TRAINEE SECTION

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Proceedings from the 9th Annual University of Calgary Leaders in Medicine Research Symposium

Abstract

On November 3, 2017 the Leaders in Medicine (LIM) program at the University of Calgary's Cumming School of Medicine hosted the 9th Annual Leaders in Medicine (LIM) Symposium. This year's event commemorated 20 years of the LIM program and its dedication to the training of clinician-scientists.

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The past 20 years of LIM have marked growth and development for the joint physician-scientist training program. With highly motivated students completing graduate work in diverse areas, from Neurosciences to anthropology, microbiology to community health sciences, the LIM program reflects the varied interests of the physician-scientist—and important areas of research within the University of Calgary. Through the LIM program, completion of an MD jointly with a PhD, MSc, MA, MBA or JD is possible. Furthermore, MD students who have previously completed graduate level training or who are pursuing research while in the MD program are supported through LIM.

The LIM program is designed to be student-led and student-driven, with all programmatic aspects being organized and executed by the annually-elected Student Executive Committee. This is another aspect of the LIM program that has contributed to two decades of progression and development. With high levels of commitment from student leaders throughout the years, a progressive nature of research, medical training and the social environment within which the LIM students exist is reflected throughout the program. The various Student Executive Committees, along with all trainees within the LIM program, have been well supported and encouraged by the founders and long-time directors of the LIM program: Dr. Morley D. Hollenberg and Dr. Paul L. Beck. The vision of creating a training environment for students to develop into leaders in health care has been well realized: from its humble beginnings to a program that includes over 150 students. In 2017, a transition in leadership led to a fond and gracious send off to Dr. Paul Beck, who passed the position of Director on to Dr. Doreen Rabi. Dr. Beck's contributions to the LIM program include securing training funding that has supported clinical training for over a dozen PhD students, enriching the undergraduate medical research experience at the Cumming School of Medicine and creating an environment that allows LIM students to publish over 200 original research articles per year.

In 2017, in celebration of LIM's 20th year milestone, the LIM Symposium, previously held as a half-day event, was extended to a full day. The day-long program allowed for an additional keynote address and for engagement with LIM alumni from across the country; inclusions that were well received by the over 200 registered attendees and guests.

The morning keynote address was provided by Dr. Janet Smylie (MD, FCFP, MPH), a respected international leader in Indigenous health research. Dr. Smylie spoke to social accountability when working alongside Indigenous

communities across Canada. The topical address came at an opportune time, preceding the launch of *ii'taa'poh'to'p* (a place to rejuvenate and re-energize during a journey), the University of Calgary's Indigenous Strategy. Following the keynote address, LIM students took centre stage to share their current research through oral presentations. As always, the LIM students demonstrated high quality, innovative research that stimulated much audience participation throughout the question period.

The afternoon highlighted the importance of mentorship, and was kicked off by a presentation by Dr. Bryan Yipp, LIM Associate Director, who discussed how both personal and professional goals can be realized with support of strong mentorship. Immediately following this presentation, several concurrent LIM alumni-led workshops were held so students had the opportunity to hear of the lives and careers of a diverse group of new investigators. We were honored to host several LIM alumni—Drs. Brian Yipp, Jodie Roberts, Jennifer Beatty, Slava Epelman, Mary Dunbar, Nicholas Bosma, Braedon McDonald and Vikram Lekhi. Attendees ranked these alumni-led sessions among the highest part of the program; highlighting the importance of the role of mentorship and continuity of community within the LIM network.

Dr. Robert Brownstone (MD, PhD, FRCSC, FCAHS), a functional neurosurgeon and leading neuroscientist, provided the second keynote address of the day. Dr. Brownstone highlighted the importance and need for clinician scientists to bridge the gap between bench and bedside. The scientific program concluded with the student poster session. With nearly 80 poster presentations, the session provided ample opportunity for students to showcase their work and to garner valuable feedback from judges, peers and other attendees.

The student oral presenters at the 2017 LIM Symposium included Nicole Burma, Vadim Iablokov, Samuel Jensen, Seth Turner, and Isabelle Vallerand. The Best Oral Presentation was awarded to Nicole Burma. The full abstracts of each of the oral presentations are given in the following section.

The following students were awarded Best Poster Presentation in their respective categories: Marta Shaw; Nicholas Jette; Daniyil Svystonyuk; Emily Macphail; Daniela Keren; David Guzzardi; Daniel Meyers; Heather Leduc-Pessah; and Zaheed Demani. The full abstracts of the Best Poster Presentations are given in the following section. The titles of all posters are also given; for full abstracts, please see the Leaders in Medicine website at <https://cumming.ucalgary.ca/lim>.

