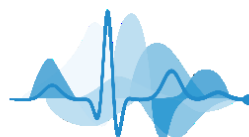


DEPARTMENT OF CRITICAL CARE MEDICINE PHYSICIAN ANNUAL REPORT

January-December 2017



Vision

We partner with University leaders to support the “Eyes High” vision.

“Eyes High” is the University of Calgary’s bold and ambitious vision to become one of Canada’s top five research universities, grounded in innovative learning and teaching and fully integrated with the community of Calgary, by the university’s 50th anniversary in 2016.

Mission

By creating and delivering exemplary human resources services, processes, and outcomes we contribute to and

share in the University’s mission and goals to:

- Sharpen focus on research and scholarship;
- Enrich the quality and breadth of learning;
- Fully integrate the university with the community.

Values

The strategy also articulates eight core values shared by the university community: curiosity; support; collaboration; communication; sustainability; globalization; balance; and excellence.

Dean’s Office

Cumming School of Medicine Strategic Plan 2015 – 2020

Vision

Creating the future of health

Mission

We must fulfill our social responsibility to be a school in which the common goal of improved health guides service, education and research. We must foster the collective pursuit of knowledge and its translation, through education and application, to better the human condition.

Values

Excellence | Collaboration | Engagement | Respect

Strategic Goals

We are committed to maintaining the public’s trust and respect as a premier academic health science centre by meeting the following goals:

- Serve our diverse communities by understanding and responding to their health needs and by effectively stewarding the resources entrusted to us by Albertans.
- Generate knowledge that has both local and global impact by fostering novel collaborative alignments among basic and clinical scientists, physicians and educators.
- Train the next generation of health-care pioneers and providers by rejuvenating the education and career development of biomedical innovators.

Alberta Health Services

Our Vision

Healthy Albertans.
Healthy Communities.
Together.

Our Mission

To provide a patient-focused, quality health system that is accessible and sustainable for all Albertans.

Our Values

To provide a patient-focused, quality health system that is accessible and sustainable for all Albertans.

compassion

We show kindness and empathy for all in our care, and for each other.

accountability

We are honest, principled and transparent.

respect

We treat others with respect and dignity.

excellence

We strive to be our best and give our best.

safety

We place safety and quality improvement at the centre of all our decisions.



Department of Critical Care Medicine

Mission Statement

We are committed to excellence and leadership in patient focused care, education and research to achieve the best patient outcomes through an innovative and team-based approach.

Values

Service

- We hold patient safety as paramount.
- We treat our patients with respect, dignity and compassion.
- We are transparent and accountable in all our decisions.

Knowledge

We are committed to improving quality of care through continued education and research.

People

- We interact with colleagues in a respectful and honest manner.
- We are committed to collaborative practice.
- We value individuals and support their well-being.

Intensive Care Commitment

We are part of a great team.

Our team includes our patients, their families and everyone that works here.

We provide comfort and dignity for all patients including those whose journey ends with us.

We are partners in patient safety.

We treat all members of our team with respect and expect the same in return.

Together we pursue new knowledge through research and education, while striving to improve the quality of care we provide.

We are here to provide the best possible care for our patients.

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Message from the Department Head



I'm pleased, on behalf of my colleagues, to present our department's annual report. Our report details important work, and accomplishments. The most important asset in our department is our people, who have an opportunity to work in world class facilities, with state of the art equipment, side by side with other outstanding health care professionals committed to the care of the critically ill patient and their family. This report will outline a few of our collective accomplishments including:

- The clinical activity in our ICU's
- The breadth of expertise in our ICU medical staff
- Educational activity
- Some of the outstanding research (including grants and publications)
- A focus on achievements of our department

Caring for patients and their families is a great privilege. With that privilege comes significant responsibility. I hope that we demonstrate through our work that we are meeting our obligations

Dr. Christopher Doig, MD, MSc, FRCPC

Awards and Recognitions

2017

Dr. Philippe Couillard

Top of the Hill Award Nomination for doing such an amazing job with the patient's and their family.

Dr. Philippe Couillard has been awarded the Frank S. Rutledge Award for excellence in clinical teaching.

Dr. Tom Stelfox received the Cumming School of Medicine Watanabe Distinguished Achievement Award. This is awarded for all around academic excellence.

Dr. Tom Stelfox has received an award for Public Health O'Brien Institute Mid-Career Research Leader Award. Stelfox has made numerous important research contributions that are directly relevant to improving patient care through the optimization of health services delivery including developing the first set of evidence-informed quality indicators, and the first patient reported outcome measures for injury care; leading an initiative to improve the implementation of scientific evidence into the care of critically ill patients admitted to intensive care units (ICU) in Alberta; and co-leading a four-year, \$1,388,754 grant from CIHR focused on late life issues.

Dr. Dan Niven not only received a Top 40 under 40 award from Avenue Magazine, but he was also recognized as a Distinguished Graduate at the fall convocation.

Critical Care Medicine Teaching Awards (2016 - 2017)

- Dean Sandham Award: **Dr. Dan Zuege**
- Research Award: **Dr. Jason Waechter**
- Rotating Resident Award: **Dr. Ken Parhar**
- 2016 Outstanding Clinician of the Year Award-
Dr. Paul Boiteau

In recognition of excellent medical/clinical expert, advocate for patients, scholarly Knowledge, professionalism and leadership and excellence in communication and collaboration

Critical Care UME Awards (2016-2017) for Classroom Based Teaching and Supervision

Dr. Luc Berthiaume	Platinum Award
Dr. Ken (Kuljit) Parhar	Bronze Award
Dr. Juan Posadas-Calleja	Bronze Award
Dr. Jason Waechter	Silver Award
Dr. Paul Boiteau	Gold Award
Dr. Jonathan Gaudet	Silver Award
Dr. Amanda Roze des Ordon	Silver Award
Dr. Chip (Christopher) Doig	Bronze Award

Dr. Paul Boiteau received recognition from the Foothills Medical Staff Association for his service to patients, the hospital, and the system. Paul was nominated because of his exemplary excellence in clinical care, his years of selfless dedication and leadership in the department, and is unwavering focus on patient safety and quality improvement.

Dr. Kirsten Fiest has received an award for outstanding graduate student supervision from the Faculty of Graduate Studies.

Promotions by the Faculty Promotions Committee at the Cumming School of Medicine:

Dr. Tom Stelfox was promoted to the rank of Professor effective July 1, 2017.

Drs. Luc Berthiaume and **Jason Lord** were both promoted to the rank of Clinical Associate Professor effective July 1, 2017.

Awards and Recognitions *continued*

2017 Calgary Zone Department of Critical Care Medicine Awards

ICU Colleagues nominate peers from each of our ICU's. A selection committee representing all disciplines chooses site/zonal recipients; their colleagues must hold in the highest regard. Following are the winners of the site (and zone) awards.

Bow Award -Early Career Achievements

FMC ICU, Zonal, Taaryn Miller
PLC ICU, Site, Carrie MacDermott
RGH ICU, Site, Corrine Turner
SHC ICU, Site, Aman Gill

Crowsnest Award -Caring for your Colleagues

FMC, Site, Angela Stranges
PLC ICU, Site, Cheryl Dyck
RGH ICU, Site, Erin Hamm
SHC ICU, Zonal, Megan Zjalic

Mount Alberta Award -Excellent Lifestyle & Wellbeing

PLC ICU, Zonal, Juliette Johnson
RGH ICU, Site, Stephanie McLeod

Mount Assiniboine Award -Outstanding Clinician

FMC, Site, Karlyn Wolfe
PLC ICU, Site, Meghan Litchfield
RGH ICU, Site, Catherine McIntyre
SHC ICU, Zonal, Laura Sullivan

Mount Robson Award -Outstanding Patient/Family Centered Care

FMC, Site, Annalise Woertman
FMC CVICU, Site, Ashley Penrose
PLC ICU, Site, Josie Dahl
RGH ICU, Zonal, Peggy McCoy

2016

Dr. Jason Waechter was awarded 'Excellence in Postgraduate Medical Education Award' based on the faculty evaluation feedback that Anesthesia Residency Training Program has received from the residents over the past academic year.

Dr. Philippe Couillard was awarded for the Gold Star Award for Outstanding Teaching, Narwhal Class of 2016.

Dr. Philippe Couillard was awarded the Department of Medicine Clerkship Teaching Award.

Dr. Chip Doig was awarded the AMA Medal for Distinguished Service Award, Alberta Medical Association (AMA).

Dr. Chip Doig was awarded the 2016 CMA Dr. William Marsden Award in Medical Ethics, Canadian Medical Association (CMA). The award recognizes a CMA member who has demonstrated exemplary leadership, commitment and dedication to the cause of advancing and promoting excellence in the field of medical ethics in Canada.

Dr. Chip Doig was awarded the Global Sepsis Award as part of the Alberta Sepsis Network, Global Sepsis Alliance.

Dr. Selena Au was awarded the Society of Critical Care Medicine Star Researcher at the SCCM 2016 Annual Congress Orlando Florida, Feb 2016 for "Determining Best Practices for Patient and Family Participation in Intensive Care Unit Rounds".

Dr. Dan Zuege and **Dr. Paul Campsall** were awarded for the Spectrum antimicrobial therapy app, which was in part developed during his fellowship. It is a great example of important practical work by our fellows during research blocks. Paul has presented his app at Grand Rounds.

Dr. Dan Niven was recognized by CIHR Institute of Health Services and Policy Research to receive one of three 2015-2016 IHSPR Rising Star Awards for his article "Effect of published scientific evidence on glycemic control in adult intensive care units".

Dr. Ken Parhar and **Karolina Zjadewicz** were successful in obtaining funding for a project on ARDS management. There were over 90 submissions and approximately 1/6 funded.

The Department acknowledges **Dr. Jason Lord's** work over the past number of years, and **Dr. Jonathan Gaudet** taking up and taking over the mantle of Program Director.

Dr. Selena Au, as Quality Improvement and Assurance Medical Director, co-chaired the Quality Assurance Committee for revisal of Morbidity and Mortality Rounds, safety culture assessments, and distribution of patient safety learning summaries. She partnered with other quality improvement and patient safety academic leaders to create a lecture series for ICU fellow's academic curriculum.

Congratulations to **Dr. Jason Waechter** who was interviewed and featured in an article on CanHealth.com, an educational website helps physicians and trainees sharpen their skills

Promotions by the Faculty Promotions Committee at the Cumming School of Medicine:

Dr. Carla Chrusch was promoted to the rank of Clinical Associate Professor effective July 1, 2016.

2016 Calgary Zone Department of Critical Care Medicine Awards

ICU Colleagues nominate peers from each of our ICU's. A selection committee representing all disciplines chooses site/zonal recipients; their colleagues must hold in the highest regard. Following are the winners of the site (and zone) awards.

Bow Award -Early Career Achievements

FMC ICU, Site, Brittany Coughin
FMC CVICU, Site, Jolene Moen
PLC ICU, Zonal, Shivani Sodha

Crowsnest Award -Caring for your Colleagues

FMC, Site, Jeanna Morrisey
PLC ICU, Zonal, Kim Holmes

Mount Alberta Award -Excellent Lifestyle & Wellbeing

FMC, Zonal, Niklas Anderson
SHC ICU, Site, Rachel Taylor

Mount Assiniboine Award -Outstanding Clinician

FMC, Zonal, Laura Robinson
FMC CVICU, Site, Sarah Araneta
PLC ICU, Site, Brad Stoich
RGH ICU, Site, Karen Nadeau
SHC ICU, Site, Kari Taylor

Mount Robson Award -Outstanding Patient/Family Centered Care

FMC, Site, Joanna Everson
FMC CVICU, Site, Andrew Lafreniere
PLC ICU, Site, Valerie Lam
RGH ICU. Zonal, Lloyd Sabas

Foothills Medical Centre Intensive Care Unit



The Foothills Medical Centre (FMC) ICU continues to support the largest hospital in Calgary by providing intensive care, code blue and outreach services to over 1000 inpatient beds that support many key programs for the zone; neurosurgery, stroke, hepatobiliary surgery, head and neck cancer reconstructive surgery, burn care, thoracic surgery, and the bone marrow transplant programs, to name a few. The unit is physically organized into three separate pods: each pod has 12 physical spaces and there are currently 28 funded beds.

Patients and families are embraced as partners in care at the FMC ICU and we encourage their participation in daily interdisciplinary rounds. We have a very active and engaged Patient and Family Centred Care Committee with three Family/Patient Advisors as members. The last year has focused on using digital stories in healthcare practice, time to first contact with patients and improving awareness of patient personal preferences through a "Getting to Know Me" brochure. Future focus is on Name, Occupation and Duty (NOD) identification as well as improving family access to our unit.

Addressing the incidence and prevalence of delirium is one of the main priorities at FMC ICU. The adoption and use of delirium screening tools, delirium management guidelines, and multiple targeted interventions has become part of daily practice with a focus on early mobility in this last year. We continue to work closely with our colleagues across the province through the Critical Care SCN Delirium Collaborative.

In the fall of 2017 the zone wide model change for the ICU Outreach Program was implemented at FMC, moving from a physician led to an RN/RRT ramp up model. This significant change for both the Outreach Team & patient care areas it serves has been successful to date and evaluation will continue.

In an effort to create a workplace environment where all staff feel empowered to communicate with each other, town hall meetings for the unit occur quarterly. These meetings provide a forum for feedback on quality measures and safety issues and are meant to encourage open, honest dialogue between all team members.

Two specific critical care programs within FMC ICU that support all Southern Alberta include the neurocritical care program and the burn program for management of critically injured burn patients.

One of our ICU pods has been specifically designated to support trauma and neurologically injured patients. The neurocritical care program has two lead Neurointensivists who work alongside specialized Registered Nurses, Registered Respiratory Therapists and Clinical Nurse Educators to provide comprehensive care that is tailored to the patient through multi-modality monitoring. This includes monitoring of intracranial pressure, cerebral temperature and oxygenation levels and continuous EEG. This team approach helps to provide the highest standard of care to this complex patient population.

The FMC ICU also supports care of critically injured burn patients for Southern Alberta. Through close collaboration with the FMC Burns & Plastics Unit, we ensure burn patients are supported with standardized and evidence based best practice.

Dr. Paul Boucher, FMC Site Director
Kelly Coutts, FMC Patient Care Manager

Foothills Medical Centre Cardiovascular Intensive Care Unit

The Cardiovascular Intensive Care Unit (CVICU), Patient Care Unit 94 continues to strive for excellence. The recent unit expansion has been put to good use as the number of cardiac surgeries has increased again this year and will reach 1400 cases plus next year.

Our dynamic CVICU team has worked very successfully at developing improved clinical pathways, specifically we have implemented the following projects:

- Multidisciplinary transfer tool for CVICU discharge
- Mechanical ventilator weaning pathway
- Pain and sedation protocol
- Identification and management of delirium post op
- Management of cardiac arrest post sternotomy
- Standardization of VV and VA ECMO care pathways

Dr. Andre Ferland, FMC CVICU Site Director



Peter Lougheed Centre Intensive Care Unit



The Peter Lougheed Intensive Care unit supports patients with life threatening medical and surgical illnesses.

The PLC ICU is the second largest intensive care unit in the Calgary zone and currently has 18 funded medical/surgical ICU beds with the capacity to expand to 22 physical spaces during times of overcapacity or pandemic. We support the 500+ bed inpatient and outpatient units at the Peter Lougheed Centre as required for patients experiencing a sudden decline in health status through our physician consult service, 24/7 Code Blue team (cardiac and/or respiratory arrest) or our Outreach team. Our Outreach team is also available to consult on patients and complete follow-up visits on those patients who require them when discharged from our ICU to the inpatient units.

We are a closed unit, therefore all admissions to the unit are accepted by our intensivists. The PLC ICU is a teaching unit that includes Fellows, various levels of Residents, Clinical Clerks, Respiratory Therapy and Nursing students in their final practicum and the advanced stream of critical care from Mount Royal University.

The ICU also supports patients requiring ICU care for the Southern Alberta Renal Program, which covers southern Alberta, southern BC and areas of Saskatchewan.

Additionally, the PLC also houses the Chronic Ventilator Program for the Calgary zone. The Peter Lougheed is the Vascular Center for Southern Alberta and Eastern British

Columbia, so the ICU frequently supports these complex patients.

On average we have over 83% of our beds occupied in the year with peaks of 116% occupancy. Most of our population has multisystem organ dysfunction, sepsis, ILI (influenza like illness) or complicated vascular patients with other health issues. We also admit all vascular patients for limb salvage therapy requiring catheter directed TPA therapy.

Our current staffing model consists of a multidisciplinary team including Registered nurses, Registered Respiratory Therapists, Health Care Aids support by Clinical Nurse educators, Unit Clerks, Dietician, Physiotherapist, Occupation therapist, Clinical Pharmacist and a Social Worker. We also have access to the zonal shared resource of a Clinical Nurse Specialist and a QI Specialist that we can consult as needed and who provide support to the various initiatives either on site or as part of the Calgary zone.

We continue to work on a number of Quality Improvement projects, including Delirium, OR to ICU handover and ICU to OR handover, and DCD (donation after cardiac death).

The PLC ICU is focused on patient and family centered care. We encourage family participation during rounds conducted by the team. We have open visiting and open doors except at night after 2100 hrs.

We actively participate in many varied research projects within the Calgary zone and the University of Calgary.

Dr. Luc Berthiaume, PLC Site Director
Patty Infusino, PLC Patient Care Manager

Rockyview General Hospital Intensive Care Unit

The Rockyview Hospital is a 650 bed hospital with over 80,000 emergency visits and the center of excellence for urology in Southern Alberta.

The Rockyview ICU/CCU is a combined unit with 10 beds allocated to the Intensive Care area and 7 beds to the Coronary Care area. The day to day operations for both units is overseen by the manager and unit manager in conjunction with 24/7 clinicians.

All admissions to the unit are accepted by our Intensivists, as it is a closed unit. The RGH is a teaching unit; medical coverage is also supported by residents, medical students, ICU fellows and extenders for CCU.

The Outreach team at RGH does over 400 calls per year on the site. The new Outreach model relies on the RN/RT team to be the first point of contact with the Most Responsible Health Practitioner. This new model ensures that ICU physicians/ delegates are only called when necessary.

Our current staffing model consists of a multidisciplinary team including Registered Nurse, Registered Respiratory Therapists, Nursing attendants, clinical Pharmacists, Allied Health, and unit clerks who are supported through clinical nurse educators.

