery after acute traumatic spinal cord injury (SCI) obviously becomes easier as time passes from the time of injury. For example, a surgeon who deems a patient to be an AIS A complete tetraplegic 6 hours post-injury is undoubtedly less certain about the ultimate neurologic outcome than in a patient assessed as an AIS A tetraplegic 6 days or 6 months post-injury. But what if the neurologic assessment is done at 12 or 18 hours post-injury? Because acute SCI clinical trials often enrol patients within 12-24 hours of injury, the neurologic examination must be conducted very soon after injury. The objective of this study was to determine the relationship between the time of assessment (TOA) within the first 48 hours and the subsequent neurologic recovery.

**Methods:** The Rick Hansen SCI Registry (RHSCIR) was utilized to identify individuals with acute cervical SCI who were admitted and examined within 48 hours of injury. The time of injury and the TOA to assign their baseline AIS grade were recorded. AIS grade conversion and motor score improvement was measured and related to the TOA.

**Results:** In a preliminary analysis of 68 cervical AIS A SCI patients examined within 48 hours of injury, we found that AIS grade conversion occurred in 25 (36.8%). Those with a TOA within 4 hours of injury revealed a 54% conversion rate, while those with a TOA past 12 hours post-injury had only a 25% conversion rate. Improvement in motor score in cervical AIS A patients with a TOA within 8 hours post-injury was also much greater than in those with a TOA past 8 hours (16 vs 7.5 motor points, p=0.039).

**Conclusion:** This is the first study to demonstrate that the TOA within the first 24-48 hours post-injury is an important parameter to consider when interpreting neurologic recovery after acute SCI. This is particularly important for non-randomized clinical trials in acute SCI that enrol patients within this acute timeframe.
1140 - 1150 Do Corticosteroids Used in Regional Blocks Result in Increased Rates of Nerve Injury? – Dr. A. Cheema - R3

Our study aims to determine if the use of corticosteroids in regional blocks result in an elevated rate of nerve injury post-operatively. It has been routine practice to use corticosteroids with the goal of prolonging analgesia and patient comfort. However, when compared to regional blocks which have not had corticosteroid, there has been a recognized trend towards increased rates of paresthesia post-operatively. This is a retrospective review of prospectively collected data. All foot and ankle trauma surgeries performed by a single surgeon during the period of November 2014 to November 2017 operated on under regional block are being investigated. Inclusion criteria are isolated trauma to the foot and ankle operated on under regional block, closed injuries, neurologically intact adult patients above age 18, and minimum six-month follow-up. Exclusion criteria are polytraumatized patients, open injuries, any pre-existing neurological illnesses, and those with nerve injury resulting from their initial trauma. Baseline data consisting of age, sex, body mass index, comorbidities, smoking status, injury sustained, operation performed, side operated on, and date of surgery will be gathered. Further, whether the patient received a corticosteroid within their regional block versus not will be collected. Prospectively collected data sheets recording sensory/motor function and dysesthesias filled out with patients at their follow-up visits will be reviewed as well as the evolution of any deficits which were found. Neurological scores were recorded on a 10-point scale. These will have been obtained at post-operative time points of two and six weeks, and three and six months. Data analysis will be performed to determine whether there is a statistically significant difference in nerve injury rate between the group of patients who received corticosteroid within their regional block versus those who did not and whether that is a clinically relevant finding.

1150 - 1200 The Other Adjacent Joint: Knee Pain in Ankle Arthroplasty and Ankle Arthrodesis. a COFAS study – Dr. M. Symes - Fellow

**Purpose:** Accepted surgical treatment options for end-stage ankle arthritis include total ankle arthroplasty (TAA) and ankle arthrodesis (AA). Although they have comparable clinical outcomes, TAA is growing in popularity and one reason for this is that TAA, compared to AA, better preserves range of motion and function at the ankle, and results in a gait pattern that more closely replicates normal controls. This has the theoretical benefit of protecting adjacent articulations and thereby limiting degenerative changes from occurring in other joints. Although multiple studies have analysed the impact of both TAA and AA on adjacent joint disease in the foot, little data exists on their impact on the knee. This study explored the relationships between knee pain, TAA and AA in patients with end-stage ankle arthritis.

**Methods:** Prospectively collected data was used from the Canadian Orthopaedic Foot and Ankle Society (COFAS) database of ankle arthritis at a single institution by three fellowship-trained foot and ankle surgeons between January 2003 and July 2012. In total, 342 patients were studied, with patient demographics collected pre-operatively, and post-operative follow up performed at the 5 year mark. All patients were examined for the development or resolution of knee pain, as well as patient-reported outcome measures including the Ankle Osteoarthritis Scale (AOS). Using a linear regression model, a multivariate analysis was performed to examine the relationship between knee pain, TAAs and AAs.

**Results:** In the 233 patients that presented without knee pain pre-operatively, 22% who underwent TAA developed knee pain at 5 years, compared to 16% of AA patients (p>0.05). In this group, patients who underwent TAA had statistically significant better outcomes in terms of AOS Pain (p<0.02), AOS Difficulty (p<0.05) and AOS Total Scores (p<0.02).

In the 109 patients who presented with knee pain, knee pain resolved in 47% of TAA patients vs 38% of AA patients at 5 years (p<0.05). There was no statistically significant difference in AOS outcomes (p>0.05) between patients who underwent TAA and AA.

Compared with patients who did not have knee pain pre-operatively, the presence of pre-operative knee pain resulted in worse AOS (p<0.02), with no difference between TAA and AA.

**Conclusion:** In those patients presenting without knee pain, TAA did result in more superior functional outcomes, with no significant difference in development of knee pain compared to AA. In patients with pre-operative knee pain, TAA had benefits of improved resolution of knee pain, with no difference in functional outcomes when compared with AA. Regardless of surgical technique, the presence of pre-operative knee pain was an independent adverse predictor of outcome in patients with tibiotalar arthritis.
Session 2: Research Presentations (6 min. presentation + 4 min. discussion)

1245 - 1255 The Efficacy of Repeated Closed Reduction Attempts of Distal Radius Fractures – Dr. A. Hoffer - R1

Distal radius fractures are among the most common fractures seen in the emergency department. Closed reduction can provide definitive management when acceptable radiographic parameters are met. Repeated attempts of closed reduction are often performed in an attempt to improve the reduction and avoid operative management. However, multiple reduction attempts may worsen dorsal comminution and lead to eventual loss of reduction, resulting in no demonstrable benefit. Previous research has suggested that only 3.9% of patients who underwent two reduction attempts healed in acceptable alignment. We hypothesize that repeated closed reduction attempts of extra-articular, dorsally angulated, displaced distal radius fractures has a low success rate in the prevention of operative fixation and improvement of radiographic parameters compared to one closed reduction attempt.

1255 - 1305 Coronoid Opening Angle: a novel radiographic technique to measure bone loss in coronoid fractures – Dr. M. Nitikman - R1

Background: In the setting of traumatic elbow injuries involving coronoid fractures, the relative size of the coronoid fragment has been shown to relate to the stability of the joint. Currently, the challenge lies in accurately classifying the amount of bone loss in coronoid fractures. In comminuted fractures, bone loss is difficult to measure with plain radiographs or computed tomography. The purpose of this study is to describe a novel radiographic measure, the Coronoid Opening Angle (COA), on lateral elbow radiographs. We will demonstrate the relationship of the COA to coronoid height and describe how this measure can be used to estimate bone loss and potentially predict elbow instability following coronoid fracture.