We would like to extend acknowledgements to each individual who volunteered their time to ensure the success of the Symposium. We would like to thank the following oral and poster competition judges: Drs, A Metcalfe; A Caprariello; B McDonald; B Yipp; D Hart, E Lang; E Burgess; F Lopes; H Bassyouni; J Buchhalter; J Beatty; J Moser; J Meddings; J Roberts; K Busche; M Russell; M Dunbar; M Hollenberg; R DeVinney; R Leigh; R Brownstone; S Jarvis; S Patten; S Epelman; S Warner; S Verma; S Coderre; T Williamson; and V Lekhi.

We would also like to thank the departments and associations who generously sponsored the symposium, including the Alberta Children's Hospital Research Institute and the University of Calgary (The Cumming School of Medicine, O'Brien Institute for Public Health, Research, Department of Medicine, Arnie Charbonneau Cancer

Institute, Department of Biochemistry and Molecular Biology, Department of Clinical Neurosciences, Hotchkiss Brain Institute, McCaig Institute for Bone and Joint Health, Snyder Institute for Chronic Diseases, Libin Cardiovascular Institute of Alberta, Undergraduate Medical Education, Cumming School of Medicine Alumni Office, Office of the Associate Dean Research at the Cumming School of Medicine, Department of Physiology and Pharmacology, Department of Emergency Medicine, Spinal Cord Injury NeuroTeam Program, Medical Science Graduate Program and the Department of Community Health Sciences).

FIGURE 1. Leaders in Medicine students Heather Leduc-Pessah and Nicole Burma present their poster

Best Oral Presentation Award:

Nicole Burma

A new use for an old drug: Probenecid alleviates opioid withdrawal in rodents

N Burma, T Trang

Physiology & Pharmacology and Comparative Biology & Experimental Medicine, University of Calgary, Calgary, AB

Introduction: Opioids are revered for their potent analgesic effects; however, prolonged use can result in a severe withdrawal syndrome upon cessation of opioid use. Opioid withdrawal is characterized by a host of intensely unpleasant signs and symptoms, including somatic and autonomic physical symptoms and an unpleasant affective component. As a result, individuals are motivated to continue using opioids to avoid these severe and unpleasant episodes of withdrawal. In a previous study, we identified the pannexin-1 (Pannx1) channel as a critical substrate of opioid withdrawal. Here, we investigated the efficacy of probenecid, a broad spectrum Pannx1 blocker currently approved as an anti-gout medication, as a therapeutic agent for combating the symptoms of opioid withdrawal.

Methods: We established a model of opioid withdrawal by treating mice and rats with escalating doses of morphine or fentanyl. On the final day of treatment, we injected naloxone to rapidly precipitate withdrawal behaviours. To test the therapeutic effects of probenecid on opioid withdrawal, we administered a single dose of probenecid prior to naloxone-precipitated withdrawal.

Results: We found that both morphine and fentanyl dosing paradigms produced a robust withdrawal syndrome in mice and rats. Furthermore, an acute injection of probenecid immediately prior to naloxone-precipitated withdrawal significantly attenuated withdrawal symptoms. Most notably, probenecid reduced jumping, wetdog shakes, teeth chattering and tremor behaviours in rodents.

Conclusion: These results suggest that probenecid may represent a viable therapeutic option for treating withdrawal in opioid dependent patients. The unpleasant symptoms of withdrawal are a major driving force for continued opioid use, and by reducing the severity of these adverse effects, we aim to assist individuals in discontinuing opioid use.

Abstracts from oral presentations

Is prehospital care supported by evidence-based guidelines? A quality appraisal using AGREE II

S Turner, E Lang, K Brown, C Leyton, E Bulger, M Sayre, D Kraus, H Robertson

Undergraduate Medical Education, Emergency Medicine, and Health Sciences Library, University of Calgary, Calgary, AB; Emergency Medicine and Undergraduate Medical Education, George Washington University, Washington, DC; Emergency Medicine, University of Washington, Seattle, WA; Emergency Medicine, University of Texas, Austin, TX

Introduction: The Institute of Medicine has recommended that high-quality, evidence-based guidelines be developed for emergency medical services (EMS). The National Association of EMS Physicians has outlined a strategy that will see this task fulfilled, consisting of multiple working groups focused on all aspects of guideline development and implementation. A first step, and our objective, was a cataloguing and appraisal of the current guidelines targeting EMS providers.

Methods: A systematic search of the literature was conducted in MEDLINE (n=1,175), EMBASE (519), PubMed (14), Trip (416), and guidelines.gov (64) through May 1, 2016. Two independent reviewers screened titles for relevance to prehospital care, and then abstracts for essential guideline features. Citations meeting inclusion criteria were appraised with the AGREE II tool, which looks at six different domains of guideline quality, containing a total of 23 items rated from one to seven. Each guideline was appraised by three separate reviewers, and composite scores were calculated by averaging the scaled domain totals.