The ICU/CCU has been on the capital infrastructure list for many years with a shelled in space above the emergency ready for construction.

The unit is very active in the following initiatives with are supported by the Zone Critical Care resources including a Quality improvement specialist and Clinical Nurse specialist.

Unit Accomplishments

Patient and Family Centered Care

- Time to Contact
- Family presence at Rounds
- Critical Care Information wall/ Digital Signage
- Family Journals / Pagers
- Family Room upgrade
- Visitor/Patient Internet access



- End of Life Care Champions and Checklist
- White Rose – Compassion Cart program
- Leadership Rounds

Quality Improvement Initiatives

- Delirium Assessment and Management Processes
- Medication Reconciliation on Admission, Transfer and Discharge
- Safety Audits
- Safety Rounds
- Patient and Family Satisfaction Audits
- iPUP survey (PRESSURE ULCER Prevention and Management processes survey)
- Braden Scoring on admission and daily
- Hand Hygiene Auditing
- VTE (venous thromboembolism prophylaxis) audits
- Fall Risk assessment
- Falls Prevention
- Mobilization
- Least Restraints
- Hazardous Medication

Dr. Carla Chrusch, RGH Site Director

Melissa Redlich, RGH Patient Care Manager

South Health Campus Intensive Care Unit



The South Health Campus is the newest ICU/CCU in Calgary and celebrated its fifth birthday in February. The unit is a 10 bed ICU and 2 bed CCU that operates within the 4 pillars of the Campus: Innovation, Collaborative Practice, Wellness and Patient and Family Centered Care.

The ICU/CCU is a very collaborative team working toward achieving patient care goals. The nursing staff is comprised of all RNs along with Nurse Practitioners, Respiratory Therapists, Nursing Attendants, Service Workers, Unit Clerks, Physiotherapists, Dieticians, Pharmacists, Social Workers and Occupational Therapists. Our Intensivist team are responsible for all patients within the ICU with Cardiology leading the CCU.

The ICU/CCU supports the site with an Outreach Team as well as a Code Blue Team. The Code Blue Team is comprised of staff from both the ICU and ED.

Unit Accomplishments

- Enrollment of patients into DCCM Research initiatives
- Participation with the SCN Delirium Innovative Collaborative and subsequent unit work and practice changes
- Regular unit PFCC Committee Meetings with 2 advisors
- Referring of suitable patients to the DCCM ICU Recovery Clinic
 - Successful implementation of the updated Outreach Model
 - Participation in city wide Code Orange Simulation
 - Planning started for implementation of Therapeutic Plasma Exchange within the ICU

Dr. Juan Posadas, SHC Site Director
Rachel Taylor, SHC Patient Care Manager

Adoption and De-Adoption of Evidence-based Clinical Critical Care Practices

Dr. Niven began his appointment as Assistant Professor in the Departments of Critical Care Medicine and Community Health Sciences in April 2016. Since that time he has developed a research program focused on improving the adoption and de-adoption of high-value and low-value clinical critical care practices, respectively.

He recently published a scoping review examining the reproducibility of clinical research in critical care that identified 14 clinical practices with reproducible evidence of benefit, and 21 practices with reproducible evidence of no benefit (BMC Medicine 2018;16(1):26). Funding has been received from the MSI foundation to translate this list of 35 clinical practices into a prioritized, actionable agenda for practice change in ICUs in Alberta, beginning with feasibility testing in Edmonton ICUs.

This work is funded by the MSI foundation Department of Critical Care Medicine, O'Brien Institute for Public Health, and the Critical Care Strategic Clinical Network. Additional funding has been sought from CIHR to scale and spread this work to a national level.

Dr. Daniel Niven, Assistant Professor



Critical Care Fellows Communication Skills Curriculum

The Critical Care Fellows Communication Skills curriculum was developed from a local needs assessment, and involves 5 formal sessions delivered over a one year period combined with structured feedback during clinical rotations. Each formal session consists of an instructor-led interactive presentation followed by case-based simulated practice with an actor. The topics of the formal sessions include basic principles of communication, family meetings and goals of care conversations, disclosure of unanticipated medical events, addressing conflict, and organ donation.

Trainees are asked to obtain guided feedback during their ICU rotations. Forms were developed to guide multidisciplinary preceptors in observing and providing feedback to trainees on their communication skills in clinical practice. Trainees are also required to obtain feedback from family members of ICU patients on their communication skills, using the CARE instrument, which has been previously validated in the literature.

Fellows complete an evaluation following each formal session. Several trainees and faculty have also participated in interviews exploring their perceptions of the curriculum and feedback forms and have shared ideas for improving the curriculum and forms. Feedback from the trainees indicate that they appreciate the opportunity to participate in simulation and feedback around difficult conversations.

A description of the curriculum has been published in *Academic Medicine* (Acad Med 2017;92:501-505).

Amanda Roze des Ordon, MD FRCPC MMEd

Philippe Couillard, MD FRCPC

Christopher Doig, MD, MSc, FRCPC

Nursing Education & Development

Orientation Program

Registered Nurses (RNs) new to critical care are provided with a comprehensive six-week orientation program through the Orientation Program for Adult Critical Care Alberta (OPACCA). This Provincial Orientation course offers a system-based introduction to critical care nursing, providing all new hires important foundational knowledge and clinical skills.

RNs with previous critical care experience are supported with tailored orientation programs that cover content relevant to their unique learning needs. Welcoming an average of 4 RN's per month or 60 staff per year, Managers, Clinical Nurse Educators, Nurse Clinician teams, and currently practicing bedside ICU RNs work together to provide mentorship to support new staff.

Partnerships

- As partners with Mount Royal University and the University of Calgary, student nurses are welcomed each semester for final practicums within our Adult Intensive Care Units.
- Many critical care RNs currently practicing within the DCCM pursue post baccalaureate specialization through the Advanced Critical Care Nursing Program (ACCN) at Mount Royal University.
- Critical care nurses with 3 to 5 years of practice are encouraged to obtain National critical care certification through the Canadian Association of Critical Care Nurses (CACCN). Educators and advanced practice nurses offer a series of lectures to support registered nurses interested in obtaining this advanced certification.
- Critical care RNs within the Calgary Zone are supported by the Canadian Association of Critical Care Nurses (CACCN) Southern Alberta Chapter.

Continuing Education

Ongoing educational support for RNs within the DCCM is provided in numerous ways each year. Advancement of RN professional practice is supported through courses designed by the Clinical Nurse Educators to address

advanced clinical qualifications and topics such as code blue response, continuous renal replacement therapy, advanced hemodynamics, along with other tailored courses that address care of specific patient populations in critical care (examples include advanced cardiac care and care of vascular surgery, neurologically injured, and burn patients).

Implementations of new initiatives or practices within the DCCM are supported through targeted education and committee support. Over the past year this type of education has encompassed topics such as donation post cardiocirculatory death, delirium prevention & management, early mobilization, restraint as last resort, time to first family contact, and plasma exchange (PLEX) therapy.

In effort to support RNs in the maintenance of the vast amount of information required for practice, every existing Critical Care RN is provided an annual educational and qualification review day. Our zonal Clinical Nurse Educator team also facilitate various levels of inter professional simulation sessions each month, and offer professional development conferences. These internally hosted events focus on relevant critical care topics and at times partner with the Canadian Association of Critical Care Nurses (CACCN) Southern Alberta Chapter to host Critical Care RN Journal Clubs.



Quality Assurance Quality & Safety Improvement

The DCCM QAC operates as a zonal committee within the AHS QAC structure. The committee, chaired by Dr. Selena Au and Critical Care Executive Director Caroline Hatcher, has multi-site and multi-disciplinary representation and meets monthly. The committee continues to provide a mechanism of quality assurance to review all clinically serious adverse events resulting in harm, or concerning close calls with the potential to cause harm. The purpose of conducting quality assurance (QA) reviews is to identify system issues that may contribute to adverse events and to generate recommendations that, if implemented, may mitigate risk to future patients.

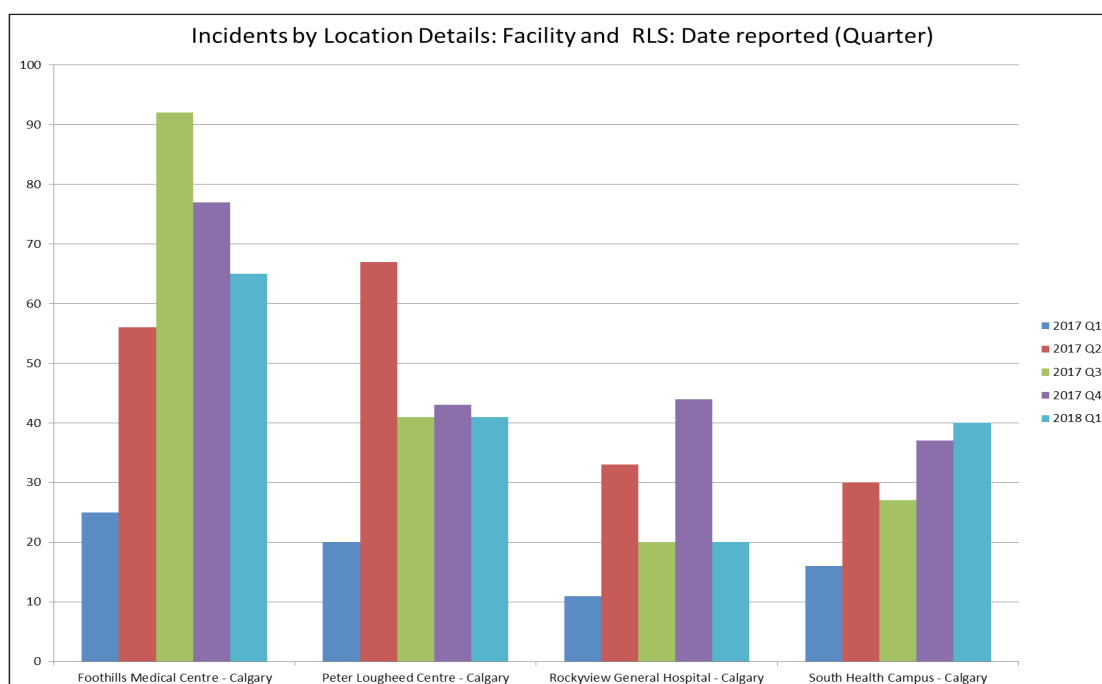
Since 2010 the DCCM QAC has completed 11 quality assurance reviews, with the last two completed in fiscal 2017-2018 year. A total of 25 recommendations were made from the 11 completed reviews. Of these 25 recommendations from the QA reviews 16 have been implemented in the critical care units in response to these events, 5 recommendation is currently in the process of implementation, 3 have not been started and 1 was abandoned with rational. A QAC Notifiable Events Guideline has been developed to guide and encourage staff in reporting events for review.

A zonal multi-disciplinary critical care Mortality Working Group (MWG) functions as a part of the DCCM QAC. The MWG partners with the Department of Pathology to review all deaths occurring in ICU or within 72 hours of ICU transfer or discharge, as well as any unexpected morbidity where concerns arise about system safety for the Calgary Zone. Findings from

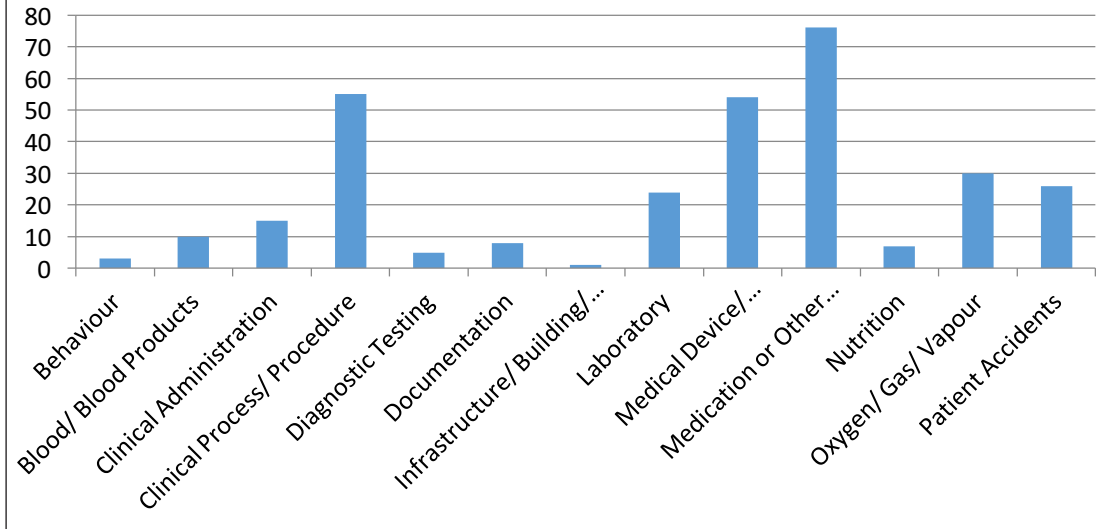
MWG meetings are brought to the QAC monthly for review and discussion to assess if further investigation is required. Safety learnings from reviews are edited to protect confidentiality and shared with staff, patient, and families in summary newsletters. Since 2016, 154 cases, including 76 autopsies, have been presented under the zonal MWG format.

A strong safety culture within the ICU promotes reporting any safety concerns directly to management and the Patient Safety office via the AHS Reporting & Learning System (RLS). The AHS RLS is a voluntary reporting system that provides an opportunity for staff/physicians to report hazards, close calls and adverse events with varying degrees of harm. All RLS reports are reviewed by management and/or medical leadership and appropriate follow-up occurs. Reports submitted confidentially are reviewed by the Patient Safety office and QAC as required. QA reviews are completed on specific events that offer opportunities to improve system safety.

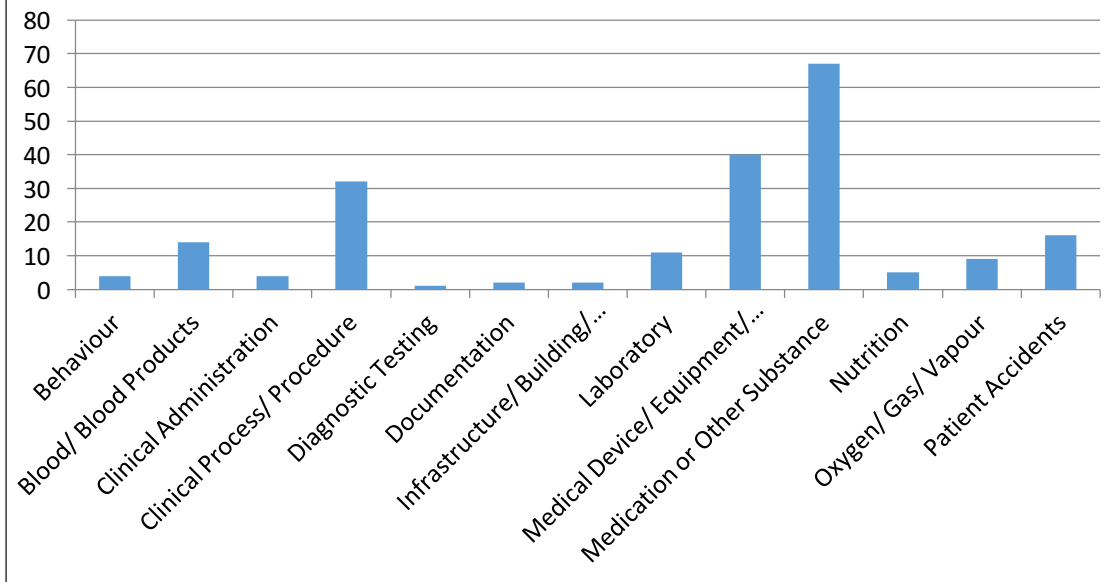
For the fiscal year of March 1, 2017 to March 1, 2018, 805 reports related to patients in the ICUs were submitted by staff and physicians. This number does not include reports that were submitted confidentially, or reports submitted by ICU staff/physicians related to patients outside the ICU. The number of reports received by each unit in each quarter is shown in the first figure. The second figure displays the trends in event types reported in all 4 adult ICUs. The subsequent figures show the trends in event types for each of the 4 adult intensive care units in the Calgary Zone.