Methods: Radiographs were drawn from a regional database in a consecutive fashion. Candidate radiographs were excluded on the basis of radiographic evidence of degenerative changes, previous surgery or injury, bony deformity, and inadequate lateral view of the elbow. The COA was measured as the angle between the long axis of the ulna at the level of the trochlear notch, and the tip of coronoid, from a common origin at the posterior cortex of the olecranon. Two reviewers completed the measurements. Normal COA, coronoid height, and calculated COA at varying amounts of bone loss were calculated by two reviewers. Intraclass correlation coefficient (ICC) was calculated for 25 subjects.

Results: 42 subjects were included for analysis (M=22; F=19). The normal coronoid opening angle is 33.19 degrees [32.20 – 34.18]. Coronoid height is 18.82 mm [18.07 – 19.58]. Extrapolating this baseline data, the COA at 20%, 33%, and 50% of coronoid bone loss were calculated to be 27.46, 23.52, and 17.99 degrees, respectively. ICC was found to be 0.70 or higher.

Conclusion: The coronoid opening angle is a novel technique that can be used on a lateral elbow radiograph to predict the minimum coronoid bone loss. This can be used to guide clinical decision making and potentially predict instability. Future research will aim to validate this tool in the clinical setting in predicting instability.
1305 - 1315 Assessing the Effects of Humeral Rotation on the Accuracy and Reliability of Radiographic Measurement of the Head-Shaft Angle Following Operative Fixation of Proximal Humerus Fractures
– Dr. A. Sepehri - R2

One key objective during operative fixation of proximal humerus fractures (PHF) is restoring the head-shaft angle (HSA) as varus and valgus malunion are associated with poor outcomes. As a result, the HSA is commonly utilized in research studies and clinical settings as one factor in assessing post treatment outcomes. Although classically the HSA is determined on the true anterior-posterior (AP) radiograph with the arm in neutral rotation (NR), these can be difficult to obtain, especially intraoperatively or in acute trauma settings. The effect of humeral rotation as well as the natural variation in ante/retroversion is thought to interfere with HSA measurements. Studies have utilized varying internal rotation (IR) and external rotation (ER) to assess HSA with minimal evidence for accuracy and reliability, resulting in heterogeneity between studies.

We propose to conduct a retrospective study aims to determine whether IR and ER of the humerus affects the accuracy, interobserver and intraobserver reliability for surgeons assessing HSA on AP radiographs in patients who received operative fixation for PHF. At a level 1 trauma centre in Vancouver, BC, Canada, it is routine for two of the orthopaedic trauma surgeons to obtain AP shoulder radiographs with the humerus in NR, 30 degree IR, and 30 degree ER following PHF fixation. Using the internal trauma database, all patients over the age of 18 who received operative fixation for PHF since 2002 will be identified. These patients will have their images assessed on the PACS imaging database. All patients with six week follow up AP shoulder radiographs with all three humeral rotation views will be included in the study. The radiographs will be blinded with no indication of patient or humeral rotation. In a randomized order, three orthopaedic trauma surgeons will measure the HSA at two separate occasions three months apart.

Statistical analysis will be performed using ANOVA assessing for significant difference between HSA measurements at varying humeral rotation. Intraobserver and interobserver reliability will be evaluated using the intraclass correlation coefficient. The results from this study will guide future studies in selecting the optimal radiograph view for assessing HSA, allowing for consistency between studies and decreased burden on enrolled patients.

1315 - 1325 Patient-Related Outcomes of Surgical Treatment of Ulno-Carpal Impaction – Dr. T. Mwaturura - Fellow

Purpose: To determine if there was a clinically significant change in patient-rated outcome scores after surgical management of ulno-carpal impaction.

Methods: We collected data, prospectively, on individuals presenting with ulnar-sided wrist pain. This included findings on standardised wrist examination, radiographs and the effect of an injection of local anaesthetic and steroid. Arthroscopy findings and post-operative radiographic data was also collected. Patient-rated scores [Patient-rated wrist evaluation (PRWE), Quick-DASH (Disabilities of the Arm, Shoulder and Hand), SF-12 (12-Item Short Form Survey) and Centre for Epidemiologic Studies Depression Scale (CES-D)] were collected on presentation, two-three and twelve months after surgery. We investigated the outcomes relating to individuals that had surgery for ulno-carpal impaction (ulna shortening osteotomy or wafer resection) and compared them to published values, where available, of minimum clinically important differences.

Results: Data from 30 patients was analysed. The average pre-operative scores were 60, 51, 58, 47 and 13 for the PRWE, Quick-DASH, SF-12 physical, SF-12 mental component and CES-D, respectively. The mean two-three months post-operatively the scores were 47, 44, 57, 50 and 12, respectively. Twelve months after surgery the mean scores were 37, 35, 59, 49 and 9 representing changes of -23, -16, 0, 1 and -3 respectively, in comparison to enrolment scores. Published MCID data was available for the PRWE, 17, and the improvement in the PRWE 12 months after surgery surpassed this.

Conclusions: Ulna shortening osteotomy and wafer resections performed in individuals with ulno-carpal impaction result in improved patient-rated outcome scores.
1325 - 1335  Ulnar Foveal Sign is Not a Specific Test for Foveal Detachment of the Triangular Fibrocartilage – Dr. G. Jarvie - Fellow

**Background:** The ulnar foveal sign as described by Berger et al. (2007) was stated to be specific and sensitive (96% and 86%, respectively) test for foveal detachment of the triangular fibrocartilage complex (TFCC). However, it is our clinical experience and hypothesis that the foveal sign is a sensitive but not specific test for foveal detachment of the TFCC. Additionally, we sought to investigate the diagnostic accuracy of the ulnocarpal impaction maneuver and distal radial ulnar joint (DRUJ) instability for detection of a foveal detachment of the TFCC and ulnocarpal impaction. We also describe a new test the ulnocarpal impaction plus test, with the hypothesis that it has improved specificity versus the ulnar foveal test for ulnocarpal impaction.

**Methods:** This study looks at prospectively collected data from an ulnar sided wrist pain database collected at St Paul's Hospital. We looked at 53 consecutively enrolled patients who had wrist arthroscopy between 2014 to 2017. The ulnar foveal test was completed as described by Berger (2007). Ulnocarpal impaction maneuver was performed as described by Nakamura (1997). The ulnocarpal impaction plus test is performed by doing the ulnocarpal impaction maneuver with the addition of foveal pressure as in the ulnar foveal sign, a positive test being tenderness with reproduction of patient’s pain. Distal radioulnar joint stability was tested at neutral, in supination and pronation of the forearm. Foveal detachment of the TFCC was defined as Palmer 1b classification. Ulnocarpal impaction was defined as Palmer type two tears or findings of ulnocarpal impaction at the time of wrist arthroscopy.

**Results:** The average age of patients enrolled was 43, with 77% being male. There was a total of four foveal detachments and 47 patients with a positive foveal test. The sensitivity and specificity for a foveal detachment with use of the foveal test was 100% and 12%, respectively. The sensitivity and specificity for ulnocarpal impaction with use of the foveal test was 92% and 21%, respectively.

The sensitivity and specificity for foveal detachment with use of the ulnocarpal impaction maneuver was 100% and 14%, respectively. Whereas the sensitivity and specificity for ulnocarpal impaction with use of the ulnocarpal impaction maneuver was 93% and 36%, respectively.