Results: After primary (kappa 97%) and secondary (kappa 93%) screening, 49 guidelines were retained for full review. Three guidelines obtained a score of > 90% (aeromedical transport, analgesia in trauma, and resuscitation of avalanche victims); two scored between 80% and 90% (stroke and pediatric seizure management); one scored between 70% and 80% (splinting in austere environments); and nine scored between 60% and 70% (ischemic stroke, cardiovascular life support, hemorrhage control, intubation, triage, hypothermia and fibrinolytic use). Of the remaining guidelines, 14 scored between 50% and 60% and 20 obtained a score of < 50%.

FIGURE 2. Leaders in Medicine student Seth Turner shares his research during Student Oral Presentations

Conclusion: There are few high-quality, evidence-based guidelines in EMS. Of the published guidelines, the majority fail to meet established quality measures. Although a lack of randomized controlled trials conducted in the prehospital field continues to limit guideline development, suboptimal methodology is also commonplace within the existing literature.

Activation of oligodendroglial PGC1 α by exercise accelerates remyelination

S Jensen, N Michaels, M Keough, S Ilyntskyy, O Kovalchuk, V Yong

Clinical Neurosciences, University of Calgary, Calgary AB; Biology, University of Lethbridge, Lethbridge, AB

Introduction: Treatment modalities that promote the functional regeneration of myelin, remyelination, remain in their infancy despite considerable clinical demand. In multiple sclerosis (MS), physical exercise and participation in activities of daily living are associated with reduced disability with little mechanistic rationale. Considering environment-derived stimuli and neural circuit activity are known to stimulate myelination in the healthy CNS, we investigated the capability of physical exercise to promote remyelination during pathology.

Methods: We employ the lysocleithin model of focal toxic demyelination. Animals are individually housed in rat cages modified to contain a running wheel. Wheel revolutions are recorded by custom computer software.

Results: Immediate therapeutic access to a running wheel enhanced oligodendrocyte generation. In exercising animals, we observed a 40% increase in oligodendrocyte progenitor proliferation resulting in the production of 36% more mature oligodendrocytes. Moreover, in exercising animals, 48% more myelin basic protein was expressed, a 2.11-fold increase in remyelinated axons was seen, the myelin generated was thicker than controls, and the number of unmyelinated axons decreased from 51% to 13%. We identify peroxisome proliferator activated receptor gamma (PPAR) co-activator-1- α (PGC1 α) within oligodendrocytes as a transiently expressed and exercise-induced factor that is required for the enhancement of myelin thickness by exercise. RNA-sequencing demonstrated increased axonal activity/neurotransmission as well as intracellular calcium and phosphatidylinositol signalling, suggesting a broad activation of pro-myelination pathways in the enhancement of remyelination by exercise. Finally, we demonstrated that exercise worked in parallel with the novel remyelinating medication, clemastine, to further potentiate therapeutic remyelination and increase the total number of axons within lesions, indicating that the combination enhanced the protection of axons from acute, demyelination-induced degeneration.

Conclusion: This study demonstrated that physical exercise was an efficacious, integrative means to enhance remyelination, and detailed a PGC1 α -dependent mechanism through which oligodendrocytes accelerated myelin production in response to activity.

Precision medicine for diabetic nephropathy and hypertensive nephrosclerosis: A pilot study

V Iablokov, A Smith, S McRae, T Komada, H Benediktsson, F Magni, D Muruve

Department of Medicine, Department of Pathology, and Laboratory Medicine, University of Calgary, Calgary, AB; Department of Experimental Medicine, University of Milano Bicocca, Milan, Italy

Introduction: Chronic kidney disease (CKD) affects approximately 35% of Canadians over the age of 65 years who are at high risk of developing end-stage renal disease requiring life-long dialysis or kidney transplant. The two most common causes of CKD are diabetic nephropathy (DN) and hypertensive nephrosclerosis (HN). Identifying the cause of CKD is important for patient prognosis, since HN has better outcomes compared with DN, which requires closer monitoring. Often patients have both diabetes mellitus and hypertension, making diagnosis and treatment decisions difficult in the absence of a kidney biopsy. This may lead to costly over-referral and over-monitoring. Our aim was to discover clinical biomarkers to differentiate between these CKD phenotypes.

Methods: Matrix-assisted laser desorption/ionization-mass spectrometry imaging was used to acquire spectral data from human DN and HN kidney biopsies. Spectral data was analyzed for analytical reproducibility and to identify m/z values more abundant in DN or HN.

Results: Analytical variability was minimal between replicates. Significant differences in the tryptic peptide profiles of DN and HN were visible. Through ROC analysis we identified 25 m/z peaks were more abundant in DN and 5 m/z peaks more abundant in HN.