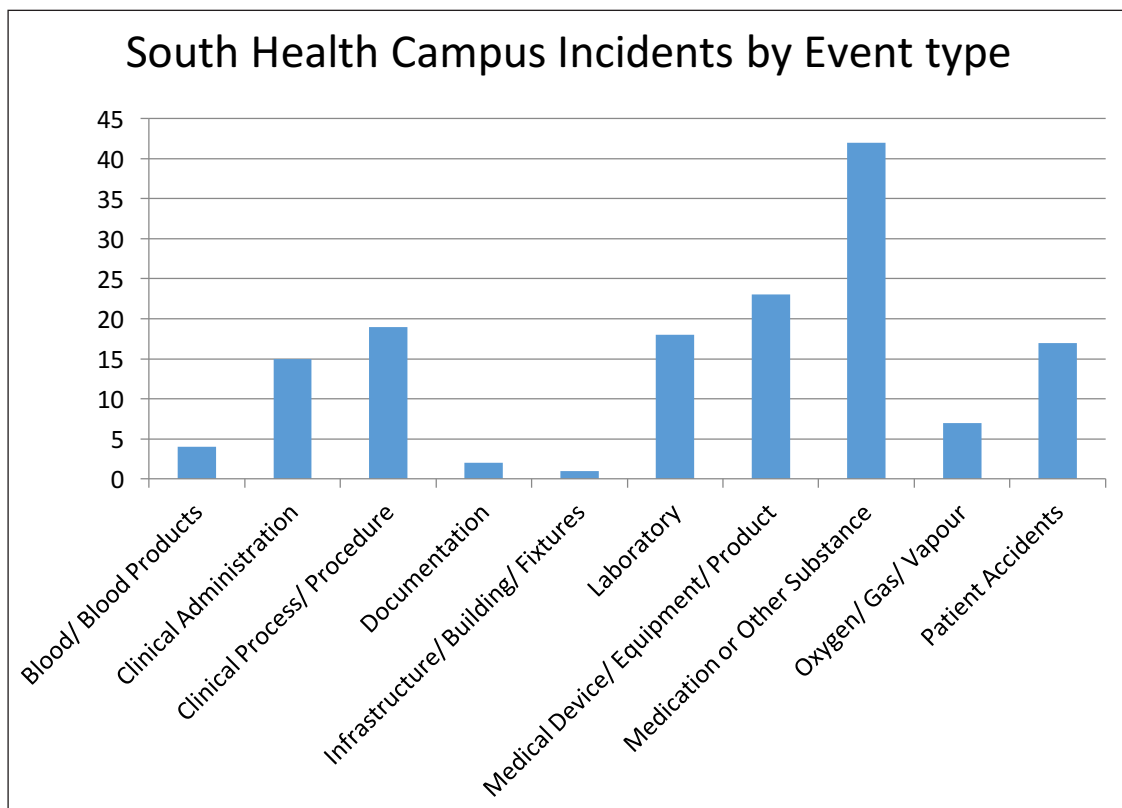
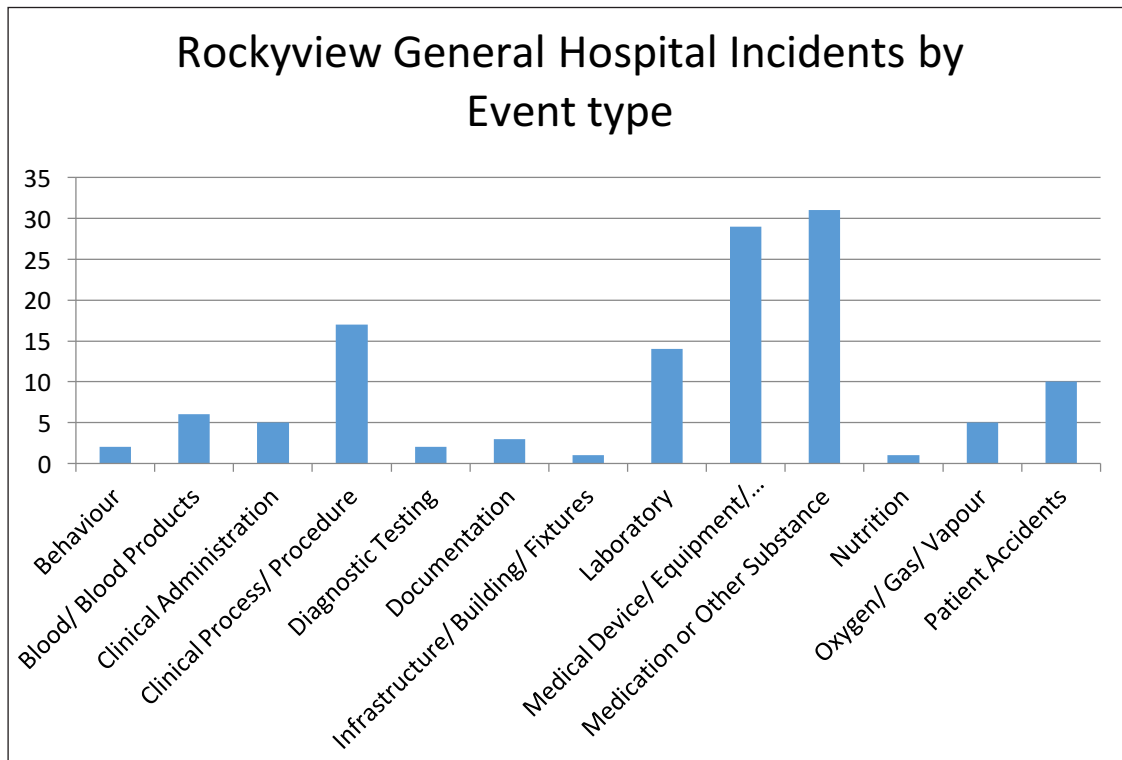
Foothills Medical Centre Incidents by Event type



Peter Lougheed Centre Incidents by Event type



Quality Assurance Quality & Safety Improvement *continued*



Quality Improvement

Quality Improvement at a National Level

The Department of Critical Care Medicine (DCCM) is committed to excellence in patient care and supports initiatives that focus on quality improvement (QI). This QI work includes sharing information within the community of providers locally, and with other health care jurisdictions within and outside of Canada. Information sharing allows the community of health care providers to openly question their practices while offering opportunities to learn and adopt better practices.

Quality Improvement at a Local Level

The DCCM defines and prioritizes QI initiatives annually. Site leadership and Medical Directors from each ICU endorse and engage in continuous QI work. Every QI initiative has interdisciplinary representation with accountable leadership, partnering in and sponsoring the improvement work.

Leadership with each project includes an operational manager, a physician lead and the department's QI lead. This triad works collaboratively to sponsor and guide the work. The QI teams meet regularly to plan, build understanding, implement and sustain the specific QI initiative they are focused on.

The interdisciplinary teams use tools from the Lean, 6Sigma, IHI Improvement Advisor, and Alberta Improvement Way (AIW) tool kits to guide the work. PROSCI change management principles are the foundation of every QI project. These principles support implementation of the improvement work at the front-line.

Quality Improvement Priorities

OR-ICU Handover Project Process

QAC reviews conducted in the former Calgary Health Region noted a system deficiency with the handover process from the Operating Room (OR) to the ICU (Intensive Care Unit). A recommendation was made to develop a standardized handover process to address this deficiency.

Development of a standardized inter-departmental clinical handover process between OR, PACU, and ICU began at the Foothills Medical Centre (FMC) in November 2014. The interdisciplinary team involved in the work included members from the OR and ICU teams:

- Registered Nurses and Nurse Clinicians
- Unit Clerks
- Respiratory Therapists
- Nursing Attendants
- Surgeons, Intensivists, and Anesthetists
- Residents and Fellows

As a result of the project work, the process of patient transfer from the OR to ICU was standardized. This work resulted in a streamlined patient handover process from the OR to the ICU.

Successful implementation of the standardized process occurred in April 2016. Once compliance measures for the new handover processes were consistently >85%, the program was evaluated using a pre-post survey methodology. Further analysis showed statistically significant improvements in 13 quality dimensions that were measured ($p < 0.001$).

Development of the standardized OR to ICU handover process occurred at the Peter Lougheed Centre (PLC) in 2017. The PLC used a similar process to FMC, with modifications that were relevant for the site. Concurrently, the PLC engaged in the successful development of the inverse handover process - ICU to OR. Implementation of both processes occurred in November 2017 with positive reviews. Compliance measurement and pre-post survey methodology will be used to evaluate these processes.

The OR to ICU process continues to be a relevant and important initiative across the zone. Work continues to sustain and spread the standardized process at the 2 other adult ICUs – Rockyview General Hospital (RGH) and the South Health Campus (SHC). Both sites have started preliminary work towards developing and implementing a similar standardized process. The inverse process implemented at PLC will be established at FMC, RGH and SHC.

Development and Implementation of an Electronic ICU Transfer Summary

Through the work of meeting accreditation standards, the importance of having an electronic transfer summary was prioritized as an area of improvement. The request was for an electronic summary that can be updated daily with pertinent patient information for the receiving inpatient physician. Rigorous research and QI methodology, was used to lead the interdisciplinary team to define elements that are required for an ICU transfer summary. In collaboration with the Sunrise Clinical Manger (SCM) team, the ICU transfer summary was developed and piloted in early 2018 for implementation in the fall of 2018.

Calgary Zone Patient and Family Centered Committee

The DCCM Patient and Family Centered Committee (PFCC) continues to meet. This committee includes family advisors and interdisciplinary representation from all adult ICUs in the Calgary Zone. Based on recommendations from the PFCC Steering Committee and approval from ICU Executive, site based PFCC committees were formed in early 2017.

The site based PFCC committees are composed of family advisors and interdisciplinary representation from the individual sites. Operational and medical leadership guide these meetings and bring forward any opportunities for improvement to the QI Lead and ICU Executive.

Devika Kashyap, Quality Improvement Lead

Quality Improvement Update

Quality Improvement Update

A large part of this year's DCCM Quality Improvement work was in conjunction with the Provincial Critical Care Strategic Clinical Network's Delirium Initiative.

All five of the Calgary Zone ICUs participated in the year-long SCN Delirium Learning Collaborative. This collaborative integrated the development of Provincial Delirium Assessment and Management KPIs with a scorecard process for site specific quality improvement activities. Performance indicators and Improvement activities included in the scorecards were:

- Sedation level (RASS) reporting
- Pain level (CPOT) reporting
- Pain Management
- Mobility assessment
- Mobilization plans and implementation per day
- Overall Delirium rates

In addition, individual ICUs continued to focus on site specific delirium management and mitigation strategies. Foothills Medical Center ICU was instrumental in the development and implementation of a Delirium focused "Rounding Tool". This tool helped support and guide consistent patient focused discussions regarding delirium assessments and management during rounds.

The South Health Campus, as well as the Foothills Medical Center Cardiovascular ICU, The Peter Lougheed Center ICU was innovative in their development of "SBT/Extubation Rounds". These respiratory focused rounds were integral in decreasing the time from successful completion of a SBT (spontaneous breathing trial) to extubation.

The Rockyview General Hospital ICU, in conjunction with the Provincial Mobility Working group, was instrumental in the development of a Readiness to Mobilize mobility assessment form. This form supports frontline providers to confidently assess for appropriate levels of mobilization and initiate mobilization earlier. In addition, Rockyview General Hospital ICU supported the development and improvement of mobility documentation within the provincial critical care electronic documentation system – MetaVision.

Melissa Redlich, Provincial Co-Lead for Delirium Initiative

Acute Respiratory Distress Syndrome Quality Improvement Project

Acute Respiratory Distress Syndrome (ARDS) is an inflammatory syndrome of the lungs that results in non-cardiogenic pulmonary edema leading to hypoxemic respiratory failure. ARDS is associated with a significant morbidity and mortality, and thus prompt recognition and treatment is crucial. Treatments for ARDS that have been shown to reduce mortality include minimizing pressure and volume during mechanical ventilation to prevent ventilator induced lung injury, as well as muscle relaxants and prone positioning.

Previous work by our project team (funded by a QI grant 2016/2017 Calgary Zone CMO/Medical Affairs as well as a Critical Care Strategic Clinical Network Seed Grant) demonstrated that ARDS is prevalent within the Calgary Zone and associated with significant morbidity and mortality. We estimate that approximately 9.2% of all Calgary Zone ICU patients meet full ARDS criteria by the Berlin Definition. 58.5% of ICU patients, who are mechanically ventilated for greater than 24 hours, go on to meet full ARDS criteria. This is important because patients with ARDS have a two-fold increase in ICU mortality, with patients in the severe ARDS category demonstrating a mortality rate of 55.6%. Application of evidence based care interventions is quite variable, particularly in the severe ARDS category. If we extrapolate our Calgary area incidence of ARDS to the province of Alberta we estimate approximately 951 cases of ARDS per year in Alberta, with an average hospital length of stay of 22 days, and that patients with ARDS accounts for a staggering 20,922 hospital days with over \$159,000,000 year spent annually on the hospital care and management of this select number of patients in Alberta.

In 2017 we conducted an expert-panel modified-Delphi Consensus process to determine the optimal evidence-informed management of ARDS. This included a multidisciplinary group of 30 experts (15 Physicians, 10 respiratory therapists, 4 registered nurses, 1 nurse practitioner) from 5 different ICUs in Calgary with a median of 17 years of clinical experience caring for patients with ARDS. We are currently externally validating this consensus bundle by surveying relevant frontline stakeholders from across Alberta. We have had an enthusiastic response with over 400 responses from tertiary, community, and regional ICUs across the province.

Our future work aims to implement and assess the efficacy of this bundle for diagnosis and treatment of ARDS. We hypothesize it will improve evidence based treatment compliance and local outcomes in patients with ARDS. The bundled treatment of ARDS is a novel and innovative concept and a potentially “low cost-low resource” intervention that may impact clinical outcomes and reduce inappropriate resource utilization. Our team has been awarded a follow-up grant in 2018 from the Calgary Zone CMO/Medical Affairs office to carry out this work.

Dr. Ken Parhar, QI ARDS Research Project Lead
Dr. Andrea Soo, Senior Biostatistician DCCM
Devika Kashyap , incoming DCCM Quality Improvement Consultant

Extracorporeal Life Support Program

Extracorporeal Life Support (ECLS) is a modality of life support used to oxygenate and remove carbon dioxide from the blood outside of the body in patients with catastrophic cardiac and respiratory failure. ECLS includes veno-venous extracorporeal membrane oxygenation (VV-ECMO), which is used to treat refractory respiratory failure, as well as veno-arterial extracorporeal membrane oxygenation (VA-ECMO), which is used to treat refractory cardiac failure.

ECLS has been provided at the Foothills Medical Center CVICU for several years. During the 2008/2009 H1N1 influenza epidemic there was a renewed interest in expanding the use of ECLS worldwide and also locally. Since then it has been used increasingly for refractory respiratory and cardiac failure. In 2015 a multidisciplinary ECLS committee was created to oversee and improve the delivery of ECLS within Calgary. The objectives of the ECLS committee have been to prioritize the provision of this resource intensive modality to those patients most likely to benefit, whilst improving safety and reducing morbidity during ECLS runs. 2016 was the first full year of the formalized ECLS program.

In 2017, 20 runs of in ECLS were performed in total (13 VA-ECMO and 7 VV-ECMO). In addition several notable accomplishments were made. The Calgary Health Trust generously agreed to support the upgrade of our equipment to a new state of art CardioHelp system. This system is due to arrive in 2018. This system will further promote patient safety through improved monitoring and ease of transport while minimizing risks to the patients such as air emboli and clotting. We continued with our formal ECLS quality improvement process which helped to help identify and address numerous issues to continue to improve safety and outcomes. Working with the data

analysis team at AHS we have now started capturing quality improvement outcomes electronically. Significant progress was also made on a clinical practice guideline for the use of ECLS post myocardial infarction. We are currently completing a systematic review to help guide the development of a pathway for patients who have suffered a myocardial infarction and require ECLS for refractory cardiac failure.

In 2018, we look to continue our momentum by rolling out our new comprehensive clinical guidelines for the use and provision of ECLS. We will continue to strengthen our collaborations with the ECLS program at the Alberta Children's Hospital to work on areas of mutual interest. We hope to hold our first joint pediatric and adult ECLS educational retreat in the fall of 2018. Finally we will continue to put the pieces in place to move towards being accredited by the international Extracorporeal Life Support Organization as a further commitment to providing the highest quality of care for patients requiring ECLS.

Dr. Ken Parhar, ECLS Committee Chair
Dr. Andre Ferland, CVICU Unit Director

Delirium in Critically Ill Patients

Since starting her position as an Assistant Professor in April 2016, Dr. Kirsten Fiest commenced a program of research focused on a patient and family-centered approach to the prevention, detection, and management of delirium in the critically ill.

Currently we are examining the validity and reliability of family-administered tools to identify delirium in critically ill patients admitted to the ICU. We are actively recruiting 145 patient and family member dyads to our Family ICU Delirium Detection Study (FIDDS) at the Foothills Medical Centre. Specifically, family members of ICU patients complete two delirium identification tools daily (FAM-CAM & “Sour Seven”), which will then be compared to a research nurse assessment as the reference standard.

We are also measuring symptoms of depression and anxiety in family members. We hope to improve both patient and family outcomes.

Funding for this work comes from the Canadian Institutes of Health Research, M.S.I. Foundation, Department of Critical Care Medicine, O’Brien Institute for Public Health, Cumming School of Medicine Clinical Research Fund, and the Critical Care Strategic Clinical Network.

Dr. Kirsten Fiest, Assistant Professor

Neurocritical Care

The Neurocritical Care service offers consultations for departmental members of Critical Care Medicine and Cardiac Sciences. Walk rounds with the neurosurgical team occur at least three times per week with the aim of integrating patient care, education and research specifically for patients with neurological injuries and diseases in the Foothills Medical Center multi-system ICU. The program supports and benefits from close collaboration with flagship teams such as the Calgary Comprehensive Epilepsy program, the Calgary Stroke program, the University of Calgary Spine program and the Regional Trauma Services. Drs. Couillard and Kramer are also available for telephone or in-person consultations at other Calgary hospitals.

More recently, a neurologist and a neurosurgeon have trained in the DCCM residency program and have had exposure and training in multimodality monitoring,

continuous EEG monitoring, neurologic critical care, and neuroprognostication. To expand and build on the current program, we hope to recruit two additional fellowship trained neurointensivists.

Multi-center research studies that are ongoing or have recently been completed include the landmark TBI Prognosis Study, Hemotion Trial (transfusion thresholds in traumatic brain injury), SaHaRA Trial (transfusion thresholds in subarachnoid hemorrhage), INDEX study (CT perfusion in the neurological determination of death), DePPaRT study (vital signs during dying process), and CAN TBI (biomarkers to predict outcome in traumatic brain injury).

Dr. Andreas Kramer
Dr. Philippe Couillard

Critical Care Rehabilitation

We are continuing to expand and refine the critical care rehabilitation service. We have focused on outpatient rehabilitation assessment and triage through the Calgary ICU Recovery Clinic (www.ahs.ca/icurecovery). In addition to the current outpatient clinic that runs at the Foothills Medical Centre, in the coming months we will launch an ICU Recovery Clinic outpatient service at the South Health Campus. This will provide better geographic coverage for the city. Our internal goal is that 10% of the discharges from the units in Calgary be assessed in the Calgary ICU Recovery clinic. We are continuing to focus on populations at risk of post-ICU sequelae (e.g. long ICU stays, mechanical ventilation, and special populations such as patients receiving ECLS).

In-unit initiatives are ongoing. Most of these efforts centre on whole-unit initiatives such as participation in delirium working-groups or contributing to the provincial mobility strategy. This year, we have secured resources to pilot adding a music therapist to the Foothills ICU. This initiative was championed by staff within the Foothills inpatient rehabilitation ward, but will be extended into critical care as a pilot for two years. The music therapy pilot will launch in May 2018.

We are continuing to develop and implement clinical support tools for the ICU Recovery Clinic through a clinical innovation grant that was awarded in 2017. These tools are designed with three goals in mind. First we are attempting to improve patient recruitment and flow into the ICU Recovery Clinic. Second, these tools will improve the use of clinical assessment data within the clinic itself. Third, we are focusing on improving reporting back to the ICU leadership teams on the outcomes of their former patients (in aggregate). Encouragingly, there is interest from other zones in leveraging off of what we have been building in Calgary.