The sensitivity and specificity for foveal detachment with the ulnocarpal impaction plus maneuver was 100% and 15%, respectively. Whereas the sensitivity and specificity for ulnocarpal impaction with the ulnocarpal impaction plus test was 93% and 44%, respectively.

The use of DRUJ instability for detection of foveal detachment of the TFCC had a sensitivity of 25% and specificity of 94%.

**Conclusion:** Our results confirm our hypothesis that the ulnar foveal test is sensitive but not specific for detection of foveal detachment of the TFCC. The ulnocarpal impaction plus test shows increased specificity for ulnocarpal impaction compared to the ulnocarpal impaction maneuver. The diagnostic accuracy of the tests investigated highlight the difficulty with evaluation of ulnar sided wrist pain as one test alone is not particularly specific, however the diagnosis is based rather on the history, findings of multiple exam maneuvers and imaging obtained.

1335 - 1345  Does “Practice Make Perfect?” The Volume-Outcome Relationship in Orthopedic Surgery – Dr. D. Banaszek - Fellow

**Introduction:** The relationship between hospital and surgeon volume and influence on patient outcomes has been well established in previous literature with regards to multiple medical therapies, and surgical procedures. In the field of orthopaedic surgery, however, this association is a relatively new concept, with an overwhelming focus on total joint arthroplasty procedures. The purpose of this study is to systematically review the volume-outcome relationship in orthopaedic surgery across subspecialties. Specifically, we seek to contrast this relationship in the elective versus emergency orthopaedic setting.

**Methods:** A systematic review of the literature was conducted for the volume-outcome relationship in orthopaedic surgery according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines. MEDLINE, EMBASE, and PubMed databases were searched for articles examining hospital- and procedure-volume relationships in all orthopaedic subspecialties over the last 25 years. Included articles were selected based on distinct criteria, including 1) defined parameters for “low” and “high” volume surgeons or hospitals, 2) defined outcome measures, 3) explicit patient volume. Articles examining other specialties in conjunction with orthopaedics were excluded. Each article was independently reviewed by three investigators, evaluating the volume-outcome relationship as positive, negative, or neutral.
Results: A total of 114 articles were examined in this study. Articles in various subspecialties included the following: 58 in lower extremity reconstruction/arthroplasty, 19 in orthopaedic trauma (16/19 in hip fracture surgery), 13 in spine surgery, 9 in upper extremity reconstruction, 7 in soft tissue/sports, 2 in foot and ankle, 2 in hand surgery, 2 in orthopaedic oncology, 1 in paediatric orthopaedics, and 1 across multiple subspecialties. The most common outcome measures included surgical complications 65/114 (57%), mortality 43/114 (37.7%), post-operative length of stay 36/114 (31.6%), readmission 27/114 (23.7%), revision rates 29/114 (25.4%), implant dislocation rate 7/114 (6.1%), and cost 11/114 (9.6%). 18 (15.8%) studies examined surgeon volume, 51 (44.7%) examined hospital volume, and 45 (39.5%) examined both. Overall, a positive relationship was noted in 90/114 studies (78%). Only 11/19 (57.9%) of articles in trauma noted a positive relationship, as compared to 81/95 (85.3%) in other specialities.

Conclusion: Despite being established across multiple elective specialties in orthopaedic surgery, the volume-outcome relationship is more controversial in the acute surgical setting. Further prospective research is needed to decipher the clinical importance of this result.

Level of Evidence: Level II – Prognostic Study

1345 - 1355 Sexual and Urinary Function after Pelvic Fracture
Dr. D. Spence – Fellow

1355 - 1405 Retrospective Review of Second-Generation Trabecular Metal Glenoid Total Shoulder Arthroplasties – Dr. Jane Yeoh - Fellow

Background: Glenoid component loosening and failure is a common mode of failure after conventional total shoulder arthroplasty (TSA). Historically, metal-backed glenoid components had a higher failure rate than cemented all-polyethylene glenoid components. Porous tantalum metal (Trabecular Metal™, Zimmer) (TM) implants have grown in popularity and success in hip arthroplasty, knee arthroplasty, and reverse shoulder arthroplasty. However, evidence for TM technology in total shoulder arthroplasty remains sparse. Two recent publications have reported metal debris in second-generation TM glenoid TSAs.

Goal: Our primary goal is to assess for metal debris and radiographic loosening of the second-generation TM glenoid TSAs. We also assess other radiographic and clinical outcomes after second-generation TM glenoid TSAs. We hypothesize that there will be findings of metal debris in this series.

Methods: We retrospectively assess second-generation TM glenoid TSAs performed by two senior surgeons with at least 2 year follow-up. Standard three radiographic views of the shoulder were assessed for radiolucency, osteolysis, metal debris, loosening and subsidence and other methods of radiographic failure. We collect postoperative clinical outcomes, including American Shoulder Elbow Score, Western Ontario Osteoarthritis of the Shoulder Index, Constant Score and Visual Analog Scale.

Results: We present preliminary results of clinical and radiographic data for second-generation TM glenoid TSAs.
**1405 - 1415 Prophylactic Antibiotics in Shoulder Arthroscopy**  
- Dr. N. Baraza - Fellow

**Purpose:** Shoulder arthroscopy is a well-established technique in dealing with a variety of shoulder conditions. The most common pathologies treated are instability, rotator cuff tears, sub acromial impingement, acromio-clavicular joint arthrosis and removal of loose bodies within the joint. As with many areas of orthopaedics, intravenous antibiotics are usually administered prophylactically prior to insertion of foreign material to reduce the potentially catastrophic sequelae of infection. Though there is no doubt that antibiotics has been one of the most important factors in reduction of infection following surgery over the past century, their continued use given advancements in surgical techniques should be looked at in detail. They are not as benign as previously thought, with increasing cases of colitis and other gastro-intestinal upsets, phlebitis, allergies, hypersensitivity, and perhaps more worryingly the promotion of antibiotic resistant strains of bacteria putting vulnerable patient groups at risk, not to mention the cost. Shoulder arthroscopy benefits from small incisions, constant lavage with isotonic saline, minimal hardware and, usually, relatively short operating times, all of which reduce the chances of infection. The purpose of this study was to compare the infection rates in patients who received antibiotics with a matched group of patients who did not receive antibiotics prophylactically.

**Method:** We prospectively collected data for a case control study. For the sample size calculation, at a significance level of 0.05 (5%) and a power of 0.85 (85%), 80 patients would be required in each group to detect a statistical difference. At our unit some of the patients receive prophylactic antibiotics while others do not. We obtained from the database the shoulder arthroscopic operations initially listed for rotator cuff repair performed between September 2008 and October 2015 by the University of British Columbia sports surgery group and conducted a detailed follow up of their outcomes using our electronic patient management system. The patients who did not receive antibiotics prophylactically were designated "cases" while the patients who received antibiotics were labelled "controls". The primary outcome was infection, either superficial or deep.

**Results:** There were 251 patients in the control group and 172 patients in the case group. In the control group the average age was 57 with 67% of the patients male. 84.5% of the patients had a rotator cuff repair. Minimum follow up was 24 months with a mean follow up of 76 months. In the case group, the average age was 56 with 69.7% of patients male. Minimum follow up was 24 months and mean follow up was 74 months. 72% of the patients had an arthroscopic rotator cuff repair. There were no infections in either of the groups. The data was analysed using a chi squared test at significance of 0.05 and the p value was 1 meaning we accepted the null hypothesis that there was no statistical difference between the two groups.