Conclusion: Our analytical protocol is robust and sensitive to detect differences in protein signatures between DN and HN. Future studies will be performed in an expanded cohort to validate these results. The discovery of biomarkers will potentially improve resource allocation, health care delivery and the outcome of patients with CKD.

Major depressive disorder as a risk factor for rheumatoid arthritis: A retrospective cohort study

I Vallerand, R Lewinson, M Lowerison, A Frolkis, G Kaplan, A Bulloch, S Patten, C Barnabe
Community Health Sciences, Mathison Centre for Mental Health, Biomedical Engineering; Department of Medicine
University of Calgary, Calgary, AB

Introduction: Major depressive disorder (MDD) has been identified to have a direct effect on cytokines, including increased TNF α levels relative to healthy controls. As these increased inflammatory markers are often seen in autoimmune diseases such as rheumatoid arthritis (RA), our aim was to explore whether MDD is a risk factor for the development of RA.

Methods: A retrospective cohort study was conducted using The Health Improvement Network (THIN) database (1986–2012). Both the MDD and referent cohorts were followed until patients developed RA or were censored. Cox proportional hazards models were used to determine the risk of developing RA among patients with MDD, accounting for age and sex.

Results: A cohort of 403,932 patients with MDD and a referent cohort of 5,339,399 patients without diagnostic codes for MDD were identified in THIN. Cox proportional hazards models revealed a significant interaction by age ($p < 0.0001$), whereby younger patients with MDD (age < 40 years) had a 42% increased risk of developing RA (HR=1.42, 95%CI: 1.31-1.53). In older patients (age > 40 years), the risk of developing RA among those with MDD was lower but demonstrated a 14% increased risk (HR=1.14, 95%CI: 1.08-1.21).

Conclusion: MDD was found to be a risk factor for the development of RA. This risk was highest among younger patients with MDD, and the risk was only somewhat increased among older patients with MDD. These results provide support for the inflammatory hypothesis that MDD may be associated with the development of RA.

Abstracts from Best Poster

Presentation Awards

Integrated knowledge translation approach to improve Advance Care Planning process in four contexts

M Shaw, J Simon, J Holroyd-Leduc, S Lavorel, J Kenney, A Kaba, M Dube,
A Kushliak, N Sharma, B Jones
Community Health Sciences and Cardiac Sciences, University of Calgary, Calgary, AB; Alberta Health Services, Calgary, AB

Introduction: Although Advance Care Planning (ACP) is a policy priority in Alberta, few patients are aware that they have engaged in this process and the conversation tracking documentation, which could enhance communication of patient values, is not being used. The current state is a concerning quality issue, as patients are at risk of receiving care discordant with their wishes. A team process improvement project was undertaken across four clinical settings serving the same clinical condition (heart failure). This project sought to develop and evaluate the effectiveness of an ACP change management intervention that utilizes an integrated knowledge translation approach and targets clinician process as well as patient oriented outcomes.

Methods: This quasi-experimental study was guided by Graham's KT framework and took place in one acute care unit, out-patient heart function clinic, primary care clinic and cardiac homecare team. Clinicians/managers from each setting were partnered with the researchers and with three AHS teams (Alberta Improvement Way, e-Simulation and ACP education) to define goals and to identify ACP processes, root cause analysis for gaps and targets to create improvement. The teams brainstormed solutions to improve and enhance conversations and documentation flow and used a matrix to prioritize strategies. Over three-months, teams implemented higher impact, lower effort changes. Outcome measurements were collected by a validated patient survey and chart audits bi-weekly pre-, during and post-intervention period.

Results: This project confirmed the feasibility and utility of utilizing existing resources to engage clinical teams in a change management intervention using a KT framework. Challenges included varied involvement of clinical disciplines and technology limitations. Outcomes for each clinical

setting will be presented to describe the effectiveness of the change management intervention.

Conclusion: This demonstration project has provided a template for engaging existing regional health resources, under the guidance of a K-T framework to address and improve team process across a broad clinical spectrum.

ATM deficient tumours and targeted therapies

N Jette, S Goutam, A Wani, G Bebb, S Lees-Miller
Biochemistry & Molecular Bio and Medical Science,
University of Calgary; Oncology, Tom Baker Cancer Center,
Calgary, AB

Introduction: Ataxia telangiectasia mutated (ATM) is an apex signalling kinase that plays roles in the repair of DNA double strand breaks. Because ATM is deleted in ~4% of pancreatic adenocarcinoma cancer tumours, we sought to identify targeted treatments for ATM deficient pancreatic cancer cells.

Methods: We utilized shRNA to deplete the ATM protein from cells and the clonogenic survival assay to determine cell viability. Flow cytometry was utilized to determine cell cycle progression following the administration of targeted therapeutics and immunohistochemistry was used to visualize DNA damage markers.