In education, we routinely have medical students and residents attend the ICU Recovery Clinic as learners. Dr. Grant continues to be involved (in a modest way) with critical care fellowship training by presenting to the fellows through their academic program. This year we have presented a variety of audiences on critical care outcomes ranging from intensivists (at the Alberta Society of Intensive Care Physicians), nurses at the city-wide Fall Update, and related specialists (for example at the University of Calgary Department of Medicine Grand Rounds). Presentations scheduled this year range from presenting to national audiences (the Canadian Association of Physical Medicine and Rehabilitation annual meeting), provincial audiences (the delirium initiative through the strategic clinical network), and more local groups such as the Division of Geriatric Medicine here in Calgary.

In research, we continue to support existing department research initiatives where this makes sense. There are a variety of ongoing smaller research projects focused generally around cognitive and physical sequelae and outcomes of critical illness as we try to build the evidence base for this practice. Finally, we have started to build bridges to larger ICU outcomes research programs (such as bodies of work in Ontario) to build a national area focus around critical care rehabilitation.

Chris Grant, MD, Physical Medicine & Rehabilitation
Joanna Everson, NP, Critical Care Medicine

Organ & Tissue Donation

Whenever possible, offering the option of organ and tissue donation after death is an important aspect of high quality end-of-life care. Some patients and families find comfort in knowing that something positive is occurring despite their own personal tragedy and grief. Since 2014, the province of Alberta has maintained an on-line registry where a growing number of citizens are officially declaring in advance their intent to donate organs and tissues at the end of life. The Human Tissue and Organ Donation Act states that “when a person dies, the medical practitioner who makes the determination of death must consider and document in the patient record the medical suitability of the deceased person’s tissue or organs for transplantation” and (if suitable) “notify a donation organization”. Thus, it is essential that critical care professionals work together to ensure that the option of donating organs and tissues is provided whenever appropriate.

There were 35 deceased organ donors in Southern Alberta in 2017. This was the highest annual number on record. The recent increment is likely attributable to two main factors. First, in 2016, the Department of Critical Care Medicine introduced the option of donation after cardiocirculatory determination of death (DCD) in patients meeting certain criteria, beginning as a pilot project at the Foothills Medical Center (FMC). This program has since expanded to the Alberta Children’s Hospital (ACH), CVICU (Unit 94) and CICU (Unit 103). DCD accounts for a growing proportion of deceased organ donors. Second, the current opiate epidemic has led to an unusually large number of young patients that sustain hypoxic-ischemic encephalopathy following cardiac arrest, and in turn progress to neurological determination of death (NDD).

The development of a DCD policy was a major project initiated by the leadership of the Department of Critical Care Medicine beginning in late 2013. Policies and procedures were developed through a collaborative process. The DCD pilot project commenced at FMC on March 1, 2016. Between March 1, 2016 and February 28, 2018, there were 290 deaths in the FMC ICU that were attributable to a neurologic cause. Sixty-four patients (22%) progressed to NDD. In seven cases, this occurred several hours after a decision had been made to proceed with DCD. Of the remaining patients, the diagnosis was likely missed in one case, and four others were ineligible. Consent for organ donation was provided in 34 out of 52 cases where families were approached (65%).

A total of 67 patients met criteria for DCD. Consent for DCD was provided in 29/56 patients whose families were approached (52%; this includes one patient from CICU and one from CVICU, both of whom were transferred to the multi-system ICU). Of the 26 patients in whom consent was refused, 23 (88%) died in a time frame in which organ donation could have been possible.

Outcomes of the 29 patients in whom consent was obtained were as follows:

- 15 became DCD donors
- 7 progressed to NDD
- 2 did not die within the requisite time frame
- 1 went to the operating room, but there was an anatomic problem with kidneys
- 2 had hepatitis C, and no recipient could be found
- 2 had organs refused by the transplant team (poor organ function, ALS)

Two additional patients from ACH became DCD organ donors. One patient’s family at PLC gave consent for DCD, but the patient progressed to NDD.

The cause of death in potential DCD donors, in order of frequency, has included the following: hypoxic ischemic encephalopathy (44%), traumatic brain injury (28%), intracerebral hemorrhage (12%), subarachnoid hemorrhage (12%), and ischemic stroke (4%). The vast majority of (adult) potential DCD donors have died within two hours of WLST (16/17 = 94% in 2016-2017). The median time interval from WLST to death was 22 minutes, with a range of 12 to 198 minutes. As a result of zonal inclusion criteria, patients have all had severe brain injuries, with 82% having a Glasgow Coma Scale score of 3 prior to WLST, and 71% having absence of at least one pupillary light reflex. Pre-mortem heparin has been administered in the majority of cases, at a dose of about 80 units/kg (range 2000 to 10,000 units).

In 2016-2017, there were 23 kidney transplants performed using grafts from Calgary DCD donors. Since 2009, there have been 46 DCD kidney transplants performed in Edmonton. The provincial rate of delayed graft function (need for dialysis within the first week post-transplant) is 64%. Donor predictors of delayed graft function were older age, cerebrovascular disease, higher creatinine concentration and higher temperature. The six-month survival rate among kidney transplant recipients has been 94%.

In the next 1-2 years, the DCD program will expand to the Rockyview Hospital and South Health Campuses. DCD eligibility criteria, including organ-specific age and warm ischemic time thresholds, will require ongoing (re) evaluation. Other aspect of the DCD protocol will also continue to be refined based on initial experience.

For the fiscal year 2017-2018, there were 362 deaths in Calgary adult ICUs. In 44 cases, the family provided assent for ocular or tissue donation. Family refusal rates for tissue donation rates are substantially higher than for organ donation.

***Dr. Andreas Kramer, Clinical Associate Professor
Medical Director, Southern Alberta Organ & Tissue
Donation Program***

ICU Outreach Program Data Tables

Median Age	25th Percentile	75th Percentile
67	55	79

Change in Goals of Care	N	%
R-->M	37	2.20
R-->C	15	0.89
M-->R	8	0.48

# Calls/Shift	N	%
0701 - 1600	751	44.68
1601 - 2300	518	30.81
2301 - 0700	412	24.51

ICU Outreach Program – Rapid Response Team

ICU Outreach Team

The ICU Outreach Program is housed within the Critical Care Program spanning all 4 adult acute care sites in the Calgary Zone. The Outreach Program functions with a team that is led by a Registered Nurse (RN) and a Registered Respiratory Therapist (RRT) with direct access to physician support when needed.

During the reporting period from January 01, 2017 to December 31, 2017:

- ICU Outreach Teams have responded to 1542 Code 66 calls - 128 calls per month.
- The majority of patients remain on the nursing units with 18% requiring transfer to ICU.
- The most common reason for Outreach team activation is decreased level of consciousness (52%) followed by hypotension/tachycardia (40%).
- The median response time for a code 66 is 5 minutes (3, 7)
- The median length of time spent on a call is 44 minutes (25, 68).
- There were 2125 follow-up visits completed by the team.

Outreach Program Objectives

- Reduce cardiac arrest rates, Code Blue calls and overall hospital mortality through early recognition of changes in physiology and clinical status
- Continuity of care for patients discharged from the ICU
- Developing an educational partnership with non-critical care units by sharing critical care skills and expertise

System Improvement

In 2017, ICU Executive Council endorsed a modification to the Outreach Program. This was presented to and approved by Senior Executive and Zone Medical Affairs. The rationale for the change was:

- The majority of outreach calls did not require ICU admission
- The primary role of the most responsible physician caring for a patient needed to be clear to all staff and care providers
- The ICU physician resource must be triaged appropriately and utilized effectively.

As such, the proposal to modify Outreach services from a physician led model to an RN and RRT led, physician supported model went forward.

The new model for ICU outreach service delivery involves the RN/RT attending all code 66 calls with the Intensivist or delegate called upon as needed. This new model was implemented on September 18, 2017.

Over the last two years, an interdisciplinary working group convened to explore and define the new model for Outreach services delivery in the Calgary zone. The following has been accomplished over the last year.

- Mapping the current state processes for Code 66 calls and follow up visits.
- Defining standard operating procedures for ICU outreach response as it relates to different call categories to support the RN and RRT led approach. This work included defining roles, responsibilities and expectations for the different categories of calls (Level 1, 2 &3); reviewing and refining the 26 pre-existing guiding documents into 3 comprehensive documents.
- Before the new model was implemented, a survey was conducted to analyze the ease of categorizing Code 66 calls. The data showed (n=345, response rate=75%) high inter-rater reliability amongst Outreach RN's, RRT's and Outreach physicians when categorizing the acuity of the calls (>0.9 with a weighted kappa of 0.78). All Code 66 calls were categorized accurately within 1 to 3-minutes of arrival.

- The appropriateness for the proposed model change was validated when reviewing the data on call volume by type of call for the physician led model; 43% to 77% of calls were categorized as C or D, in other words, not requiring intervention by an Outreach physician. Understanding Code 66 response type (A, B, C, D) as it relates to patient status and physician resources was a key factor in determining the acceptability of a model change involving the RN and RRT leading outreach services.
- Current follow-up processes for the Outreach team were reviewed systematically. This included a review of historical follow up activity, relevant literature and local data showcasing ICU readmission rates (24 and 48-hour) and cardiac arrest rates/1000 discharges. From direction of the ICU Executive Leadership team, ICU Outreach follow-up will only be provided on case by case basis, as required.
- Refining Outreach program key performance indicators (KPI) to include process, outcome and balancing measures. To support this work, the web-application that tracks the activity and other KPI measures for the Outreach Program were changed to ensure program measures are tracked without the need for duplicate charting from the Outreach RN/Outreach RRT.

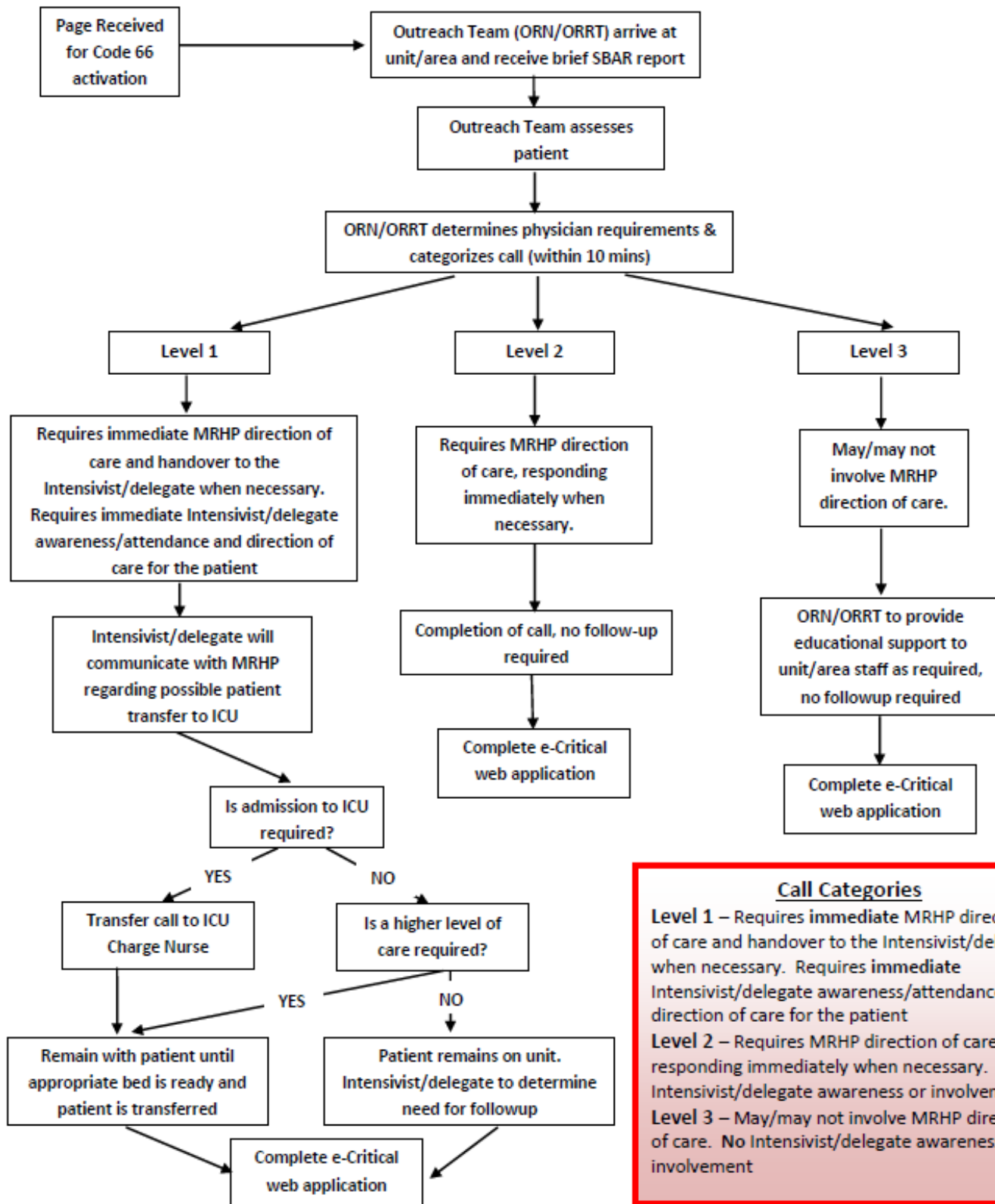
Outreach Program Coverage

In 2017, we encountered challenges in physician coverage which was compounded by PARA Call restrictions. This limited BSP availability in replacing vacancies. We have been addressing this by recruiting to our full FTE.

***Dr. John Kortbeek, ICU Outreach Program Director
Kevin Sedor, ICU Outreach Program Assistant***

ICU Outreach Program – Rapid Response Team *continued*

Process Map for Code 66 Calls



Call Categories

Level 1 – Requires immediate MRHP direction of care and handover to the Intensivist/delegate when necessary. Requires immediate Intensivist/delegate awareness/attendance and direction of care for the patient

Level 2 – Requires MRHP direction of care, responding immediately when necessary. No Intensivist/delegate awareness or involvement

Level 3 – May/may not involve MRHP direction of care. No Intensivist/delegate awareness or involvement

DCCM Research Summary

In 2017 more than 2,700 were admitted to four general system intensive care units (ICU) across the Calgary Zone with an average stay of 7 days. This is where patients with life threatening, complex medical conditions are treated by highly trained multidisciplinary teams which include Registered Nurses, Respiratory Therapists, Pharmacists, Physiotherapists, Occupational Therapists, Speech Language Pathologists, Dieticians, Intensivists, Physiatriests, and Researchers.

The goal of our Department is to lead and partner in research initiatives to develop and implement new knowledge to provide the best care for critically ill patients. This past year in consultation with 28 Departmental members we developed and began to implement a new five-year strategic research plan (2018-2023) (<https://myahs.ca/iweb/clin/icu/research/DCCM%20SRP%20FINAL.pdf>). Our plan is anchored in three goals and six strategic principles.

Research Goals:

1. Building a research culture
2. Building research capacity
3. Successfully operationalizing research

Strategic Principles:

1. All patients are provided with an opportunity to participate in research
2. All Departmental members are engaged in research
3. Research is anchored in the care of critically ill patients
4. Research is designed to benefit current and future patients
5. Research is designed to benefit Departmental members
6. Research is budget neutral

Our Department has much research to celebrate and notable highlights are summarized below.

Notable Highlights:

Biomedical:

The Translational Laboratory in Critical Care Medicine, under the direction of Dr. Paul Kubes, continues to foster collaborations between clinicians and basic scientists. The lab is committed to understanding complex immune responses in the context of human clinical disease. The lab continues to develop new and innovative approaches to assess biomarkers associated with critical illness and is optimizing novel, in-house assays to measure markers of inflammation, infection and tissue damage reflected in their on-going contribution to numerous publications in the past year.

The Jenne Lab, led by Dr. Craig Jenne, focuses on infectious disease, using intravital microscopy to better understand how the immune system recognizes and responds to pathogens. This research aims to identify mechanism modulate the immune response, improving the clearance of pathogens while limiting collateral tissue damage.

Of particular interest is a research project examining how infectious disease leads to the activation of intravascular coagulation. This project, in collaboration with Dr. Braedon McDonald, has identified a number of key immune molecules that directly interact with the coagulation cascade, leading to the initiation of clotting, reduced vascular perfusion and tissue damage. Additional studies have begun to link pathogen-mediated activation of the clotting cascade with tissue damage associated with severe influenza infection. These studies open exciting new therapeutic avenues for the potential treatment of patients with influenza.

DCCM Research Summary *continued*

Clinical:

2017 was a year for growth and redevelopment for the DCCM Clinical Research group. A comprehensive review with 28 Department of Critical Care Medicine members led to the development of the 2018 -2023 Department of Critical Care Medicine Strategic Research Plan which identified areas of strength but also outlined three areas of improvement to help guide the department in addressing barriers to on-going clinical research.

Several new studies were initiated in 2017 including:

- Lyric Promote Study (Stelfox/Posadas): This is a multicenter, randomized, double-blind, comparator-controlled study with a lead-in Observation Phase looking to evaluate the effect of multiple daily intravenous (IV) doses of ulimorelin on the proportion of the target daily protein and target daily calories received through enteral nutrition by mechanically ventilated and tube-fed patients with EFI.
- Probiotics to prevent Severe Pneumonia and Endotracheal Colonization Trial: Prospect study (Niven/Stelfox): this trial seeks to determine the effect of enteral *L. rhamnosus* GG on VAP, other ICU-acquired infections, diarrhea, antibiotic use, duration of mechanical ventilation, ICU and hospital length of stay, ICU and hospital mortality compared to placebo among mechanically ventilated critically ill patients.
- CAN-TBI: A National Biobank and Database for Patients with Traumatic Brain Injury (Winston): The goal of this study is to establish a sustainable platform to improve operations and capabilities of existing regional biobanks and to link them to a national database of children and adults with TBI, all in support TBI research in Canada

In 2017 more than 150 patients were enrolled across 11 different clinical studies in ICUs across the Calgary zone. The DCCM Clinical Research team prioritized developing a more transparent approach to financial tracking and placed emphasis on addressing backlogs in both finance and research administration. As a result these modifications the 2017/18 fiscal year ended with a deficit of \$3,237.72 as compared to the \$157,700.63 deficit in 2016/17. The most recent Department Research Report can be found in Appendix VIII.