**Conclusion:** In this study, the withholding of prophylactic antibiotics for arthroscopic rotator cuff repair did not increase the infection rate in our unit and their continued routine use should be reconsidered in light of this novel evidence.

**1415 - 1430 REFRESHMENT BREAK**

Session 3:  
**Research Presentations** (6 min. presentation + 4 min. discussion)

**1430 - 1440 Institutional Costs Associated with Ankle Fusion Non-Union**  
- Dr. O. Gagne - R3

**Introduction/Purpose:** Ankle arthrodesis is the most favored surgical treatment for several tibiotalar pathologies. Nonunion requiring revision occurs in 5.7% - 6.5% of patients. Nonunion is a challenging surgical complication and bone graft substitutes are costly. This study aimed to summarize all institutional expenditures related to ankle fusion nonunion needing revision, presuming that cost and skin-to-skin time would exceed that of the index surgery. and skin-to-skin time would exceed that of the index surgery.

**Methods:** Reviewing electronic charts from a foot and ankle center, a patient list with two or more entries for tibiocalcaneal, pantalar and tibiotalar fusions was generated. Out of 44 cases found, 21 patients had bilateral surgery and were excluded. Three had TAR or surgery in the periphery as index surgery; four had revision not for nonunion. Demographic factors and skin-to-skin time of the 16 remaining patients were compiled. Supplemental clinic visits and investigations were included either after CT to assess union, or 365 days post-index procedure in the absence of CT. Total cost of the revision was calculated from surgical billing codes, length of operation, and period of hospitalization. Post-revision outpatient fees were all included. This cohort included 16 patients (6F : 10M) with an average age of 60 years (52 - 67) and BMI of 33 (29 - 38). 14 revisions were performed open; 13 patients received bone graft.

**cont’ pg 18**
1430 - 1440  Cont’

Results: Average hospitalization post-operatively was 5.5 days (1.87 - 9.28). The additional cost associated with nonunion were $1,538 (CAD) for imaging, $737 for pre-revision visits, $12,483 for the revision and hospital stay, and $1,990 for post-revision followup. The total average amount was $14,982, equivalent to 10 nights of acute inpatient stay. Index average skin to skin time was 2:00:50 and for revisions 2:18:20, for a p-value of 0.26. The cost of nonunion per 100 primary procedures is therefore $85,397 to $97,383. If an intervention reduces the incidence of nonunion by 50% the cost saved would be $486 per procedure. As grafting or bone graft substitutes cost over $1,000, grafting should be limited to at risk patients.

Conclusion: Additional care related to ankle fusion nonunion represents a financial burden equivalent to 10 nights of acute inpatient stay. Revision surgery is not significantly longer intraoperatively than index surgery. Bone graft and/or substitute should only be considered if it's cost is less than $486 CAD.

1440 - 1450 A Comparison of Outcomes of Ankle Arthritis Surgery Between MSP-funded, WCB-funded and Self-funded Surgery in Vancouver – Dr. J. Fairley - R3

Background: A significant portion of total ankle arthroplasty and ankle arthrodesis procedures performed in British Columbia are funded by the public medical services plan (MSP). Some patients, however, are treated either privately through self-pay or by the workers compensation board (WCB), with the latter two groups being more likely to receive treatment sooner. The potential effect of payer on patient-reported outcomes has not been previously explored.

Method: In total, N=443 patients (393 MSP, 26 self-pay, 24 WCB) treated with either total ankle replacement or ankle arthrodesis by three subspecialty-trained orthopaedic surgeons in Vancouver, British Columbia between 1999 and 2013 were analyzed. Clinical outcomes were compared preoperatively and at long-term follow-up (6.3 years, range 2-14 years). Expectation and satisfaction with symptoms was assessed using the Musculoskeletal Outcomes Data Evaluation and Management Scale, function was assessed using the Ankle Osteoarthritis Scale in terms of pain and difficulty, swelling was assessed using a swelling scale, and physical and emotional quality of life was assessed using the Short Form-36 (SF-36) Health Survey in terms of both the mental component summary (MCS) and physical component summary (PCS).

Results: WCB patients had worse SF-36 MCS scores preoperatively (43, 95% CI 38-48) compared to MSP and self-pay patients (51, CI 50-52; 51, CI 46-56, respectively) (p<0.05). The scores were also worse at follow-up (MCS 45 vs 51 and 54) (p<0.05). WCB patients had worse AOS difficulty scores preoperatively (73, CI 65-80) versus MSP (65, CI 63-67) and self-pay patients (56, 49-63) (p<0.05).

Trends were seen preoperatively, in that self-pay patients had the higher expectations (88, CI 81-95) but had better AOS (53, CI 46-60) and SF-36 scores (MCS 51, CI 46-56; PCS: 34, CI 30-37) and less swelling (3.0, CI 2.6-3.4). Conversely, WCB patients had the lowest preoperative expectations (76, CI 69-84) with the worst AOS (64, CI 57-71) and SF-36 scores (MCS 43, CI 38-49; PCS 28, CI, 25-32), and the most swelling (3.5, CI 3.1-4.0).

Post-operatively, MSP patients had better AOS scores (31, CI 29-33), with less swelling (2.1, CI 2.0-2.2) than the WCB patients (AOS 36, CI 27-45; swelling: 2.5, CI 2.0-2.9). WCB and self-pay patients had similar follow-up scores (self-pay: AOS 35, CI 26-43; swelling 2.2, CI 1.8-2.6).

MSP patients were more satisfied to live with their symptoms both pre- and postoperatively (1.3, CI 1.2-1.4; 3.2, CI 3.1-3.3), compared to WCB (1.1, CI 0.8-1.4; 2.8, CI 2.3-3.4) and self-pay patients (1.19, CI 0.91-1.47; 2.9, CI 2.3-3.4).

Conclusions: There are differences in SF-36 MCS scores in WCB patients compared to MSP and self-pay patients, with WCB patients having worse scores both pre- and post-operatively. WCB patients also reported more difficulty with symptoms prior to surgery.
Regional Variation in Outcomes of Ankle Arthrodesis
– Dr. A. Albaghdadi - R2

Ankle arthrodesis remains an effective intervention in the management of end-stage ankle arthritis, however reported outcomes have been inconsistent. Several factors can affect surgical outcomes, including unwarranted variation in practice patterns. The objective of this study was to assess whether regional variation in outcomes of ankle arthrodesis exist across Canada, and to identify sources of variability that cannot be explained by patient level factors. We performed a cross-sectional retrospective review of the COFAS dataset from the year 2002-2010. We included all patients who underwent ankle arthrodesis and had a minimum 2-year follow up. Our primary outcome measure was improvement in AOS pain and disability scores at follow up. We included a total of 205 patients, and compared the mean scores measured in BC, ON, and NS. Large variation in AOS pain and disability scores was identified comparing the 3 provinces (33.32, 15.32, 24.32, p<0.01). After controlling for patient-level factors and severity of arthritis, the rates of arthroscopic fusion compared to open fusion was associated with the greatest improvement in scores (p <0.01) and may explain this variation across provinces. Standardization of surgical approaches may help reduce variation and disparities in outcomes of ankle arthrodesis.