Results: Pancreatic cancer cells treated with ATM inhibitor were sensitive to the PARP inhibitor olaparib. Moreover, ATM knockdown (shRNA) Panc 10.05 cells were sensitive to olaparib and rucaparib (PARPi), ionizing radiation and VE-821 (ATR inhibitor). ATM knockdown Panc10.05 cells accumulated in G2/M phase when treated with olaparib for extended periods, but do not apoptose. Olaparib caused the accumulation of DNA damage in pancreatic cancer cells.

Conclusion: ATM-deficient pancreatic cancer cells can be effectively treated with PARP and ATR inhibitors; however, rather than inducing cytotoxicity, in the context of ATM-deficient pancreatic cancer cells, olaparib may induce a cytostatic event leading to cell cycle arrest in G2/M phase. This information will help to inform olaparib treatment schedules and potential future combinatorial treatments.

FIGURE 3. Leaders in Medicine students mingle at the poster presentations

The role of diet and gut microbiota in obsessive compulsive disorder in youth

E Macphail, R Reimer, P Arnold

Cumming School of Medicine, Faculty of Kinesiology, Department of Biochemistry & Molecular Biology, Mathison Centre for Mental Health Research and Education, Hotchkiss Brain Institute and Department of Psychiatry, University of Calgary, Calgary AB

Introduction: Obsessive compulsive disorder (OCD) affects 5.2–10.4 million North Americans. Most commonly diagnosed in childhood and adolescence, OCD often persists into adulthood and can be disabling. Zinc is physiologically essential and integral for optimal health; however, zinc deficiency is quite prevalent. Not only are youth (particularly females) at increased likelihood of having zinc deficiency risk factors, but they are also in a life stage where zinc deficiency is more problematic, based on its importance developmentally. Neural zinc levels have implications for neuroplasticity (a factor in cognitive flexibility, which is a feature of executive function demonstrated to be impaired in OCD). Additionally, zinc supplementation has been found to improve mental health and, in animal models, zinc deficiency has been shown to alter the microbial environment of the gut. This project is investigating associations between zinc (intake and physiological levels), cognitive flexibility, anxiety, depression and OCD symptoms and the gut microbiota, in youth with and without OCD. It will also explore the effects of prebiotic supplementation for youth with OCD, with respect to symptoms and gut microbial diversity.

Methods: Zinc status analysis is via intake (3-day dietary record), as well as serum and hair levels. Mental measures include interview and self-report symptom questionnaires, and cognitive flexibility testing. Gut microbiota analysis is via qPCR with 16S rRNA sequencing of stool samples. Youth with OCD are also given a prebiotic or placebo supplement (double-blind RCT) for 8 weeks. Data will be compared for youth with vs. without OCD, and pre- vs. post intervention.

Results: Recruitment is ongoing, with participants with OCD having unique sample challenges compared with healthy controls.

Conclusion: Nutritional status' impact on mental health is underexplored. No literature to date combines analysis of zinc, cognitive flexibility, and gut microbiota, particularly in

OCD. This research has potential to aid development of adjunct OCD therapy for youth.

Undergraduate medical students' experiences with social studying and learning

D Keren, J Lockyer, M Kelly, N Chick, R Ellaway

Cumming School of Medicine and Taylor Institute for Teaching, University of Calgary, Calgary, AB

Introduction: Medical students study in social groups, which influences their learning, but few studies have investigated the influence of social studying and learning (SSL) on medical students' educational experiences. This study aimed to improve our understanding of students' experiences with SSL, their perceptions of the role of this learning tool in their education, and what barriers students may face in utilizing SSL.

Methods: This qualitative study employed grounded theory methodology through a sensitizing lens of phenomenology to better understand students' experiences. Semi-structured in-depth interviews were conducted with 23 students within a single medical school cohort at the University of Calgary, regarding their experiences with SSL. Data collection and analysis were conducted iteratively through paired and parallel coding until saturation was reached.

Results: Three emergent theories were generated: (1) there is a culture and belief system around SSL in medical school, which is propagated by faculty and students; (2) social and academic privilege—or lack of it— influence students' ability to access and utilize SSL; and (3) there is a reciprocal relationship between SSL and student experiences of social isolation.

Conclusion: This study demonstrates a clear role for SSL in medical school and highlights the implications of this on medical students' experiences. By demonstrating both a significant variation in the accessibility of SSL to different students and a clear relationship between SSL and student wellbeing, the results from this study are implicated in discourses regarding medical student resiliency and welfare. Ultimately, a better understanding of how SSL influences students' experiences in medical school will better enable medical educators to support and guide their students.