Health Services Research:

In 2017, members of the DCCM contributed to a total of 77 peer reviewed scholarly publications and 34 peer reviewed abstracts (presented at national and international conventions). Grant support was strong with members receiving funding from Alberta Health Services, Canadian Institutes of Health Research (CIHR), the Canadian Frailty Network (Centres of Excellence of Canada), the Critical Care Strategic Clinical Network, the Lung Association of Alberta, M.S.I. Foundation, the Royal College of Physicians and Surgeons of Canada and the University of Calgary. A complete list of departmental publications and grants can be found in Appendix IX.

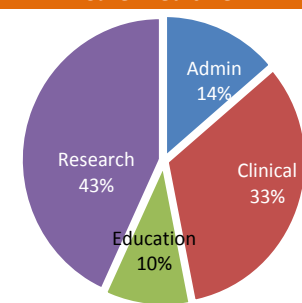
Annual Report 2016-17 - Critical Care Medicine

Prepared by OFA - Sept 2017

FTE² of Professors, Associate Professors and Assistant Professors

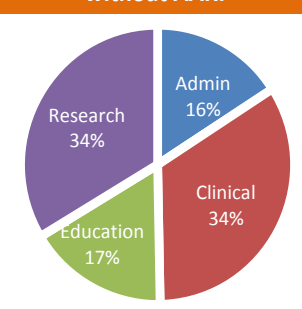
FTE ²	2013				2014				2015				2016 ¹							
	Critical Care Medicine				Basic Sciences				Clinical Depts w. AARP				Clinical Depts w/out AARP							
	6				6				6				8							
	130				131				126				129							
	231				225				220				221							
	151				154				152				156							
	CSM				512				510				498				506			

Activity Profile 2016 Critical Care Medicine



RE ³	Research Equivalents RE ³				
	2013	2014	2015	2016	
	2.5	2.6	2.4	3.5	
	68.4	69.4	66.8	67.9	
	81.6	80.3	81.4	80.6	
	46.7	50.2	50.9	52.4	
	CSM	196.7	199.9	199.1	201.0

Activity Profile 2016 - Clinical without AARP

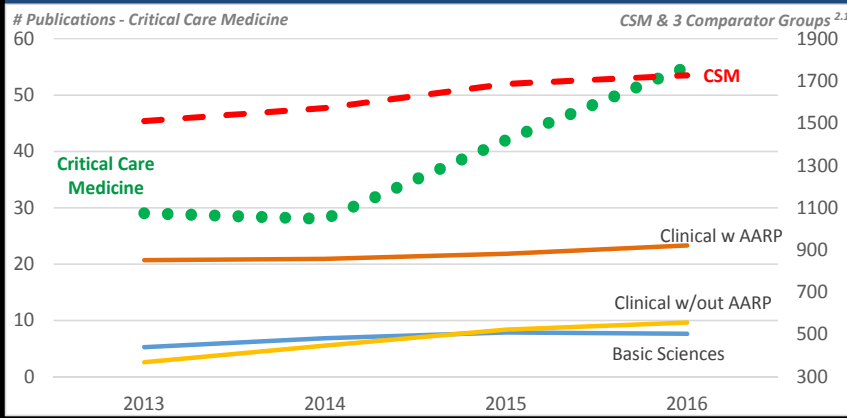


Total Research Revenue ⁴	Total Research Revenue ⁴				Total Research Revenue per RE				
	2014	2015	2016	2017	2014	2015	2016	2017	
	\$2. M	\$1.1 M	\$1.5 M	\$1.9 M	\$0.8 M	\$0.4 M	\$0.6 M	\$0.5 M	
	\$48.3 M	\$45.7 M	\$43.7 M	\$41.6 M	\$0.7 M	\$0.7 M	\$0.7 M	\$0.6 M	
	\$53.9 M	\$54.4 M	\$65.6 M	\$62.9 M	\$0.7 M	\$0.7 M	\$0.8 M	\$0.8 M	
	\$27.2 M	\$25.9 M	\$24.2 M	\$27.6 M	\$0.6 M	\$0.5 M	\$0.5 M	\$0.5 M	
	CSM	\$158.6 M	\$172.7 M	\$167.1 M	\$164. M	\$0.8 M	\$0.9 M	\$0.8 M	\$0.8 M

CIHR Revenue ⁵	CIHR Research Revenue ⁵				CIHR Research Revenue per RE				
	2014	2015	2016	2017	2014	2015	2016	2017	
	\$0.3 M	\$0.3 M	\$0.4 M	\$0.8 M	\$0.1 M	\$0.1 M	\$0.2 M	\$0.2 M	
	\$16. M	\$15.3 M	\$14.6 M	\$14.6 M	\$0.2 M	\$0.2 M	\$0.2 M	\$0.2 M	
	\$8.5 M	\$10.5 M	\$12.5 M	\$13.1 M	\$0.1 M	\$0.1 M	\$0.2 M	\$0.2 M	
	\$1.8 M	\$2.6 M	\$3.3 M	\$5.2 M	\$0. M	\$0.1 M	\$0.1 M	\$0.1 M	
	CSM	\$26.3 M	\$28.4 M	\$30.4 M	\$33. M	\$0.1 M	\$0.1 M	\$0.2 M	\$0.2 M

Clinical Research Revenue ⁶	Clinical Research Revenue ⁶				Clinical Research Revenue per RE				
	2014	2015	2016	2017	2014	2015	2016	2017	
	\$0.35 M	\$0.355 M	\$0.405 M	\$1.428 M	\$0.141 M	\$0.135 M	\$0.17 M	\$0.414 M	
	\$0.2 M	\$0. M	\$1.8 M	\$6.7 M	\$0. M	\$0. M	\$0.03 M	\$0.1 M	
	\$11.3 M	\$12.3 M	\$16.1 M	\$34.9 M	\$0.1 M	\$0.2 M	\$0.2 M	\$0.4 M	
	\$2.8 M	\$2.4 M	\$3.9 M	\$16.9 M	\$0.1 M	\$0. M	\$0.1 M	\$0.3 M	
	CSM	\$14.4 M	\$14.8 M	\$23.2 M	\$58.9 M	\$0.1 M	\$0.1 M	\$0.1 M	\$0.3 M

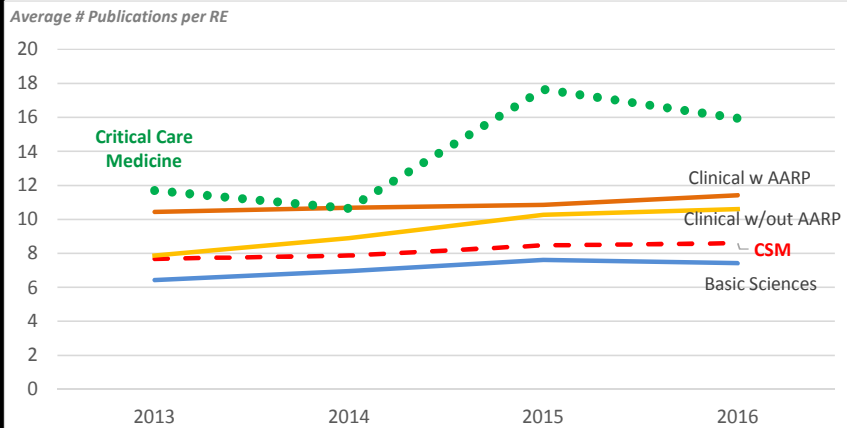
Publications⁷



Average # Publications per FTE⁸

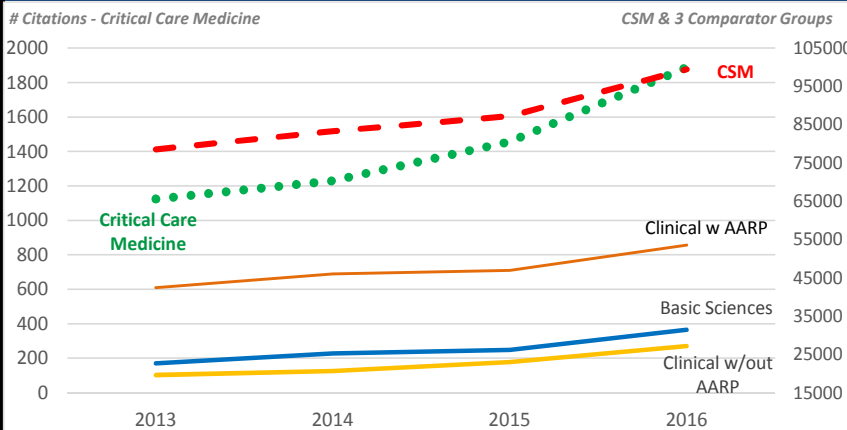
	2013	2014	2015	2016
Critical Care Medicine	4.8	4.7	7.0	6.9
CSM	2.9	3.1	3.4	3.4
Basic Science	3.4	3.7	4.0	3.9
Clinical Depts with AARP	3.7	3.8	4.0	4.2
Clinical Depts w/out AARP	2.4	2.9	3.4	3.6

Average # Publications per RE⁹



	2013	2014	2015	2016
Critical Care Medicine	11.7	10.6	17.6	15.9
CSM	7.7	7.9	8.5	8.6
Basic Science	6.4	6.9	7.6	7.4
Clinical Depts w. AARP	10.4	10.7	10.8	11.4
Clinical Depts w/out AARP	7.9	8.9	10.3	10.6

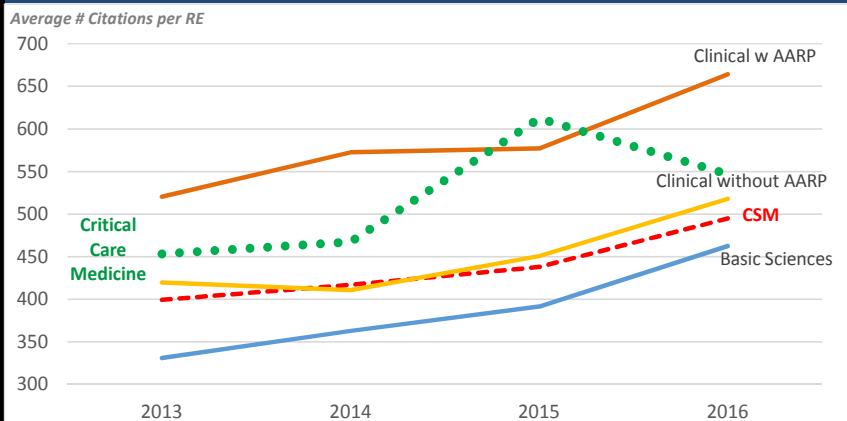
Citations¹⁰



Average # Citations per FTE¹¹

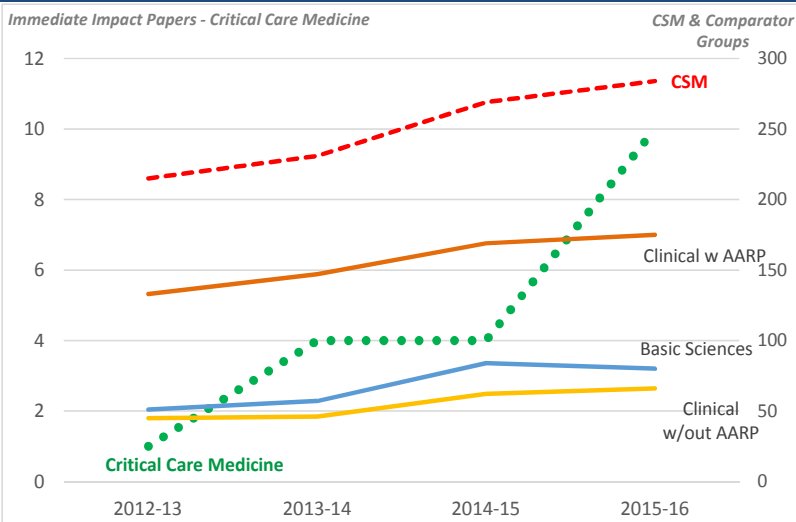
	2013	2014	2015	2016
Critical Care Medicine	187.3	204.8	242.8	235.9
CSM	153.4	163.4	175.1	196.5
Basic Science	174.1	192.2	207.5	243.4
Clinical Depts w. AARP	183.7	204.4	213.3	242.3
Clinical Depts w/out AARP	129.8	133.9	151.0	174.1

Average # Citations per RE¹²



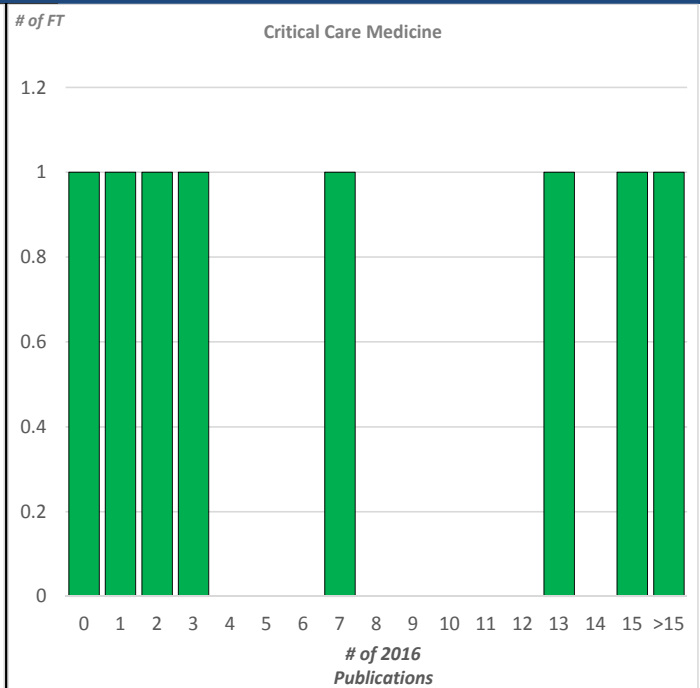
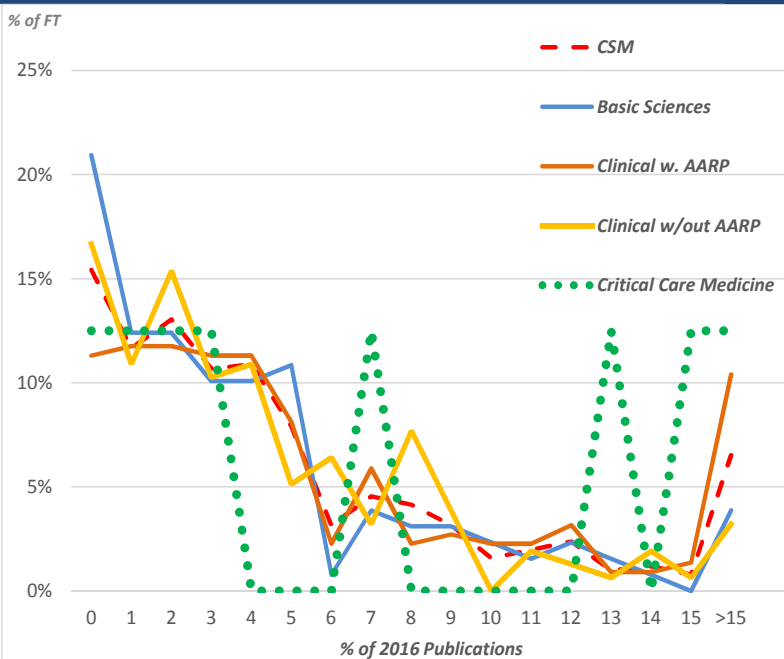
	2013	2014	2015	2016
Critical Care Medicine	453.2	467.3	612.2	547.0
CSM	399.3	416.7	438.0	494.9
Basic Science	331.0	362.9	391.2	462.5
Clinical Depts w. AARP	520.4	572.3	576.8	664.2
Clinical Depts w/out AARP	419.5	410.8	450.7	517.9

Immediate Impact Papers (Publications cited >49 times in first 5 years¹³)



	2013	2014	2015	2016
Critical Care Medicine	1	4	4	10
CSM	231	269	284	348
Basic Science	57	84	80	99
Clinical Depts w. AARP	147	169	175	204
Clinical Depts w/out AARP	46	62	66	91

Productivity among FT in 2016¹⁴



Notes

Term	Description	Source of data
1. Year 2016-17	<p>Primary dates of measurement for 2016-17 reporting are: - 31 Dec 2016: FTE</p> <p>Primary periods of measurement for 2015-16 reporting are: - 1 Jan-31 Dec 2016: Publications, Citations; - 1 Apr 2016-31 Mar 2017: Revenue; - 1 Jul 2016-30 Jun 2017: Activity Profile, Research Equivalent.</p>	
2. FTE	Full-time Academic Staff with Ranks of Professor, Associate Professor or Assistant Professor, Instructor, Senior Instructor.	Annual Factbook by the UCalgary Office of Institutional Analysis
2.1 Comparator Groups	<p>1) Basic Sciences - Biochemistry, - Cell Biology & Anatomy, - Community Health Sciences, - Microbiology Immunology & Infectious Diseases, - Physiology & Pharmacology</p> <p>2) Clinical with AARP - Cardiac Science - Clinical Neuroscience - Family Medicine - Medicine - Paediatrics</p> <p>3) Clinical without AARP - Anaesthesia - Critical Care Medicine - Emergency Medicine - Medical Genetics - Obstetrics & Gynaecology - Oncology - Pathology & Laboratory Medicine - Psychiatry - Radiology - Surgery</p>	
3. Research Equivalent (RE)	<p>Annual Sum of %Time for Research (as reported in ARO) / 100, for FTE faculty (see Note 2).</p> <p>Note: To account for CSM Academic Staff members with no time allocations reported in the ARO, the previous year's time allocation is used. If the previous year's time allocation is also blank, then the department average is assigned.</p>	Academic Report Online
4. Research Revenue	Defined according to CSM Financial Reporting guidelines	Enterprise Reporting\Research & Trust Accounting datamart
5. CIHR Revenue	<p>Research revenue export (see Note 4), where: - IF Account Description = ("CIHR Grants" OR "CIHR Authorized Transfers") OR Tri-Council Source = "CIHR" AND Account Description <> ("CIHR Grants" OR "CIHR Authorized Transfers")</p>	Enterprise Reporting\Research & Trust Accounting datamart
6. Clinical Research Revenue	<p>Research revenue export (see Note 4), where" Purpose of Funds = "Clinical Trials" OR "Clinical Research" * In 201617, all revenue assigned to projects involving 'Grant Sponsored Clinical Trials' was classified as 'Clinical Research'. In 201516, only 47% of revenue assigned to projects involving 'Grant Sponsored Clinical Trials' was classified as 'Clinical Research'. This led to a large increase in 'Clinical Research' revenue in 201617 from 201516</p>	Enterprise Reporting\Research & Trust Accounting datamart
7. Publications	<p>Only publications of Document Types "Article", "Review", "Editorial", "Case Report", "Clinical Trial" and "Book" are included; This is the total number of publications in a year for Department/Comparator Group/CSM FTE faculty of the same year. Papers co-authored by more than 1 FTE faculty member will be counted once within the same Group.</p>	<p>Web of Science; - CV from Authors sent to Office of Faculty Analysis (OFA) in 2014-17</p>
8. Average # Publications per FTE Faculty	Total # of Publications (see Note 7) / # FTEs for Department, Comparator Group or CSM (see Note 2)	(See Note 7)
9. Average # Publications per RE	Total # of Publications (see Note 7) / RE (see Note 3)	(See Note 7)
10. Citations	Total citations in a year for all unique career publications by FTE faculty of the same year	(See Note 7)
11 Average # Citations per FTE Faculty	Total # of Citations (see Note 12) divided by # of FTE faculty (see Note 2)	(See Note 7)
12. Average # Citations per RE	Total # of Citations (see Note 12) divided by RE (see Note 3) of FTE faculty	(See Note 7)
13. Publications cited > 49 first 5 years	Unique publications cited > 49 in the first 5 years of a 5 year publication date window (ie: For 2016, Sum of unique publications published in 5 year window 2012-16 with citation counts in years 2012 -16 greater than 49)	(See Note 7)
14. Productivity among FT in 2016	All calculations in these charts are using the Total # of Publications for FTE Faculty. For example, 3 Professors in same Department co-authored a publication, this publication will be counted for all 3 Professors and thus will be counted as 3 in the Department total.	(See Note 7)

Department of Critical Care Medicine Education Office Highlights

Critical Care Medicine Residency Program

The University of Calgary has trained adult critical care physicians since 1988 and the Royal College of Physicians and Surgeons survey fully accredited our Critical Care Medicine (CCM) Training Program once again in February 2015. Physicians who have graduated from our Training Program have gone on to practice in a variety of both tertiary and secondary centers across Canada and the United States. In addition to their clinical practice, many have gone on to assume leadership positions in administration, research and education in their respective centers.