Variability in the Reporting Terminology of Adverse Events in Ankle Fracture Fixation – Dr. S. St. George - R1

Background: Classification systems for the reporting of surgical complications have been developed and adapted for many surgical subspecialties. The purpose of this systematic review was to examine the variability and frequency of reporting terms used to describe complications in ankle fracture fixation. We hypothesized that the terminology used would be decidedly varying and inconsistent, corroborating previous results suggesting a need for standardized reporting terminology in orthopaedics.

Methods: Studies meeting the predetermined inclusion and exclusion criteria were selected for analysis by 2 independent observers. Terms used to define adverse events were identified and recorded. Results of both observers were compared. All terms were then compiled and assessed for variability and frequency of use throughout the studies involved. Reporting terminology was subsequently grouped into 10 categories, and the reported incidence of each adverse event was computed.

Results: In the 48 studies analyzed, 301 unique terms were utilized to describe adverse events. Of these terms, 74.4% (224/301) were found exclusively in one study. Only 1 term, “infection”, was present in 50% of studies, and only 19 of 301 terms (6.3%) were used in at least 10% of papers. The category that was most frequently reported was infection, with 89.6% of studies reporting on this type of adverse event using 25 distinct terms. Other categories were “wound healing complications” (72.9% of papers, 38 terms), “bone/joint complications” (66.7% of papers, 35 terms), “hardware/implant complications” (56.3% of papers, 47 terms), “revision” (56.3% of papers, 35 terms), “cartilage/soft tissue injuries” (45.8% of papers, 31 terms), “reduction/alignment issues” (45.8% of papers, 29 terms), “medical complications” (43.8% of papers, 32 terms), “pain” (29.2% of papers, 16 terms) and “other complications” (20.8% of papers, 13 terms). There was a 78.6% interobserver agreement in the identification of adverse terms across the 48 studies included.

Conclusion: The reporting terminology utilized to describe adverse events in ankle fracture fixation was found to be highly variable and inconsistent. This variability prevents accurate reporting of adverse events and makes the analysis of potential outcomes difficult. The development of standardized reporting terminology in orthopaedics would be instrumental in addressing these challenges to accurate outcomes reporting.

Level of evidence: Level-III, systematic review of Level III studies and above.
1510 - 1520  Platelet-derived growth factor vs Autograft in ankle Fusions: a COFAS study – Dr. H. Al-Rumaih - Fellow

Introduction: Ankle fusion and common procedures addressing ankle and hindfoot arthritis. Autograft has been used to reduce the rate of non-union at the fusion site. Recombinant human platelet-derived growth factor-BB with beta-tricalcium phosphate (rhPDGF-BB/β-TCP) is an alternative used to promote osseous fusion across the joint. The aim of the study is to know the success rate of (rhPDGF-BB/β-TCP) fusions and are they comparable to the results with autograft and report the relative risk of developing a non-union when it is used as compared to autograft. A secondary aim is to compare the complication rate, cost and functional outcome of the two grafts.

Methods: We utilized the Canadian Orthopaedic Foot and Ankle Society (COFAS) database to identify 178 patients who underwent ankle fusions. Patients who had documented connective tissue disease or were receiving immunosuppressive medication were excluded. They were divided into two cohorts of patients. The group that have ankle or subtalar fusion using Autograft and the second group that had rhPDGF-BB/β-TCP. A retrospective cohort study design is used to report the relative risk of having a non-union between the two cohorts. The chi- squared test is used to compare complication rates between the two groups. A student t-test is used to compare differences in the COFAS Ankle Arthritis Score and the cost.

Results: We are still gathering data till this stage. The advanced statistics well follow.

1520 - 1530  A Proposed Radiographic Predictive Score for Failure in Total Ankle Arthroplasty: a COFAS study – Dr. M. Escudero - Fellow

Purpose: Total ankle arthroplasty (TAA) and ankle arthrodesis (AA) are standard treatment modalities for end-stage ankle osteoarthritis. The total ankle arthroplasty (TAA) anatomical alignment is critical for the longevity of total ankle components. Coronal and sagittal malalignment results in altered joint mechanics and reactive forces that result in implant failure. Also, to our knowledge, tibial component sizing in the sagittal plane has been addressed in knee arthroplasty literature, but not in ankle arthroplasty literature. Based on these parameters, we developed a novel radiographic predictive score for failure in TAA (RPSFT).

Methods: A retrospective review was performed on the COFAS database, selecting for all total ankle replacements done at a single institution between September 2004 and June 2015. Those with complete series of anteroposterior and lateral standing ankle radiographs, both preoperative and postoperative and a minimum of 1 year of follow-up, were included. We performed a multivariate logistic regression, using the medial distal tibial component angle, lateral talar station, talar tilt angle, and the absence of posterior under- or overhang of the tibial component in the first post-operative radiographs. These parameters were used to develop a RPSFT. Binomial regression was used to determine each variable’s weight in the RPSFT and assigned a corresponding score value. A univariate logistic regression was estimated, using the RPSFT as the independent variable and mechanical failure as the dependent variable. Then a Receiver-Operating Characteristic curve was constructed and the probability of failure for each possible score was estimated.

Results: Of a total of 296 TAAAs, 146 were included, and 8 TAAAs required revision (5%). TAA revision was defined as a reoperation to remove one or both metal components, or amputation. According to our predictive score, if all the parameters are within established normal ranges (17 points) the TAA failure probability (TPF) is 2% [0.0.1] p<0.01. If none of them are obtained (0 points) the TFP rise to 42% p<0.01 (see attached table). Time to TAA failure averaged 4.4 years and ranged from 1.4 to 9.6 years.

Conclusion: Our model suggests that a coronal and sagittal alignment and absence of tibial implant under/overhang are of vital importance to prevent TAA failure. To our knowledge, this is the first study that presents a predictive score for failure in TAA using postoperative ALSAR. Further data analyses are ongoing and may expand our predictive model to include other radiographic parameters.
Postoperative Coronal Alignment Predicts Total Ankle Replacement Failure: a COFAS study – Dr. Brian Le - Fellow

**Introduction:** Total ankle replacements (TAR) are an increasingly common treatment for end-stage ankle arthritis but evidence on optimal alignment is not as well-established as in the hip and knee arthroplasty literature. Many believe that restoration of coronal and sagittal alignment is critical, while others suggest malalignment within a certain range has no impact on failure (Braito et al. 2015). There is controversy on the ideal TAR component positioning to minimize failure and requiring revision surgery. In this study we examine 9 radiographic measures of TARs, 6 of which have previously been described for TARs, 1 commonly used on preoperative ankles, and 2 novel measures on a database of 146 TARs to identify predictors of TAR re-operation.

**Methods:** A retrospective review was performed on the Canadian Orthopaedic Foot and Ankle Society (COFAS) database of ankle arthritides, selecting for all total ankle replacements done at a single institution by one of three fellowship-trained foot and ankle surgeons between September 2004 and June 2015. Those with complete series of anteroposterior and lateral standing ankle radiographs both preoperative and postoperative, and minimum of 1 year of follow-up were included. Measurements were performed on the postoperative radiographs and included: coronal and sagittal distal tibial component angles, talar center migration, talar tilt angle, lateral talar station, tibial axis-talus ratio, talar component gamma angle, anterior and posterior tibial component overhang and underhang. Standard descriptive statistical methods were used to analyze the data.