The analgesic effects of morphine are decreased with prolonged microglial activation

H Leduc-Pessah, N Burma, R Redick, T Trang

Department of Comparative Biology, Department of Physiology and Pharmacology and Hotchkiss Brain Institute, University of Calgary, Calgary, AB

Introduction: Effective pain management is a pervasive clinical problem, and unmanaged pain profoundly impacts the quality of life of afflicted individuals and their families. Morphine is a potent opioid analgesic used in the treatment of moderate to severe pain; however, individual responses to morphine are highly variable. By understanding the biological changes that alter the response to morphine, we may be able to better predict opioid responders. Growing evidence suggests that microglia are involved in modulating the response to opioids. In the present study, we examined the analgesic response to morphine and how it is modulated by prolonged microglial reactivity.

Methods: Male and female wild-type and knock-out mice were treated with morphine (10 mg/kg, or an escalating dose response 2.5-40 mg/kg; IP) and anti-nociception was measured using thermal tail withdrawal test. Microglial reactivity was assessed using immune histochemical labelling of microglial and inflammatory cytokine analysis using quantitative PCR.

Results: Male knock-out mice had prolonged microglial reactivity compared with wild-type controls. In wild-type mice, acute response to morphine produced a robust anti-nociceptive response, reaching about 90% of the maximum possible effect; however, in knock-out mice, only 40% MPE was achieved. In contrast, in female mice, there was no evidence of ongoing microglial reactivity, and no difference in the antinociceptive response to morphine. We also found that ongoing microglial reactivity in male knock-out mice exacerbated the development of side effects to repeated morphine treatment.

Conclusion: We characterized a mouse model where microglial reactivity was altered in male but not female mice. The microglial changes diminish the analgesic effects of morphine and exacerbate the development of side effects with repeated exposure. By gaining an understanding of the role of microglia in opioid analgesia we may be able to predict opioid responders, thereby minimizing unnecessary

opioid trials and decreasing the development of severe side effects.

Improving quality of care using a single-entry model of referral for total joint replacement

Z Damani, E Bohm, H Quan, T Noseworthy, G MacKean, L Loucks, D Marshall

Department of Community Health Sciences, University of Calgary, Calgary, AB; Department of Surgery, University of Manitoba, Winnipeg, MB; Concordia Joint Replacement Group, Winnipeg, MB

Introduction: Single-entry models (SEMs) in healthcare are a waiting time management strategy that can improve accessibility to scheduled clinical services. Impact on overall quality of care is poorly understood. We evaluated the Winnipeg Central Intake Service (WCIS), a SEM for patients referred for total hip (THR) or knee replacement (TKR).

Methods: A pre/post-intervention cross-sectional design was used to measure changes in six dimensions of quality of care (Alberta Quality Matrix for Health): acceptability; accessibility; appropriateness; effectiveness; efficiency; and safety. Two cohorts were identified using the regional THR and TKR waitlist. Pre-WCIS (n=2,282) and post-WCIS cohorts (n=2,397) were compared before and after WCIS implementation. Primary outcomes were waiting time (WT) variation across surgeons, waiting times (WT1 primary care to specialist referral; WT2 decision to treat until surgery; and TW total waiting time), and proportion of surgeries within benchmark. Analysis included descriptive statistics, Student's t and chi-square tests and clustered regression analyses (by surgeon).

Results: Compared with pre-implementation, most orthopedic surgeons experienced a reduction in WT variation for WT1, WT2 and TW following the introduction of the WCIS. Variability in TW was reduced among surgeons by 3.7 (hip) and 4.3 (knee) weeks. Mean WTs for THR (WT1) and TKR (WT1/WT2/TW) were also reduced. The proportion of patients who underwent TKR, within benchmark, increased by 5.9%. Among the quality dimensions, only accessibility and safety changed (post-WCIS, THR and TKR). Regression analysis revealed shorter WT2 was associated with post-WCIS (knee), worse Oxford score (hip and knee) and having medical comorbidities (hip). Meeting benchmark WTs was associated with post-WCIS

(knee), lower BMI (hip) and worse Oxford score (hip and knee).

Conclusion: WCIS use reduced variability in surgeon WTs, and facilitated modest reductions in overall patient waiting for surgery. Some, but not all dimensions of quality of care improved. Further longitudinal study can elucidate SEM impact on quality of care.

Acellular matrix scaffold reprograms cardiac fibroblasts and stimulates adaptive cardiac repair

D Svystonyuk, J Turnbull, G Teng, D Belke, D Guzzardi, D Park, S Kang, P Fedak
Cardiac Sciences, Libin Cardiovascular Institute, Calgary, AB

Abstract withheld as per the authors' wishes.

4D Flow MRI-derived wall shear stress corresponds to elastic fiber thinning in human bicuspid aorta

D Guzzardi, E Bollache, P van Ooij, D Svystonyuk, M Markl, A Barker, P Fedak
Martha and Richard Me Bicuspid Aortic Valve Program
Cardiac Surgery, University of Calgary, Calgary, AB;
Radiology, Biomedical Engineering, Surgery-Cardiac Surgery, and Bluhm Cardiovascular Institute, Northwestern University, Chicago, IL; Radiology, Academic Medical Center, Amsterdam, Netherlands

Abstract withheld as per the authors' wishes.