Presently, there are nine trainees in our CCM Training Program from a variety of base specialty backgrounds (e.g., Internal Medicine, Respiriology, Nephrology, Neurology). We continue to provide entry positions for four trainees each year with a guarantee of two years of funding. Last year recruitment was again highly successful with four applicants from across Canada choosing to pursue CCM training at the University of Calgary. Over the years the Training Program has built a solid national reputation, if one trusts the fact that we have witnessed strong numbers of external applicants and that we consistently match into all of our offered training positions.

Education Curriculum

In addition to outstanding clinical patient care opportunities afforded at the University of Calgary, we continue to strive to improve and grow our formal educational curriculum for CCM trainees. Notable aspects include: a weekly core content curriculum, monthly journal club, monthly morbidity and mortality working group, monthly clinicopathological correlation, multi-professional high-fidelity simulation as well as weekly city-wide grand rounds.

Our core content curriculum covers the foundational expertise required of a CCM specialist across all CanMEDS domains. Educational sessions as part of the core content curriculum are provided by a combination of Departmental attending physicians and local experts and are designed in a small-group, interactive format to maximize participation.

Our residents also continue to participate in a variety of PGME-sponsored workshops, including sessions on Teaching techniques, Biomedical Ethics and Medical-Legal aspects of practice. Our trainees were also enrolled into a variety of clinical workshops during the year, including Introduction to Bronchoscopy and Difficult Airway Management. This full day workshop integrates didactic and hands-on skills stations to develop strategies and refine techniques for dealing with patients with difficult airways. This interprofessional collaboration is now in its sixth year and targets approximately 40 participant learners per workshop from a number of disciplines including CCM, Anesthesia, Emergency Medicine, Otolaryngology and Respiriology. It also includes involvement from the regional Respiratory Therapists as well as our Critical Care Outreach physicians and DCCM nurse practitioners and physician assistants. This year we were pleased to continue our expanded enrolment to also include residents from Cardiology and General Internal Medicine in our participant pool.

Multiprofessional Simulation

The last twelve months have witnessed substantial reengagement in embedding and improving multi-professional simulation as an educational tool for our Department. Our monthly Level II or advanced simulation sessions see our CCM trainees, ICU nurses and respiratory therapists participate in high-fidelity simulation scenarios preceptored by DCCM faculty and supported by our nurse educators and respiratory therapists as well as our provincial eSIM colleagues. Participant feedback has been very positive. This year we have continued to work on our vision to develop engaging simulation opportunities for DCCM attending physicians. In the months ahead we will be offering our first Level III high-fidelity, multiprofessional simulation sessions with our own ICU attending physicians as participants. We anticipate this will prove fruitful in augmenting team-based competence and multiprofessional trust in our Department.

Department of Critical Care Medicine Education Office Highlights

Continuing Professional Development

High caliber citywide CCM Grand rounds continue to be a weekly staple as part of our continuing professional development. These are recorded and archived along with the presentation slides. Both are available for review on our website: <http://iweb.calgaryhealthregion.ca/clin/icu/education/index.html>.

MDSC Program

A number of years ago a Critical Care MSc/PhD graduate training program was developed within the University Of Calgary Department Of Medical Sciences in an attempt to better support departmental academic activities. It offers CCM residents and graduate students an improved and more structured education environment to further their academic pursuits. Presently there are 3 graduate courses offered: the Fundamental Basis of Critical Illness (UofC course #623.02) and Advanced/Applied Pulmonary Physiology (UofC courses #623.03 and #623.04 respectively). Currently, multiple students are enrolled in this program pursuing graduate degrees. Students have successfully presented their basic science and clinical research at local and national conferences and have been published in well-respected, peer-reviewed scientific journals.

Curriculum Innovations

Several new curriculum innovations have been implemented in recent years as well. In 2017 our didactic and hands-on curriculum on application of ultrasound and echocardiography in the ICU continued to mature. State of the art on-line educational modules to augment the didactic and practical experiences as part of the curriculum were developed and implemented in 2016. Since then, a novel IT solution enabling image archiving of ultrasounds acquired at each of the various sites in the city has been put in place to facilitate expert feedback on image acquisition and image quality. We have also purchased four hand-held ultrasound platforms to allow our CCM trainees to more easily be able to develop their echocardiography skills at the point of care.

More recently, clinicopathological case rounds (CPC) rounds have been developed as a new curriculum innovation to have a forum to improve clinical reasoning skills. These monthly rounds are a joint educational activity between the DCCM and the Division of Anatomic Pathology / Department of Pathology & Laboratory Medicine to provide multidisciplinary teaching around interesting presentations of common diseases, common presentations of uncommon diseases, or otherwise diagnostically and therapeutically challenging disease presentations in critically ill patients. These rounds have been extremely well received by participants and will continue for the foreseeable future due to the high-quality teaching and learning opportunity they afford us.

Two additional important curricula continue to grow in 2017, serving to nicely round out our educational offerings. A novel communication skills curriculum that explores fundamental aspects of effective communication including goals of care discussions, addressing conflict and disclosure of unanticipated medical events has been implemented relying on simulated patients to allow CCM residents to grow their skills. Recognizing the increasing importance for physicians to develop comfort and fluency with Quality Improvement (QI), we have also developed a QI curriculum to familiarize our trainees with foundational concepts and to help them develop skills necessary to lead QI projects in their future careers. This year we have expanded this curriculum offering to include our counterpart training program in at the University of Alberta in Edmonton. This cross-pollination will enable further sustained growth and maturation of the curriculum going forward. The eventual goal will be to develop a Masters level graduate science course in QI and health systems management.

Community ICU

To further enhance our clinical and academic collaboration with our referring rural centers, the Training Program continues to integrate a one-month community based rotation at the Red Deer Regional Hospital intensive care unit. This several of our fellows participated in this rotation supported by the Distributed Learning and Rural Initiative Program offered by the U of C.

Undergraduate and Post-Graduate Medical Education

In addition to the CCM Training Program, the Department of Critical Care Medicine (DCCM) continues to support undergraduate and post-graduate medical education at the University of Calgary. The DCCM supervised 210 months of Critical Care Medicine training for rotating residents this past academic year. Rotating residents came from the following core programs: Internal Medicine, Respiriology, Cardiology, Neurology, Emergency Medicine, Anesthesia, General Surgery, Orthopedic Surgery, Plastic Surgery, Otolaryngology, Cardiac Surgery and Urban and Rural Family Medicine. There is no national requirement for CCM rotations in Family Medicine, but given that many trainees subsequently practice in rural Alberta, a one-month rotation is offered for all trainees in order to develop skills in caring for the critically ill.

We are pleased to report that our clinical rotation continues to be highly desired by undergraduate medical students at the University of Calgary. For the sixth consecutive year, the number of medical students who have chosen Critical Care Medicine remains very high. This year, 35 students rotated within our critical care units and 18 pre-clerks and job shadowers participated in various elective forms of ICU exposure. In addition to local students, we continue to attract national and international trainees wishing to pursue Critical Care Medicine as a medical elective. Based on requests for the upcoming academic year, we anticipate the number of medical students interested in rotating with will continue to be high.

Opportunities and Challenges Ahead

One significant opportunity and challenge that lies ahead for the DCCM CCM Training Program will be preparing for and navigating the transition to competency-based medical education. The Royal College of Physicians and Surgeons of Canada is currently implementing competency-based education (CBME) requirements for all medical and surgical specialties in Canada. This program called "Competence by Design" (CBD) is the biggest change in postgraduate

medical education in Canada in more than three decades! CBD is an outcomes focused physician education model to better support continuous learning and assessment in professional development.

Over the past year several of our faculty members have been engaged in meetings at the Royal College in Ottawa and served in a leadership capacity in this regard. The product of these workshops has been delineation of required training experiences, development of new training requirements organized around a framework of competencies, as well as the incorporation of new workplace-based assessment methods that will inform the education and professional development of future cohorts of CCM trainees. Implementation of this new educational model across disciplines will unfold over several years and CCM is currently scheduled to transition to CBD in July 2019. In an effort to try and remain ahead of the curve, our Education office intends to soft-launch in July 2018 to begin to pilot many of the requirements of this transformational change initiative ahead of our officially scheduled transition date. This will afford our clinical faculty hands-on experience with this new paradigm and hopefully iron out process issues ahead of time. We remain excited about these changes on the horizon for 2018-2019. They offer the DCCM an important opportunity for transformational educational change and provide good opportunity for further education scholarship as we explore our experience with and the outcomes from a transition to CBD.

Dr. Jonathan Gaudet, Critical Care Medicine Residency Program Director

Critical Care Medicine Faculty Members 2017-2018



George Alvarez, Clinical Assistant Professor (MPT)
Clinical Activities: RGH-MSICU, SHC-MSICU, PLC-MSICU
Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine M.Sc. Health Informatics

Dr. George Alvarez has been a member of the DCCM since April 2006. He studied at University Of Manitoba for both his undergraduate and Medical School including his Internal Medicine Specialty. He completed his Critical Care training at the University of Western Ontario before moving to Australia to pursue Informatics training. He is the past chair of the Quality Assurance Committee and a former medical director of the SHC ICU. He is the current chair of the departments' renal replacement committee.

Graciela Andonegui, PhD Research Assistant Professor

Dr. Graciela Andonegui has been in the Department of Critical Care Medicine since July 2009. She graduated at the University of Buenos Aires, Argentina in May 1999 (PhD in Immunology). She completed postdoctoral studies at the University of Calgary under the supervision of Dr. Paul Kubes and was funded by the Alberta Heritage Foundation for Medical Research and Canadian Institutes of Health Research. Dr. Andonegui's research area is studying the role of innate immune cells in sepsis in different affected organs. Current research interests include investigating the role of monocytes in sepsis-associated encephalopathy. Dr. Andonegui has 31 peer-reviewed publications including journals such as Journal of Clinical Investigation, Blood and Journal of Immunology. Dr. Andonegui is involved in teaching Independent Studies, Honours Thesis and Research Communication and mentoring at the Bachelor of Health Sciences, University of Calgary. Dr. Andonegui is married with 3 children and loves being active and spending time with her family.



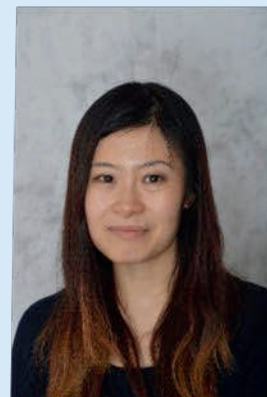
Selena Au, Clinical Assistant Professor (MPT)

Clinical Activities: RGH-MSICU, SHC-MSICU, PLC-MSIUC

Administrative Responsibilities: QI- QAC Medical Director

Fellowship and Postgraduate Training: Critical Care Medicine

Dr. Au completed her undergraduate studies in biopsychology and medical school at the University of British Columbia. In 2007, she moved from her hometown of Vancouver for the University of Calgary Internal Medicine residency program followed by fellowship with the Department of Critical Care Medicine. She completed her Masters of Science in Quality and Improvement and Patient Safety with the University of Toronto in 2014. Currently, Dr. Au is appointed as a Clinical Assistant Professor in the Department of Critical Care. As Quality Improvement and Assurance Medical Director, she co-chairs the Quality Assurance Committee to oversee patient safety review and learning and morbidity and mortality rounds. Her academic interests for which she has received grants and awards include health services delivery and patient and family centered care. Dr. Au is an arts and languages enthusiast and enjoys time with her family in Vancouver and Québec.



Luc Berthiaume, Clinical Assistant Professor (MPT)

Clinical Activities: PLC-MSICU, FMC-CVICU

Administrative Responsibilities: Mechanical Ventilation Committee
Co-Chair, Site Director PLC

Fellowship and Postgraduate Training: Critical Care Medicine,
Pulmonary Medicine, Internal Medicine, M.Sc Clinical Epidemiology

Dr Berthiaume is the Medical Director of the Peter Lougheed Centre ICU. He graduated at the University of Ottawa in 1999 (MD magna cum laude). He completed Internal Medicine residency training in 2002 at the University of Toronto. He pursued further training in Pulmonary Medicine (2004) and Critical Care Medicine (2005) at the University of Calgary. Dr Berthiaume has additional training in clinical epidemiology. He is heavily involved in undergraduate and postgraduate medical education. Dr Berthiaume is married with 4 children. He enjoys skiing, mountain biking and hiking.

Paul Boiteau, Clinical Professor

Clinical Activities: FMC-MSICU

Fellowship and Postgraduate Training: Critical Care Medicine, Pulmonary Medicine, Internal Medicine

Dr. Boiteau is a 1979 medical graduate of Laval University. He completed a residency in Internal Medicine at McGill University in 1983 before moving to the University of Manitoba to complete a fellowship in Pulmonary and Critical Care Medicine in 1986. He was an Assistant Professor of Medicine at the University of Calgary and the Assistant Director of the Foothills Hospital ICU from 1986 to 1993. He moved to Toronto in 1993 to assume the Directorship of the Mount Sinai Hospital Critical Care Unit. He was an Associate Professor of Medicine at the University of Toronto from 1993 to 1998. He relocated to Calgary in 1998 as the Medical Director of the Foothills Medical Centre Multi-System ICU with the rank of Clinical Associate Professor of Medicine. In 2003 Dr. Boiteau became the Head, Department of Critical Care Medicine as well as Professor of Medicine at the University of Calgary. In 2013 he ended his term as Head of the Department and is currently an Intensivist in the Calgary Zone with an interest in a systems approach to Patient Safety, the use of Simulation in creating High Performance Teams and optimization of the management of High and Intermediate High Risk Pulmonary Thromboembolism.



Paul Boucher, Clinical Assistant Professor (MPT)

Clinical Activities: FMC-MSICU, FMC-CVICU

Administrative Responsibilities: Site Director, FMC-MSICU; Chair, Zonal Resuscitation Committee; Critical Care Rep, Care at the End of Life Initiative; Leader, DCCM Patient Centered Care QI Team; Member of the Board of the AMA

Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine

Dr. Paul Boucher; Graduate of the University of Ottawa, Bachelor of Biochemistry 1991, Medicine 1995. Completed Internal Medicine Residency in 1988, and specialty in Critical Care in 2000, at the University of Calgary. Echocardiography fellowship, University of Calgary, completed 2002. Currently the medical director of the Foothills intensive care unit and co-chair of the Patient and Family Centered Care committee. Clinical interests include cardiovascular intensive care, echocardiography, and Patient and Family Centered Care.



Carla Chrusch, Clinical Associate Professor (MPT)
Clinical Activities: RGH-MSICU, PLC-MSICU, SHC-MSICU
Administrative Responsibilities: Site Director RGH ICU, RGH Site Education Coordinator
Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine, M.Sc Epidemiology

Philippe Couillard, Clinical Assistant Professor (MPT)
Clinical Activities: FMC-MSICU
Administrative Responsibilities: FMC Deputy Site Education Coordinator, Course V Chair- Elect, UME Program
Fellowship and Postgraduate Training: Critical Care Medicine, Neurology

Dr. Philippe Couillard is a member of the Critical Care Department since 2012. He graduated at Laval University in 2005, completed further training in Calgary with specialization in Neurology and Critical Care Medicine. He has additional training in Neurocritical care and Stroke neurology. Dr. Couillard is an Assistant Professor in the Departments of Critical Care Medicine and Clinical Neurosciences in the Faculty of Medicine, University of Calgary. He currently is appointed as Course V chair with the Undergraduate Medical Education at the Cumming School of Medicine. Dr. Couillard is married with 3 children.