**Results:** Of a total of 296 TARs, 146 were included and 14 TARs failed (9.6%), defined as requiring re-operation, 8 of which were metal-component revisions (5%). The TARs were stratified into those with measurements within previously published normal values and those that fall outside that range. Time to failure ranged from 1.4 to 9.6 years. Our preliminary data analysis showed that TARs with coronal distal tibial component angles between 87-93 degrees demonstrated an odds ratio of 0.11 for re-operation compared with those beyond that range, p=0.003. TARs with talar tilt angles of 0 degrees demonstrated an odds ratio of 0.24 for re-operation compared with those whose talar tilt was not zero.

**Conclusion:** Post-operative coronal alignment of TARs, namely distal tibial component angle and talar tilt, appear to be associated with TAR-reoperation. Specifically, if the measurements are within previously described normal limits, the odds ratio for re-operation is low and statistically significant. Further data analysis is underway and may demonstrate more parameters of significance in predicting TAR failure.

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A Randomized Prospective Study Comparing Ligament Reconstruction and Tendon Interposition (LRTI) with the Ascension® PyroDisk for Trapeziometacarpal Osteoarthritis – Dr. E. Villemare-Côté - Fellow

**Introduction and objectives:** Trapeziometacarpal arthritis is a common condition, causing symptoms in up to ten percent of women and one percent of men¹. LRTI is the most commonly used surgical technique for this condition however, long-term studies have shown persistent weakness of pinch strength² after surgery. The Ascension® PyroDisk is a pyrocarbon disk shaped implant designed to articulate against the trapezium and metacarpal, preserving the height of the articulation. The objective of this study was to determine whether treatment with a pyrocarbon implant resulted in comparable pain relief and range of motion, whilst providing superior gains in pinch strength when compared to LRTI.

**Materials and methodology:** This is a prospective randomized control trial comparing pyrocarbon implant to LRTI. Surgeries were accomplished by a single surgeon in a standardized fashion. Patients were evaluated at 6 weeks, 3, 6 and 12 months following surgery. Data on pain (VAS), function (Patient Rated Wrist Evaluation), mobility and strength (grip, key and lateral pinch) were obtained as well as radiographic assessment of the height of the arthroplasty space.

**Results:** A total of eighty-one patients had surgery between July 2008 and November 2016. Forty patients were allocated to the PyroDisk group and forty-one to the LRTI group. Seventy-five patients (92.6%) completed the one year follow-up. Mean age was slightly older in the PyroDisk group (64 vs 60.9 y.o., p=0.03). Surgical and tourniquet times were longer in the PyroDisk group. There was no difference between the groups in strength, pain or functional outcome at one year. However, VAS was significantly higher in the PyroDisk group at 3 and 6 months (4.56 vs 2.4, p=0.0002; 2.67 vs 1.69, p=0.02).

**Conclusion:** Treatment of trapeziometacarpal arthritis with PyroDisk does not provide superior strength gains when compared to LRTI. However, it seems to result in more pain in the first few months following surgery. This difference in pain is not seen at 1 year after surgery. This may suggest that there is a period of adaptation to the Pyrodisk after its insertion. cont’ pg 22
1540 - 1550  Cont’

References:  

1550 - 1600  Cemented and Uncemented Hemiarthroplasty for Hip Fractures: a 5 year experience – Dr. I. Abdullah - Fellow

Introduction: Displaced intracapsular neck of femur fractures in the elderly population are primarily treated with cemented or uncemented hemiarthroplasty. The literature suggests less pain, better outcomes and less implant related complications with a cemented prosthesis while an uncemented prosthesis offers the benefits of shorter operating room time, less blood loss and no risk of bone-cement implantation syndrome. We reviewed the intraoperative fracture rate of cemented and uncemented hemiarthroplasties in the treatment of acute hip fractures at a single, tertiary referral centre.

Methods: Using the Orthopaedic Trauma Database at Royal Columbian Hospital (Vancouver, Canada), we retrospectively reviewed all hip fractures requiring hemiarthroplasty treated at our institution over a 5-year period between April 2012 and May 2017. We reviewed demographic data, operative data, implant choice, rate of intraoperative fracture and whether cemented or uncemented stems were used. Furthermore, all intraoperative fractures were retrospectively reviewed to identify whether revision surgery was ever required.

Results: We treated 498 acute hip fractures with hemiarthroplasty. 32.3% (n=161) were treated with cemented prosthesis while 67.7% (n=337) were treated with an uncemented prosthesis. A total of 27 (5.4%) intraoperative fractures were identified. 1.8% (3/161) were in the cemented cohort, while 7.1% (24/337) were in the uncemented cohort.

At the time of our retrospective review, none of the patients who experienced an intraoperative fracture required a second surgical procedure as a result of implant failure.

Conclusion: Intracapsular hip fractures treated with uncemented hemiarthroplasty had an increased risk of intraoperative fracture (OR: 3.822) when compared to cemented hemiarthroplasty. Intraoperative fractures did not result in the need for a revision or secondary procedure.

1600 - 1610  Hip Cartilage Damage in Adolescents With Healed Legg-Calve-Perthes Disease – C. Jones - MSc. candidate

Introduction: Legg Calvé Perthes Disease (LCPD) is a juvenile hip disorder where blood flow is disrupted to the femoral head, leading to bone necrosis and collapse. LCPD often results in residual deformity of the femoral head and cartilage degeneration, and is associated with a very high risk of early onset hip osteoarthritis (OA)1-2. Assessing management of LCPD in the healed phase requires an understanding of when and where hip cartilage damage happens. Increased $T_{1p}$ (a MRI parameter) is associated with cartilage degeneration3. Our research question is: Is $T_{1p}$ increased in healed LCPD hips (compared to contralateral hips) in adolescents?

Methods: Eight adolescents (10-17 YO (mean 13.9); 1F 7M) with healed unilateral LCPD (Stulberg grades 2-5) were imaged (both hips) in a 3T MRI (GE Discovery MR750) using a CubeQuant $T_{1p}$ sequence from GE Healthcare. Femoral and acetabular weightbearing articular cartilage was segmented manually using Analyze. $T_{1p}$ values were calculated in Matlab for the segmented cartilage regions4. We applied a hierarchical linear model, nested by subject, to determine the effect of Stulberg grade on overall and regional mean $T_{1p}$ values (Stata). LCPS hips were divided into three groups: contralateral (n=8), Stulberg 2 (n=5) and Stulberg ≥3 (n=3) for the statistical analysis.

Results: Overall, medial, central and lateral region $T_{1p}$ values were significantly higher in Stulberg ≥3 hips than contralateral hips (Table 1). We found no difference in mean $T_{1p}$ for any region between Stulberg 2 and contralateral hips (Table 1). cont’ pg 23
1600 - 1610  Cont’

Discussion: Our finding that $T_1^\rho$ values were higher overall in the weightbearing region of the Stulberg ≥3 hips compared to contralateral hips suggests that there is increased cartilage damage in the weightbearing region of Stulberg ≥3 hips in adolescents. The overall $T_1^\rho$ difference between Stulberg ≥3 hips and contralateral hips (7.3 ms) is larger than those reported between hip OA progressors and non-progressors (3 ms)5. Our finding that the medial region had the largest $T_1^\rho$ differences compared to contralateral hips is consistent with dGEMRIC results for adults who had LCPD in childhood4.