FIGURE 4. Best Poster Presentation Award winners

Immune checkpoint blockade augments oncolytic virotherapy for the treatment of cancer

A Mostafa, **D Meyers**, C Thirukkumaran, P Liu, Z Shi, K Gratton, J Spurrell, A Yang, S Thakur, D Morris

Pathology & Laboratory Medicine and Oncology, University of Calgary, Calgary, AB; Tissue Typing Laboratory, Calgary Lab Services, Calgary, AB; Translational Laboratory, Tom Baker Cancer Centre, Calgary, AB; Medicine, University of Toronto, Toronto, ON

Abstract withheld as per the authors' wishes.

Posters

The following are titles and authors of abstracts presented in poster format. Full details can be seen on our LIM website.

Use of CT during off-hours to investigate patients with IBD presenting to the Emergency Department

E Boyce, R Fyfe-Brown, W Aman, P Remo, W Stephanie, K Gil, H Jennifer, P Jack, K Novak
Medicine, University of Calgary, Calgary, AB

The SAFER exam: Detecting aphasia in “confused” patients in the emergency department

S Crooks, G Jewett, T Mobach, D Pearson, E Smith
Faculty of Medicine and Department of Clinical Neurosciences, University of Calgary, Calgary, AB

Palliative care needs of homeless patients with chronic diseases who frequent Emergency Departments in Calgary: A retrospective study

J Ding, D Wang, E Lang, S Colgan, J Simon
Cumming School of Medicine, Department of Emergency Medicine, Division of Palliative Medicine, and Department of Family Medicine, University of Calgary, Calgary, AB

Mental health care for pediatric presentations to Emergency Departments: A scoping review

G Narendran, S Ratnapalan
Medicine, University of Calgary, Calgary, AB; Pediatrics, Hospital for Sick Children, Toronto, ON

Emergency physicians are choosing wisely when transfusing patients with NVUGIB and hemoglobin >70 g/L

B Stebner, C Vasquez, D Grigat, C Joseph, E Lang, G Kaplan, K Novak
Cumming School of Medicine, Family Medicine, Emergency Medicine, and Gastroenterology, University of Calgary, Calgary, AB

An environmental scan of emergency hemodialysis provision in Canada

J Yang, C Thomas, J MacRae
Faculty of Medicine and Division of Nephrology, University of Calgary, Calgary, AB

Urinary bladder cancer cells secrete proteolytic enzyme regulators

S de Lima (Gibson), K Mihara, M Hyndman, M Hollenberg
Physiology & Pharmacology and Surgery, University of Calgary, Calgary, AB

Cancer, chemo and the brain

A Kovalchuk, Y Ilnytsky, D Sidransky, O Kovalchuk, B Kolb
Neuroscience and Biology, University of Lethbridge, Lethbridge, AB; Oncology, Champions Oncology, Baltimore, MD

A probable trigeminal nerve sheath tumor presenting as a cluster headache: a case report

A Mirian, A Budhram, A Leung, M Jones
Cumming School of Medicine, University of Calgary, Calgary, AB; Clinical Neurological Sciences and Clinical Medical Imaging, Western University, London, ON

Platin sensitivity and ATM-deficiency in non-small cell lung cancer

J Moore, L Petersen, A Elegbede, G Bebb
Cumming School of Medicine, University of Calgary and Tom Baker Cancer Centre, Alberta Health Services, Calgary, AB

Ultrasensitive nano-mechanical vibration profiling of brain tumor cells and tissues using atomic force microscopy

S Nelson, D Proctor, A Ghasemloonia, S Lama, K Zareinia, Y Ahn, M Al-Saiedy, F Green, M Amrein, G Sutherland
Cardiovascular & Respiratory Sciences, Leaders in Medicine, Clinical Neuroscience & HBI, Pediatrics- Alberta Children's Hospital, Cell Biology & Anatomy, and Pathology & Laboratory Medicine, University of Calgary, Calgary, AB

Current practice of Canadian dermatologists for the field therapy of actinic keratoses

Z Sarwar, L Parsons
Department of Medicine, Cumming School of Medicine, Calgary, AB

Bortezomib induced state of BRCAness: PARP inhibitors and proteasome inhibitors in Multiple Myeloma

J Simms, P Neri, K Gratton, E Stebner, N Bahlis
Hematology and Southern Alberta Cancer Research Institute, University of Calgary, Calgary, AB

Epigenetic drug screening and target follow-up for GBM using brain tumour stem cells

A Wang, H Luchman, S Weiss
Hotchkiss Brain Institute and Arnie Charbonneau Cancer Institute, University of Calgary, Calgary, AB