Christopher James Doig, Professor (GFT)

Clinical Activities: FMC-MSICU, SHC-MSICU, RGH-MSICU

Administrative Responsibilities: Department Head CCM, MEC Chair, ICU Executive Council Co-Chair, Member Leadership Forum, Faculty of Medicine Member, Executive Committee for Institute of Infection, Immunity and Inflammation, AMA Board Member

Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine, M.Sc, Epidemiology

Dr Christopher Doig is Head of the Department of Critical Care Medicine since November 1, 2013 and the immediate past Head of the Department of Community Health Sciences. He graduated at the University of Saskatchewan in 1988 (MD with distinction), completed further training in Vancouver and Calgary with specialization in Internal Medicine and Critical Care Medicine. He has additional training in clinical epidemiology and health care ethics. Dr. Doig is a Professor in the Departments of Critical Care Medicine, Internal Medicine and Community Health Sciences in the Faculty of Medicine, University of Calgary. He was the Medical Director of the Multisystem ICU at the Foothills Medical Centre from 2002 - 2010. He was the President of the Alberta Medical Association 2009 – 2010. Dr. Doig has over 140 peer-reviewed publications including in journals such as Nature Medicine, the New England Journal of Medicine, the Journal of the American Medical Association, the Canadian Medical Association Journal, and international and national critical care subspecialty journals. Dr. Doig is married with 4 children. He is an avid cyclist, swimmer, and soccer player....currently ranked 4th in his family in goal scoring, but hoping to improve.

Michael Dunham, Clinical Assistant Professor

Clinical Activities: RGH-MSICU, SHC-MSICU, FMC-MSICU

Administrative Responsibilities: Zonal Director for ATLS Courses, Site Lead General Surgery SHC, Director Acute Care Surgery SHC, General Surgery Finance Committee, General Surgery Surgical Executive Committee, General Surgery Recruitment Committee

Fellowship and Postgraduate Training: Critical Care Medicine, General Surgery, Trauma Surgery



Dr. Michael Dunham is the Site Lead for General Surgery at the South Campus Hospital. He graduated from the University of Alberta in 1999 (MD) and completed a General Surgery residency at the University of Calgary in 2004 (FRCSC). He pursued further fellowship training at the University of Miami in Critical Care Medicine and Trauma Surgery in 2006. He is Clinical Assistant Professor of Surgery at the University of Calgary and is actively involved in several committees and teaching ATLS and ATOM courses for medical staff. Academic interests involve teaching and training residents Critical Care, Trauma Surgery and Acute Care Surgery and has been recognized as Educator of the year four times by the Departments of Surgery, Emergency Medicine and Critical Care Medicine. Dr. Dunham is married with 4 children and hobbies include World War II history, mountain biking, running and skiing.

Paul Easton, Associate Professor (GFT)

Administrative Responsibilities: Medical Director; Lethbridge Sleep Laboratory, Advisory Committee for AADL Chair, Program of the Ministry of Seniors and Social Services

Fellowship and Postgraduate Training: Pulmonary Medicine, Sleep Medicine, Internal Medicine, Ph.D, Resp Physiology

Dr. Easton is a pulmonary physician with specific expertise in sleep medicine. Dr. Easton is a respiratory muscle physiologist with a focus on respiratory muscle function in chronic respiratory failure.



Andre Ferland, Clinical Associate Professor (MPT)

Clinical Activities: FMC-MSICU, FMC-CVICU

Administrative Responsibilities: Site Director, FMC-CVICU;

Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine

Dr. Andre Ferland is a Clinical Associate Professor in the Department of Critical Care (DCCM), Medicine, Cardiac Sciences and Internal Medicine within the University of Calgary, Faculty of Medicine.

Dr. Ferland graduated from Sherbrooke medical school in 1984, completed thereafter general internal medicine and critical care. It is worth mentioning that he was the first intensivist to graduate from the U of C Critical Care program! On faculty since 1990, Dr. Ferland held the position of Critical care program director for more than 10 years until taking a 1 year sabbatical in clinical echocardiography. In 2013, he resumed for the second time the role Medical Director of the Cardiovascular Intensive Care Unit at the Foothills Medical Centre (FMC). In 2015 in partnership with Dr. Godinez, Boucher and the radiology group EFW, Dr. Ferland helped developing an outpatient echocardiography lab with the goal of enhancing the echo training of DCCM residents. Dr. Ferland is still an active internist as he still practices and teaches general internal medicine in his outpatient clinic and the FMC.

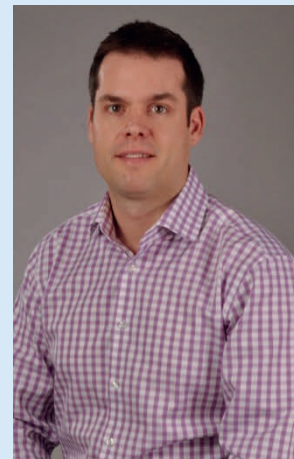
Jonathan Gaudet, Clinical Assistant Professor (MPT)

Clinical Activities: PLC-MSICU

Administrative Responsibilities: DCCM Education Director, Critical Care Residency Training Program Director, PLC Site Education Coordinator, Medical Advisor Respiratory Therapy

Fellowship and Postgraduate Training: Critical Care Medicine, Emergency Medicine

Dr. Jonathan Gaudet is the Adult Critical Care Medicine Program Director and the Medical Advisor for Respiratory Therapy in the AHS Calgary Zone. He graduated from Dalhousie University Medical School in 2005 and completed his Emergency Medicine specialization at the University of Alberta in 2010 before coming to Calgary to pursue his fellowship training in Critical Care Medicine. He has since completed a Masters degree in Medical Education to further his expertise in his area of interest. Dr. Gaudet is married with two young children that keep him on his toes.





Tomás Godínez-Luna, Clinical Assistant Professor
Clinical Activities: FMC-MSICU, FMC-CVICU
Administrative Responsibilities: Co-Chair, CRRT Committee
Fellowship and Postgraduate Training: Internal Medicine

Dr. Tomás Godínez-Luna graduated from The National Autonomous University of Mexico in 1977. Further training in internal medicine, critical care medicine and clinical echocardiography. He has been practicing Critical Care Medicine since 1986.

Terrance Hulme, Clinical Assistant Professor (MPT)
Clinical Activities: RGH-MSICU, PLC-IUC, SHC-MSICU
Fellowship and Postgraduate Training: Critical Care Medicine, Pulmonary Medicine, Internal Medicine

Dr. Hulme graduated medical school in Ottawa. He completed his internal medicine and critical care training at the University of Western Ontario, in London Ontario. Upon completion of his training, Dr. Hulme moved to Calgary and joined the medical staff of the Rockyview General Hospital, where he presently practices both pulmonary and critical care medicine. His non-clinical interests focus on quality improvement and medical decision making. He is a current member of the department of critical care's delirium initiative.



Craig N. Jenne, Assistant Professor (GFT)

Administrative Responsibilities: Canada Research Chair in Imaging Approaches Towards Studying Infection, Snyder Institute for Chronic Diseases Fellowship and Postgraduate Training: Dept of Microbiology, Immunology and Infectious Diseases, Critical Care Medicine



Dr. Craig Jenne is an Assistant Professor in the Departments of Critical Care Medicine and Microbiology, Immunology and Infectious Diseases. Dr. Jenne completed his PhD at the University of Calgary in 2005 followed by Post-doctoral positions at the University of California, San Francisco and the Australian National University before returning to Calgary in 2009. Dr. Jenne began an independent research program in 2013 using intravital microscopy to study infectious disease such as drug resistant bacterial infections and influenza. Of particular interest is how infection, immunity and inflammation interact with hemostasis leading disseminated coagulation in the critical ill. Dr. Jenne's group is supported by funding from the Canadian Institutes for Health Research, Natural Sciences and Engineering Research Council, the Heart and Stroke Foundation of Canada and the Canadian Cancer Society Research Institute. In addition, Dr. Jenne serves as the Scientific Director of the Snyder Translational Laboratory in Critical Care Medicine. The Snyder Lab works to foster clinical research projects by providing "wet bench" and biochemical support to clinical researchers, analyzing patient samples for biomarkers to develop an understand the underlying mechanisms of critical illness in an effort to improve patient care and outcomes.

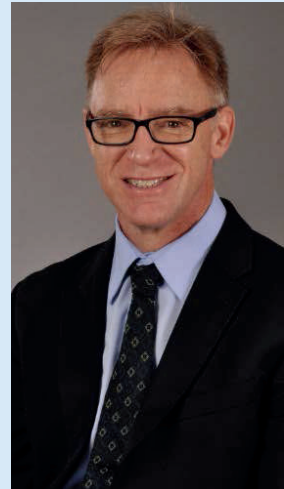
John B. Kortbeek, Professor (GFT)

Clinical Activity: RGH-MSICU, SHC-MSICU

Administrative Responsibilities: ICU Outreach Medical Director, Member Leadership Forum, Faculty of Medicine, International Chair, ATLS, American College of Surgeons.

Fellowship and Postgraduate Training: Critical Care Medicine, Trauma Surgery, General Surgery

Dr. John B. Kortbeek is a graduate of the University of Alberta. He completed an internship at St. Thomas Hospital, Akron Ohio and a General Surgery residency at the University of Calgary. He trained as a Critical Care fellow at the University of Calgary and as a Trauma fellow at Carraway Methodist Medical Centre in Birmingham, Alabama. He has held an appointment at the University of Calgary since 1991 and is currently a Professor in the Departments of Surgery, Anesthesia and Critical Care. Dr. Kortbeek has served as regional Trauma Services Director for Calgary, Director of the Intensive Care unit at the Foothills Medical Centre as well as Foothills Site Chief of Surgery. He served as Head of the Department of Surgery for the University of Calgary and for the Calgary Zone, Alberta Health Services from 2006-2016. He has been an active member of many surgical and trauma organizations. He has previously served as President of the Trauma Association of Canada, Governor of the American College of Surgeons as well as Chair of the Advanced Trauma Life Support subcommittee of the American College of Surgeon's Committee on Trauma. Dr. Kortbeek currently serves as a Director for the Shock Trauma Air Rescue Society (STARS).



Kirsten Fiest, PhD Assistant Professor (GFT)

Kirsten is an Assistant Professor of Critical Care Medicine, Community Health Sciences & Psychiatry at the University of Calgary. She received her PhD in Epidemiology from the University of Calgary and completed post-doctoral training in neuro and psychiatric epidemiology from the University of Manitoba. Her research program focuses on advancing the science of patient and family-centered critical care research. Her current work examines the role of family in detecting delirium in the critically ill.

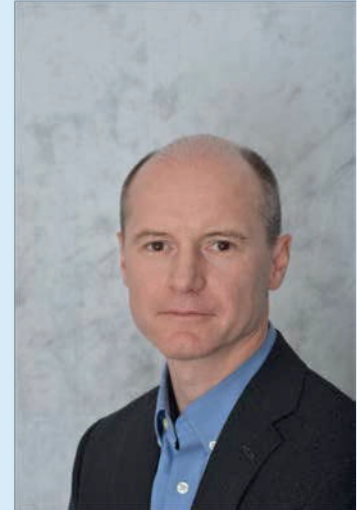
Andreas Kramer, Clinical Associate Professor (MPT)

Clinical Activities: FMC-MSICU

Administrative Responsibilities: Medical Director SAOTDP, DCD Working Group Meeting Chair

Fellowship and Postgraduate Training: Critical Care Medicine, Neuro Critical Care, Internal Medicine, M.Sc., Public Health

Dr. Andreas Kramer is a Clinical Associate Professor in the Departments of Critical Care Medicine and Clinical Neurosciences. He graduated from medical school at the University of Manitoba in 1997 and received specialty training in internal medicine and critical care at the University of Calgary in 2002. After working for three years as a community internist and intensivist in Manitoba, he obtained fellowship training in neurocritical care at the University of Virginia 2005-2007. During this time, he also completed a Master of Science degree in Health Evaluation Sciences. Dr. Kramer joined the Department of Critical Care Medicine in Calgary in 2007. He has a particular research and clinical interest in neuro-monitoring and prevention of secondary injury in neurocritical care patients. Research awards have included Neurocritical Care Society "Young Investigator of the Year" in 2007 and "Best Abstract" in 2013. Dr. Kramer is on the Editorial Boards of the journals Neurocritical Care and Critical Care Medicine. He has over 70 peer-reviewed publications, with over half of these as first or senior author. He has also written multiple textbook chapters on a variety of topics, and was the co-editor of two 2017 neurocritical care editions of the prestigious Handbook in Clinical Neurology. Since 2011, he has been the Medical Director of the Southern Alberta Organ and Tissue Donation agency, and has served on numerous Canadian Blood Services advisory committees. Dr. Kramer is married with four very energetic children between the ages of 7 and 15.



Paul Kubes, Professor (GFT)

Administrative Responsibilities: Holder of the Calvin, Phoebe & Joan Snyder Chair in Critical Care Research, Director; Institute of Infection, Immunity & Inflammation

Fellowship and Postgraduate Training: Ph.D, CIHR Senior Scientist, Dept. of Physiology & Biophysics



Dr. Paul Kubes is a basic scientist with a focus on mechanisms of disease involving acute and chronic inflammation. Dr. Kubes received his PhD from Queen's University, followed by post-doctoral training in Shreveport Louisiana with Dr. Neil Granger. Dr. Kubes joined the faculty at the University of Calgary in 1991 as a member of the Department of Immunology. Since arriving, Paul has focused his research on understanding the complex field of inflammation, and the role of neutrophils particularly involving their interaction with vascular endothelium, the role of neutrophils in acute sepsis, and the use of in-vivo high fidelity dynamic imaging to understand the activation and interaction of white blood cells with other tissues. This year, Dr. Kubes published papers in Cell on sterile injury (Impact factor greater than 30) and Journal of Experimental Medicine, Cell Reports and Cell Host Microbe in the area of infections common to the ICU. These journals all have an impact of 10 or higher. Dr. Kubes also has a CIHR Foundation Grant and a CIHR team grant in lung inflammation. Dr. Kubes is the inaugural Snyder Chair in Critical Care Research. Dr. Kubes has led multiple team grants and other initiatives including multiple Canadian Foundation for Innovation grants awarded to the University of Calgary, CIHR training team grants for developing translational research, and was a Principal Investigator for the AHFMR Sepsis Team Grant. Dr. Kubes is also the inaugural and current Scientific Director of the Snyder Institute for Chronic Disease and leads the priority initiative in Infection Inflammation and Chronic Diseases for the VPR. Past graduate students and post-doctoral fellows are now in academic positions globally. He has received numerous awards and accolades including as a past recipient of the Canadian Institutes for Health Research Health Researcher of the Year for 2014. As the Snyder Chair in Critical Care, Dr. Kubes has dedicated his time and talent to developing translational research related to critical care including investing in the next generation of clinician scientists.

Calvin Lam, Clinical Assistant Professor
Clinical Activities: FMC-CVICU, FMC-MSICU
Administrative Responsibilities: CVICU ECLS Committee co-chair, Medical Informatics Zonal Team, Cardio-Respiratory Therapeutics Program
Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine

Dr. Lam is an attending physician in the department, working in various intensive care units.



Jeanna Parsons Leigh, PhD Research Assistant Professor

Dr. Parsons Leigh holds an appointment as Assistant Scientific Director of the Critical Care Strategic Clinical Network, Research Priorities and Implementation with Alberta Health Services, and is strongly committed to research. Dr. Parsons Leigh completed a Doctor of Philosophy in 2014 at the University of Calgary with a specialization in Sociology. Her expertise in Qualitative Methods offers a valuable contribution to our current and planned programs of research. In addition, Dr. Parsons Leigh has shown initiative and capacity building in research by assuming the lead on ongoing research projects and acting as a research mentor to both undergraduate and graduate trained research assistants.

Jason Lord, Clinical Associate Professor (MPT)

Clinical Activities: PLC-MSICU

Administrative Responsibilities: Director of Assessment, PGME. CBD Lead, DCCM

Fellowship and Postgraduate Training: Critical Care Medicine, Emergency Medicine, M.Sc (Anatomy), M.Sc (Med Ed)

Dr. Jason Lord completed his undergraduate degree in Biology at the University of Victoria. He then moved to Kingston Ontario to complete a Master's degree in Anatomy and Cell Biology before entering Medical school at Queen's University. He graduated from medicine in 1998 and then completed residency in Emergency Medicine and fellowship in Critical Care at Queen's University in 2004. He also completed a Master's degree in Community Health Sciences at the University of Calgary with a specialization in Medical Education. Currently, Dr. Lord is dual appointed as a Clinical Associate Professor in the Departments of Critical Care Medicine and Emergency Medicine at the University of Calgary. He served as the Critical Care Residency Training Program Director from 2009-2016. He is also the Director of Assessment at the UofC PGME office and the Competence by Design Lead for the DCCM. His academic interests include medical education, simulation based training, procedural skills training and assessment methodology. Personal interests include hiking and camping, fly fishing, back-country skiing and cycling.



Paul McBeth, Clinical Assistant Professor

Clinical Activities: RGH-MSICU, SHC-MSICU, FMC-MSICU

Fellowship and Postgraduate Training: Critical Care Medicine, Surgery

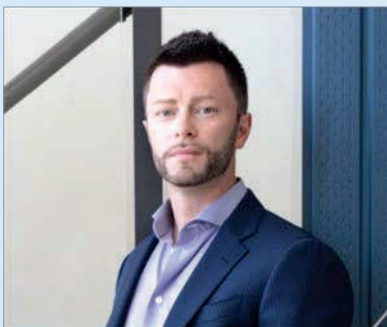
Dr. Paul McBeth joined the Departments of Surgery and Critical Care Medicine at the University of Calgary in 2015. Dr. McBeth is a native of Calgary and started his career as an engineer with post graduate training in surgical robotics and human performance evaluation. He led the design and development of Project neuroArm: an image-guided neurosurgical robot system. During his medical training he continued to develop his research interests in robotics, remote ultrasound and monitoring of intra-abdominal pressures in critically ill patients. Dr. McBeth went on to complete post graduate training in General Surgery at the University of Calgary with sub-specialty training in Critical Care Medicine at the University of British Columbia and Trauma Surgery at the Elvis Presley Memorial Trauma Centre in Memphis. Dr. McBeth currently is an Assistant Professor of Critical Care Medicine and Surgery at the Cumming School of Medicine and Adjunct Professor of Engineering at the Schulich School of Engineering, University of Calgary. He has over 50 peer-reviewed publications and is currently developing a program to support the use of thrombelastography in trauma and the critically ill patients.