Conclusion: In adolescents with healed unilateral higher-grade (≥3) Stulberg LCPD, $T_1^\rho$ is elevated overall in the LCPD hip compared to the contralateral hip. This suggests that cartilage damage in LCPD has begun by adolescence in Stulberg 3/4/5 hips. $T_1^\rho$ measurements may be useful for planning management of LCPD in an effort to limit or delay cartilage degeneration.


<table>
<thead>
<tr>
<th>Region</th>
<th>Stulberg 2 (n=5)</th>
<th>Mean difference (ms (SE))</th>
<th>p</th>
<th>Stulberg 3/4/5 (n=3)</th>
<th>Mean difference (ms (SE))</th>
<th>p</th>
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<tbody>
<tr>
<td>Overall</td>
<td>1.10 (0.99)</td>
<td>0.27</td>
<td></td>
<td>7.30 (1.23)</td>
<td>0.000*</td>
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<tr>
<td>Medial</td>
<td>0.11 (0.82)</td>
<td>0.90</td>
<td></td>
<td>8.49 (1.04)</td>
<td>0.000*</td>
<td></td>
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<tr>
<td>Central</td>
<td>2.77 (1.32)</td>
<td>0.04</td>
<td></td>
<td>6.18 (1.64)</td>
<td>0.000*</td>
<td></td>
</tr>
<tr>
<td>Lateral</td>
<td>-0.13 (1.74)</td>
<td>0.94</td>
<td></td>
<td>5.49 (2.09)</td>
<td>0.007*</td>
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</table>

Table 1: Mean difference in $T_1^\rho$ from contralateral group for overall, medial, central and lateral weightbearing regions of Stulberg 2 and Stulberg 3/4/5 hips. *significance at $\alpha = 0.0125$ (Bonferroni correction factor (n=4) for multiple comparisons).

1610 - 1620 Understanding Musculoskeletal Literacy in an Orthopaedic Trauma Population: a cohort study proposal – Dr. J. Nevin - R4

Health literacy is defined as the ability to obtain, process, and understand basic health information and services needed to make informed health decisions. Poor health literacy has been associated with poorer disease outcomes, higher cost of care and increased mortality. Physicians tend to overestimate their patients’ understanding, which can impede meaningful physician-patient communication about their condition, lower patient satisfaction and decrease compliance. While there are now a handful of studies examining MSK-specific health literacy in an orthopaedic patient population, no study to date has measured how we are currently performing in improving health literacy among our patients during routine visits. This cohort study aims to answer how MSK-specific health literacy measurements change over time for an adult patient presenting to an outpatient orthopaedic trauma appointment. We will include all adult patients without previously documented cognitive impairment presenting to an outpatient trauma clinic. The Literacy in Musculoskeletal Problems (LiMP) and Newest Vital Sign (NVS) will be used to measure MSK-related and overall health literacy over the course of normal care, from first visit to final follow-up. Future goals will be to introduce educational material and evaluate how health literacy over time, which we hypothesize will improve from current standard of care.

1620 - 1630 Differences in Caregiver Perspective on Quality of Life of Children with Cerebral Palsy – Emily Schaeffer - Post-doctoral Fellow

Purpose: The Caregiver Priorities and Child Health Index of Life with Disabilities (CPCHILD) questionnaire is a validated outcome measure used to assess health-related quality of life (HRQOL) in children with severe Cerebral Palsy (CP). Although it has become a widely-used tool to evaluate the effectiveness of surgical interventions, caregiver demographics are not necessarily reported or taken into account when administering the questionnaire longitudinally. The purpose of this study was to investigate the differences in caregiver perspective on HRQOL in children with severe CP as measured by CPCHILD.

Methods: Caregivers of children with CP or CP-like conditions classified at GMFCS level IV and V were enrolled. Two primary caregivers of each patient were asked to complete the Parent Version of the CPCHILD questionnaire.

cont’ pg 24
Caregivers were defined as an individual directly involved in the child’s care, assisting with activities of daily living (ADL) or routinely spending time with the child. This included parents, legal guardians, foster parents, family members or healthcare providers. Patient and caregiver demographics were assessed, CPCHILD scores were tabulated and descriptive analyses were performed.

Results: In total, 31 pairs of caregivers completed the questionnaires. Children of caregivers (18 male, 13 female) were an average age of 9.7 years, 95% CI [8.0, 11.5]. There were 20 CP diagnoses, 9 CP-like diagnoses, and 2 undiagnosed conditions; 14 patients were classified at GMFCS IV and 17 at GMFCS V. Caregivers were an average age of 42.5 years, 95% CI [40.22, 44.82] with an average age difference of 6.4 years, 95% CI [3.99, 8.87] between pairs. CPCHILD was completed by both caregivers on the same day in 22/31 pairs. The average total CPCHILD score was 47.8 points, 95% CI [42.36, 52.58] with an average score difference of 7.35 points, 95% CI [4.8, 9.9] between caregiver pairs. Caregiver pairs included biological parent, foster parent, and parent/professional caregiver relationships.

Conclusion: CPCHILD scores differed by 7.35 points between caregivers. While previous studies have shown a clinically significant change in CPCHILD score to be ten points, questionnaire validation revealed an equivalence margin of four points. Consequently, larger numbers will be required to determine whether CPCHILD scores for a single patient from multiple caregivers can be considered equivalent.

Significance: These findings suggest that there may be meaningful differences in caregiver perspective on the quality of life of their child with CP. Consequently, tracking which caregiver completes the CPCHILD is important to accurately assess the impact of an intervention on the child’s HRQL.
0700 - 0800  BREAKFAST AND REGISTRATION

Session 4:  Improving Patient Care and Outcomes: “Short-stay Total Hip/Knee Arthroplasty”

0800 - 0805  Chair/Opening remarks – Dr. B. Masri

0805 - 0820  Establishing a Successful “Same-Day Discharge” Total Joint Arthroplasty Program – Dr. P. Beaulé

0820 - 0835  Short-Stay Hip and Knee Arthroplasty—a practical approach with emphasis on safety/quality – Dr. B. Masri

0835 - 0850  The Anterior Approach: an essential technique for same-day discharge THA? – Dr. P. Beaulé

0850 - 0905  Minimal-Incision Posterolateral Approach: still the “gold standard” for short-stay THA? – Dr. N. Greidanus

0905 - 0920  Outcomes and Complications of MIS THA Approaches: an evidence-based evaluation – Dr. N. Greidanus

0920 - 0945  Panel Discussion

0945 - 1015  REFRESHMENT BREAK
Session 5: Improving Patient Care and Outcomes: “The Relevance of Patient Reported Outcomes and Adverse Event Reporting to Clinical Practice”
Chair – Dr. N. Greidanus

1015 - 1035 Morton Lecture: Dr. Judy Baumhauer
Title: Patient Reported Outcomes: How They are Changing the Care We Provide to Our Patients

1035 - 1050 Incorporating Patient Reported Outcome Measurement in Routine Clinical Practice – Dr. A. Younger

1050 - 1105 Patient-Reported Outcomes Relevant to Care of the Pediatric Orthopaedic Patient – Dr. H. Chhina

1105 - 1120 Improving Outcomes of Hip Arthroscopy in the Young Adult Population: lessons learned – Dr. Parth Lodia

1120 - 1140 Adverse Event Reporting and Developing a Framework for Continuous Quality Improvement (CQI) – Dr. P. Beaulé