The impact of performing a hemithyroidectomy on patients with known papillary thyroid cancer

A Bysice, J Pasieka, S Chandarana
Cumming School of Medicine, General Surgery and Surgical Oncology, Otolaryngology-Head & Neck Surgery, and Surgical Oncology, University of Calgary, Calgary, AB

Unravelling the myths and mysteries of the antimicrobial agent, silver

J Lemire, K Chatfield-Reed, L Kalan, N Gugala, C Westersund, H Almlad, G Chua, R Turner
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Mesenchymal stem cells shift mitochondrial dynamics and enhance oxidative phosphorylation

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The use of silver-impregnated dressings for the treatment of chronic wounds: A scoping review

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Shiga toxins engage both the canonical and non-canonical inflammasomes to induce inflammation

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Macrophages promote wound-induced hair follicle regeneration in a CX3CR1 and TGFb1 dependent manner

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Investigating the role of pulmonary neutrophils in pneumococcal vaccine immunity

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The use of plant-derived fHbp to develop an effective vaccine against *Neisseria meningitidis*

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Examining the role of NLRP3 in intestinal fibrosis

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***Giardia duodenalis* alters mucin gene transcription and disrupts the intestinal mucus layer**

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General anesthetics and cognitive impairment—should we be concerned?

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Pathways to care for children with autism spectrum disorder

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Exploring patterns of atypical prescription drug misuse in the correctional setting

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Does multiple sclerosis affect outcome in burn patients? A small cohort analysis

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Second-generation antipsychotics and metabolic side effects in the Canadian population

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A longitudinal cohort study on the impact of the clobazam shortage on patients with epilepsy

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Participation in PEERS® improves emotional intelligence in adolescents with autism spectrum disorder

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Development and content validity of the Autism Social Participation Classification System for preschool children with autism spectrum disorder

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Cultivating effective leadership skills with professional executive coaching for LIM students

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Is SHINE continuing to contribute to medical students successfully learning CanMED roles?

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Community Outreach Mentorship Program for under-represented populations in medicine: A pilot project

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The Calgary Guide to Understanding Disease—Assessing growth and change after five years

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Addressing inequities within the healthcare system: What role can physicians play?

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Valuing health advocacy: First Annual Calgary Medical Students' Association Advocacy Symposium

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The Calgary Student Run Clinic in context: A qualitative study

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Student Run Simulation Team: A near peer approach to simulation based medical education

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Combining native T1 mapping and 3D strain analysis for cardiac amyloidosis phenotyping

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Reservoir-wave analysis of dynamics of pulmonary hypertension: Effects of exercise and bronchodilation

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Sensorimotor robotic measures of tDCS-enhanced motor learning in children

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The neural correlates of motor functioning in preschool-aged children

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Proprioceptive loss after stroke is associated with brain activity in frontal and parietal areas

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Sensory tractography and robotic position sense in perinatal stroke and hemiparetic cerebral palsy

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MRI monocyte tracking can detect the effects of innate immune stimulating therapy in brain tumor

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Algorithm enhanced gray-white matter non-contrast CT improves reliability of ASPECTS scoring

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Incidence of bleeding in children undergoing circumcision with ketorolac administration

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Increasing rates of breast and cervical cancer screening in Canadian newcomers: A systematic review

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Altered radiation responses of breast cancer cells resistant to hormonal therapy

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Methods used to develop Canadian provincial guidelines for cervical screening

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Understanding the experiences of East African immigrant women with gestational diabetes mellitus

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Roles of prostaglandin E2 (PGE2) in pregnancy: Time for new perspectives?

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Postpartum hemorrhage in Von Willebrand disease with adequate VWF activity: A retrospective review

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Unbuckling the buccal oscillator in the American bullfrog

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DNA double-strand break repair in different neural cell lineages

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Gastrulational ethanol and/or tetrahydrocannabinol exposure causes altered neuromuscular junctions

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Amyloid beta alters neuronal excitotoxic glutamate release during hypoxia

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DOK7 mutations as a possible cause of seronegative Myasthenia gravis

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Diagnosing sport-related concussion using 1H NMR-based urine metabolomics

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Time and perfusate-dependent molecular repair response during ex vivo lung perfusion

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Descemet's stripping automated endothelial keratoplasty post failed penetrating keratoplasty

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Case series of mycotic aortic aneurysms managed with endovascular and open repair

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Kelling, Jacobaeus, and the advent of minimally invasive surgery

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Taking the next step: A case study in the decision-making and value-space of one's body

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Impact of direct oral anticoagulants on time from diagnosis to surgery for hip fracture patients

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Selection and optimization of patients with obesity for total knee arthroplasty

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Developing North America's first Virtual Reality Temporal Bone Drilling Laboratory

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**An audit of implanted device associated infections
at the Alberta Children's Hospital**

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