1140 - 1150 Discussion

1150 - 1210 ALVAL after Metal on Polyethylene Hip Replacement: Update 2018 – Dr. C. Duncan

1210 - 1215 Discussion

1215 - 1300 LUNCH FOR ALL ATTENDEES
### Session 6: Improving Patient Care and Outcomes: “Joint Preservation and Optimization”

Chair – Dr. M. Gilbart

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>1300 - 1320</td>
<td>Patterson Lecture: <strong>Dr. P. Beaulé</strong>&lt;br&gt;<strong>Title:</strong> <em>Unraveling the Pistol Grip/Cam Deformity of the Hip: Origins to Joint Degeneration</em></td>
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<tr>
<td>1320 - 1330</td>
<td>Mild Dysplasia and Hip Joint Preservation – Dr. K. Mulpuri</td>
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<tr>
<td>1330 - 1340</td>
<td>Hip Arthroscopy for Joint Preservation/Optimization – Dr. M. Gilbart</td>
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<tr>
<td>1340 - 1350</td>
<td>Joint preservation Surgery of the Knee: current status for 2018 – Dr. Mark McConkey.</td>
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<td>1350 - 1400</td>
<td>Injection Therapy for Optimization of Joint Preservation -Myth or Magic – Dr. R. McCormack</td>
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<tr>
<td>1400 - 1410</td>
<td>Discussion</td>
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<tr>
<td>1410 - 1420</td>
<td>The Science Behind New Technologies for Forefoot Deformities – Dr. J. Baumhauer</td>
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<td>1430 - 1440</td>
<td>Avoiding Complications in Shoulder Arthroplasty implant/technique considerations – Dr. P. Chin</td>
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<td>1440 - 1450</td>
<td>Salvage options for the arthritic wrist - surgical options for 2018 – Dr. T. Goetz</td>
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<td>1450 - 1500</td>
<td>The Role of the Intra-Pelvic Approach in Acetabulum Fracture Fixation in Young and Older Patients – Dr. P. Guy</td>
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<tr>
<td>1500 - 1515</td>
<td>Discussion</td>
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<td>1515 - 1545</td>
<td>REFRESHMENT BREAK</td>
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<tr>
<td>1545 - 1700</td>
<td>Breakout Session #1: Complex Cases of Hip/Knee: preservation, optimization, reconstruction Case discussion – Chair: Dr. N. Greidanus Faculty: Dr. P. Beaulé, Dr. C. Duncan, Dr. J. Potter, Dr. K. Mulpuri, Dr. R. McCormack, Dr. P. Chin, Dr. M. McConkey</td>
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<tr>
<td>1545 - 1700</td>
<td>Breakout Session #2: Complex Cases of Foot/Ankle Reconstruction and Trauma-solutions/controversies Case discussion – Chair: Dr. A. Younger Faculty: Dr. J. Baumhauer, Dr. M. Penner, Dr. A. Veljkovic, Dr. D. Malish, Dr. K. Apostle</td>
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<td>1700</td>
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0700 - 0800  BREAKFAST & REGISTRATION

Session 8:  Improving Patient Care and Outcomes:  “Optimizing Patient Satisfaction and Minimizing Complaints/Risk/Malpractice”

0800 - 0805  Opening Remarks/Chair – Dr. B. Masri

0805 - 0835  For Orthopaedic Surgeons, Minimizing Patient Complaints is All About Communication: the CPSBC perspective – Dr. J.G. Wilson

0835 - 0900  Avoiding the Unhappy Patient-- Perspectives on Risk Minimization and Risk Management: the hospital administrative perspective – Steven Tam

0900 - 0915  Panel Discussion

0915 - 0930  Royal College Lecturer: Dr. Mike Moran
Title: What are your Patients Hearing? The Noise Out There

0930 - 1000  REFRESHMENT BREAK

Session 9:  Improving Patient Care and Outcomes:  “Improving Outcome and Minimizing Complications/Adverse Events”
Chair – Dr. M. Moran

1000 - 1020  Prevention of Surgical Site Infection: what’s new for 2018? – Dr. B. Masri
1020 - 1040 Perioperative Optimization/Management of the Medically-Complex Orthopaedic Patient – Dr. E. Sloan

1040 - 1100 Strategies for Preventing Chronic Post-surgical Pain and Prolonged Opioid Use after Orthopaedic Surgery – Dr. A. Sutherland

1100 - 1110 Is it the Back or the Hip? Differentiating Spine vs Hip Pathologies: strategies for evaluation/treatment – Dr. J. Street

1110 - 1120 Adverse Event Reporting Improves Quality of Care – Dr. J. Street

1120 - 1130 Pediatric Musculoskeletal Infections: what to know and when to worry – Dr. C. Reilly

1130 - 1140 Osteoporotic Hip Fracture Management: prosthetic selection to minimize complications – Dr. H. Broekhuyse

1140 - 1150 Optimizing Outcome in Clavicle Fractures: What’s Gained By Doing Surgery? – Dr. B. Perey

1150 – 1200 Primum Non Nocere: A Paradigm Shift in Virtual Surgeon Education – Dr. D. Goel
1200 - 1220  McGraw Lecture: **Dr. Andrea Veljkovic**
Title: *Management of Ankle Arthritis*

1220 - 1315  **LUNCH FOR ALL ATTENDEES AND ALL BCOA MEMBERS**

**BCOA AFTERNOON SESSIONS (ALL BCOA MEMBERS WELCOME)**

**Session 10:**  **Improving Patient Care and Outcomes:**
*“New Technology-Tips/Tricks/Techniques”*
Chair – Dr. A. Younger

1315 - 1325  Polyvinyl Alcohol Implant for Hallux Rigidus – Dr. J. Baumhauer

1325 - 1335  Custom 3-D Printing Prosthetic Implants for Complex Hip Reconstruction – Dr. B. Masri

1335 - 1345  The Dual-Mobility Hip Prosthesis: indications/techniques – Dr. D. Garbuz

1345 - 1355  Percutaneous Foot and Ankle Surgery: the way forward – Dr. A. Younger

1355 - 1405  New Techniques in Ankle Syndesmosis Fixation – Dr. K. Apostle
1405 - 1415  Distal Humerus Fractures-what’s hot, what’s not – Dr. P. Daneshvar

1415 - 1425  Targeted Muscle Re-innervation - rewriting an old chapter on Amputations of the Upper Limb – Dr. T. Goetz

1425 - 1435  Adolescent ACL Reconstruction: techniques for 2018 – Dr. C. Reilly

1435 - 1445  Innovative Techniques to manage Shoulder /Elbow Pathology – Dr. B. Regan

1445 - 1500  REFRESHMENT BREAK

1500 - 1530  UBC Department of Orthopaedics Faculty-wide Departmental Meeting
Chair – Dr. B. Masri

1530 - 1700  BCOA BUSINESS MEETING
CHAIR – DR. A. YOUNGER
1) BC INSTITUTE UPDATE
2) ACCESS TO CARE CAMPAIGN
3) CODING PRINCIPLES AND BEST PRACTICES
4) BUSINESS MEETING AGENDA (AGENDA TO BE DISTRIBUTED ON-SITE)

1700  ADJOURN

Friday Evening, May 4, 2018

1830  UBC Department of Orthopaedics
Graduation, Alumni and Awards Banquet
Shaughnessy Golf and Country Club
Vancouver, BC
The generous support of the following organizations is gratefully acknowledged

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