Daniel Niven, Assistant Professor (GFT)

Clinical Activities: PLC-MSICU

Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine



Dr. Daniel Niven is an Assistant Professor in the Department of Critical Care Medicine since April 1, 2016. He obtained his MD from the University of Calgary in 2006, and completed additional training in Internal Medicine and Critical Care Medicine in 2011. He subsequently completed a PhD in Health Services Research between 2012 and 2015. His clinical appointment is primarily based at the Peter Lougheed Centre ICU. His research focuses on improving use of evidence-based best practices in critical care through methods in Knowledge Translation. In 2016 he received the CIHR Institute of Health Services and Policy Research (IHSPR) Rising Star award, and in 2017 he was named one of Avenue Magazine's Top 40 under 40 for the City of Calgary.

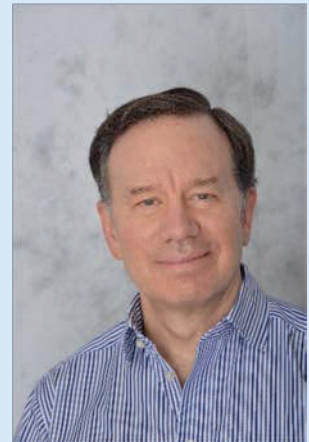
Richard J Novick, Clinical Professor

Clinical Activities: FMC-MSICU, FMC-CVICU

Fellowship and Postgraduate Training: Critical Care Medicine, Cardiac Sciences, Surgery

Dr. Richard J. Novick is a consultant cardiac surgeon and intensivist at the Foothills Medical Centre and a Professor in the Departments of Cardiac Sciences, Critical Care and Surgery at the University of Calgary. He completed medical school, as well as residency training in general surgery and cardiothoracic surgery at McGill University, followed by a fellowship in cardiac surgery, critical care and transplantation at Stanford University Medical Center. He subsequently practiced at Western University's Schulich School of Medicines for 24 years, where he served as Professor and Chair of the Division of Cardiac Surgery, as well as Chief of Cardiac Surgery, at the London Health Sciences Centre.

Dr. Novick has engaged in a busy clinical practice of both cardiac surgery and critical care, while maintaining a strong academic commitment, including grant-supported laboratory research and completion of a graduate certificate in Clinical Epidemiology and Biostatistics. Dr. Novick's research interests have focused on the preservation of grafts for transplantation, on the learning curves of innovative cardiac surgical procedures and, more recently, on qualitative educational research. He introduced use of the cumulative sum failure method in the analysis of surgical learning curves and postoperative complication rates in adult cardiac surgery. In addition, he was the project leader of an \$18.2 million grant from the Canada Foundation for Innovation, which established CSTAR (Canadian Surgical Technologies & Advanced Robotics), a national centre for minimally invasive and robotic surgery. Dr. Novick has mentored numerous clinical trainees and has also supervised the laboratory and clinical research work of postgraduate fellows, surgical residents, and medical students; Dr. Novick and two of these trainees have won national research awards. Dr. Novick has served as a member of the Editorial Board of the Annals of Thoracic Surgery, including a decade as Associate Editor, and served a five year term as national Chair of the Cardiac Surgery Examination Board of the Royal College. His bibliography includes over 300 peer-reviewed papers, textbook chapters, abstracts, and invited commentaries. Dr. Novick is married and has two sons. He has a strong interest in foreign languages and he and his family are avid hikers and skiers.





Ken Parhar, Clinical Assistant Professor (MPT)

Clinical Activities: FMC-MSICU, FMC-CVICU

Administrative Responsibilities: Chair, ECLS Committee; Lead, QI ARDS Research Project

Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine, Cardio Thoracic Fellowship

Dr. Ken Parhar has been a member of the Department of Critical Care Medicine since 2013. Ken was born and grew up on Vancouver Island. He went to the University of British Columbia to complete his Bachelors of Science in Immunology with Honors, as well as a Master's of Science in Experimental Medicine focusing on the molecular biology of the innate immune response within the GI tract. After completing his Medical degree at Queen's University, he moved west to Calgary for Internal Medicine residency. Ken has completed fellowship training in General Internal Medicine, as well as Critical Care in Calgary, which included training in echocardiography. Ken has also completed an advanced fellowship in Cardio-Thoracic Critical Care at Papworth Hospital in Cambridge, England, with a focus on mechanical circulatory support. His clinical interests include shock, acute lung injury, and extracorporeal life support (ECLS). Ken currently leads the ECLS program, and is also leading a combined QI/research project on ARDS management in Calgary. Ken is married and welcomed the arrival of their first child in 2016. Ken and his family enjoy travelling in their spare time having been all over the world including Asia, South America, and Africa including the top of Mount Kilimanjaro. Being from BC originally, Ken is a very dedicated Vancouver Canucks fan.

Juan Posadas, Clinical Assistant Professor (MPT)

Clinical Activities: PLC-MSICU, RGH-MSICU, SHC-MSICU

Administrative Responsibilities: SHC ICU Medical Director

Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine

Dr. Posadas was born in Mexico City, entered Medical School at UNAM (National Autonomous University of Mexico) in Mexico City in 1990. Obtained his Medical Degree in 1997 and then completed the Residency in Internal Medicine and a Fellowship in Critical Care Medicine at UNAM/National Institute of Nutrition and Medical Science in 2003. He worked as staff Intensivist at a medical/surgical ICU at National Institute of Nutrition and Medical Science before moving to Calgary in 2007. Entered the International Fellowship in Critical Care Medicine at the Department of Critical Care Medicine at the University of Calgary and completed a Master's Degree in Critical Care in 2014. Currently Dr. Posadas is appointed as a Clinical Assistant Professor in the Department of Critical Care Medicine at the University of Calgary and as Medical Director of the South Health Campus ICU since 2016. His academic interests involve nutrition in the critically ill patient, sepsis and delirium. Juan's personal interests include long distance running, soccer, history and mystery books and FIFA2017™.





Tom Rosenal, Associate Professor Emeritus

Dr. Tom Rosenal is an Associate Professor Emeritus in the Department of Critical Care Medicine. He is a critical care physician who currently works at the intersection of several fields: health humanities, clinical informatics, education and change management. Tom believes that his professional worldview arises from his experiences with critically ill patients and their families and from the opportunity to share those encounters with colleagues across many disciplines.



Amanda Roze des Ordon, Clinical Assistant Professor (MPT)
Clinical Activities: RGH-MSICU, SHC-MSICU, FMC-MSICU
Administrative Responsibilities: DCCM CME Coordinator, SHC Site Education Coordinator
Fellowship and Postgraduate Training: Critical Care Medicine, Anesthesiology, Palliative Care, Masters of Medical Education

Dr. Amanda Roze des Ordon is a Clinical Assistant Professor in the Department of Critical Care Medicine and Division of Palliative Medicine. She completed her Doctor of Medicine degree at the University of Alberta in 2006 and completed additional training in Anesthesiology (University of Alberta), Critical Care Medicine (University of Ottawa), and Palliative Medicine (University of Calgary). She has also completed a Master's Degree in Medical Education through the University of Dundee. Her research interests include serious illness conversations and patient and family support in the acute care setting. Outside of work, she enjoys hiking and spending time with family and friends.

James Dean Sandham, Professor Emeritus

Dr. Dean Sandham is one of the pioneers of critical care in Canada. A farm boy from southern Alberta, Dr. Sandham attended medical school at the University of Alberta. After a short time at the Montreal General as an intern, Dr. Sandham returned to Alberta as a family physician in Red Deer. He then completed internal medicine and pulmonary medicine fellowships at the University of Calgary. Dr. Sandham was responsible for starting the multidisciplinary ICU at the Calgary General Hospital. In 1986, he moved as the medical director of the Foothills Hospital ICU. Dr. Sandham was foundational in the development of critical care medicine at the University of Calgary starting the critical care residency training program, and establishing first a free standing division of Critical Care Medicine, followed by Critical Care Medicine becoming a free-standing clinical and then academic department; Dr. Sandham was the inaugural head of both the division and the department. Dr. Sandham was influential in the funding for the Snyder Chair in Critical Care Research. Dr. Sandham had an important national influence in critical care including helping to start the Canadian Critical Care Society, The Canadian Critical Care Trials Group, and the Canadian Intensive Care Foundation. Dr. Sandham served as the Dean of the University Of Manitoba Faculty Of Medicine before retiring, and returning home to Alberta. Dr. Sandham's legacy of excellence in clinical care coupled with the importance of research and patient safety continues as a philosophy within the department. The Dean Sandham Clinical Teaching Award is named in his honour, in part recognizes his influence on the training of high quality clinicians, and is awarded annually to a clinical teacher within the department (as selected by trainees). Dr. Sandham continues to reside in Alberta, and is an avid flier, outdoorsman, and music maker with his unique bedpan banjo.



**Andrea Soo, Adjunct Assistant Professor
Senior Biostatistician
Fellowship and Postgraduate Training: Ph.D.**



Dr. Soo completed a Doctor of Philosophy in 2015 at the University of Calgary with specialization in Biostatistics in the Department of Community Health Sciences. She additionally has a BSc in Statistics and Actuarial Science and MSc in Statistics. During the past 10 years, she has been very active as a statistician in multiple areas of research including outcomes and adverse events of adults and children with kidney disease and of adults in assisted living facilities. In her current role, she provides statistical and methodological expertise for research and quality improvement projects in the Department of Critical Care Medicine. She is primarily involved in a project on optimizing ARDS management with Dr. Ken Parhar and multiple projects within Dr. Tom Stelfox's research group. Andrea is an avid fan of the Boston Bruins, enjoys sewing, knitting, crocheting and DJ'ing.

H. Tom Stelfox, Professor (GFT)

Clinical Activities: FMC-MSICU

Administrative Responsibilities: Senior Medical Director, Critical Care Strategic Clinical Network, Alberta Health Services. Deputy Head, Department of Critical Care Medicine, University of Calgary & Alberta Health Services, Director Research & Innovation, University of Calgary & Alberta Health Services

Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine, Ph.D., Health Policy - Statistics & Evaluative Sciences

Dr. Tom Stelfox is Professor of Critical Care Medicine, Medicine and Community Health Sciences at the University of Calgary. He is the Senior Medical Director of Alberta Health Services Critical Care Strategic Clinical Network. He received his M.D. from the University of Alberta, Internal Medicine Residency at the University of Toronto, Ph.D. in Health Care Policy at Harvard University and Critical Care Fellowship at the Massachusetts General Hospital. His research program focuses on the application of health services research methods to evaluate and improve the quality of health care delivery to critically ill patients. His research activities include developing quality indicators; developing strategies to improve continuity of patient care across the care continuum; and improving the translation of scientific evidence into clinical practice.





Sid Viner, Clinical Associate Professor (MPT)

Clinical Activities: PLC-MSICU, FMC-MSICU

Administrative Responsibilities: Zone Medical Director

Fellowship and Postgraduate Training: Critical Care Medicine, Pulmonary Medicine, Internal Medicine

Dr. Sid Viner is a native Calgarian and specialist in Respiratory and Critical Care Medicine who has practiced in Calgary since 1990. He is a Clinical Associate Professor at the University of Calgary in the Department of Critical Care and Division of Respiratory Medicine. He received his MD degree from the University of Alberta in 1983. After completing a rotating internship at the Holy Cross Hospital in Calgary, he completed post-graduate training in Internal Medicine, Respirology and Critical Care at the University of California, Los Angeles, University of Toronto and University of Pittsburgh. While maintaining an inpatient clinical practice, Dr Viner is also actively involved in teaching within the Faculty of Medicine. He is a senior medical administrator and leader who currently holds the position of Medical Director, Calgary Zone, Alberta Health Services. Dr. Viner is patient-focused with a particular interest in quality and engagement. Dr. Viner is married with 3 children.

Jason Waechter, Clinical Assistant Professor (MPT)

Clinical Activities: FMC- MSICU, FMC-CVICU

**Administrative Responsibilities: FMC, Site Education Coordinator
Co-Chair, DCCM Website Committee**

**Fellowship and Postgraduate Training: Critical Care Medicine,
Anesthesia**

Dr. Jason Waechter is an intensivist and cardiac anesthesiologist. He has an interest in medical education and is founder of teachingmedicine.com which is a medical education website used at many medical schools in Canada and the US. He was the cardiovascular course director for 4 years at UBC and currently is very involved with curriculum design and teaching at the University of Calgary. His research interest is competency within medical education.





Frank Warshawski, Clinical Assistant Professor

Clinical Activities: RGH-MSICU, FMC-CVICU, SHC-MSICU

Administrative Responsibilities: Member, Staff Work Life Program

Fellowship and Postgraduate Training: Critical Care Medicine, Pulmonary Medicine, Internal Medicine

Dr. Frank Warshawski is a consultant of Critical Care Medicine since September 1984 and joined the Calgary department in July 1990. He graduated from the University of Alberta in 1976 (MD cum laude). He then completed a year of family practice in Vancouver BC, followed by further training at the University of Western Ontario in London ON, and Harvard University in Boston, Massachusetts, with specialization in Internal Medicine, Respiratory Medicine and Critical Care Medicine. Dr. Warshawski is a Clinical Assistant Professor in the Departments of Critical Care Medicine, Internal Medicine and Respiratory Medicine in the Faculty of Medicine at the University of Calgary. He was the Medical Co-Director of ICU at the Calgary District Hospital Group 1990-1998, then Director of the RGH ICU from 1998-2004. Dr. Warshawski is married with 4 children. He is an avid cyclist, swimmer & skier.

Brent Winston, Associate Professor (GFT)

Clinical Activities: FMC-MSICU

Departments of Critical Care Medicine, Medicine, and Biochemistry and Molecular Biology. Member: Immunology Research Group and Airway Inflammation Research Group, Snyder Institute for Chronic Diseases, Cumming School Of Medicine, University of Calgary, Calgary, AB, Canada

Administrative Responsibilities: Coordinator for Post Graduate Sciences, Chair, and is the DCCM Representative to the Faculty Association. Member of the DCCM Research Committee and the DCCM Graduate Education Committee.

Fellowship and Postgraduate Training: Critical Care Medicine, Pulmonary Medicine, Internal Medicine



Research:

The research focus in my laboratory has been in three areas:

- We are primarily interested in using metabolomics to study human diseases in Critical Care. We continue to study metabolomics in sepsis, lung injury (ARDS) and head injury (traumatic brain injury, TBI).
- Gene regulation in sepsis. We have examined gene regulation in macrophages in sepsis with a focus on the alternative complement cascade Factor B and have examined IGF-I gene regulation in lungs with an interest in acute and chronic lung fibroproliferation.
- Clinical/Translational studies on sepsis. We have participated in a number of sepsis clinical studies. To this end, I have created a Critical Care Tissue bank to conduct translational research on clinically important problems in the ICU and have also created a wet lab within the ICU to manage samples.

My laboratory is particularly interested in conducting translational research on clinically relevant Critical Care and Pulmonary disease processes.

Dean Yergens, PhD Adjunct Assistant Professor



Dr. Dean Yergens is an Adjunct Assistant Professor in the Department of Critical Care. He has a BSc in Computer Science and a PhD in Community Health Sciences with a specialization in Health Services Research. Dr. Yergens has been very active in the area of Medical Informatics having previously developed and deployed Calgary's first ICU Clinical Information System in 1995. His current area of research is in the application of artificial intelligence towards the automation of data analysis and software for improving literature reviews. He has a strong interest in Global Health having worked in several countries over the past 15 years.

Bryan Yipp, Assistant Professor (GFT)

Clinical Activities: RGH-MSICU, SHC-MSICU

Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine

Dr. Bryan Yipp is a physician-scientist and assistant professor in the department of critical care medicine at The University of Calgary. His research interests include imaging host-pathogen responses and the in vivo immune system. Bryan joined the Leaders in Medicine program at The University of Calgary and completed a combined graduate immunology and medical degree (2000-2005). He pursued Internal Medicine at The University of British Columbia in Vancouver (2005-2008) followed by Critical Care Medicine in Calgary (2008-2010). Following his clinical training, Bryan was accepted into a physician-scientist training program at The Rockefeller University, New York, where he studied under Dr. Ralph Steinman (Nobel Laureate 2011). Currently, Dr. Yipp is investigating acute immune responses in the lung using advanced resonant scanning confocal and multiphoton intravital microscopy. He has received a Canada Foundation for Innovation award and holds a Canada Research Chair (tier II) in pulmonary immunology, inflammation and host defense. His laboratory is supported by operating funds from the CIHR.





Dan Zuege, Clinical Professor (MPT)

Clinical Activities: PLC-MSICU

Administrative Responsibilities: Provincial Medical Director eCritical Alberta; Medical Informatics Lead – Critical Care – Calgary Zone; co-chair Connect Care Critical Care Area Council; co-chair University of Calgary Medical Group Executive Council

Fellowship and Postgraduate Training: Critical Care Medicine, Pulmonary Medicine, Internal Medicine, M.Sc. Respiratory Physiology

Dr. Dan Zuege graduated from the University of Alberta (MD with distinction) with further training in Edmonton and Calgary obtaining specialty certification in internal, respiratory and critical care medicine and a Master's of Science in respiratory physiology. Dr. Zuege is a clinical professor in the Departments of Medicine and Critical Care Medicine in the Cumming School of Medicine, University of Calgary. He has held a number of medical leadership positions including the Medical Director for the Peter Lougheed Centre ICU from 2001 to 2012, the Medical Director for the Southern Alberta Organ and Tissue Donation Program from 2003 to 2010, and the Medical Director for the eCritical Alberta Provincial Critical Care Clinical Information System Program from 2011 to the present. He is the co-chair of the University of Calgary Medical Group Executive Council. His research interests include the epidemiology and prevention of infections in critical care and the use of medical informatics to support population health in the critically ill. He is married and tries to keep up with his young child in the mountains, skating rinks and ski hills.

Membership

There are many different types of membership in University of Calgary (academic) component of the department. There are two major categories: geographic full time or clinical/adjunct/research.

Geographic full time appointments are for MD's or PhD's who dedicate a considerable portion of their career to the advancement of medicine through research and scholarship. Clinical/adjunct/research appointments include physicians whose major focus is clinical service but may have other significant contributions in education, creative activity including research and medical leadership. Most physicians are members of the University of Calgary Medical Group (GFT or MPT). Adjunct and research appointments for non-medical members of the department recognize the important research/scholarship creative activity that these individuals provide to the department. Collectively, all contribute to the fabric and environment of the department that enhances care including through education and research.

Critical Care Medicine Leadership Group

2017-2018

Caroline Hatcher, Executive Director, FMC

Caroline is the Executive Director of Critical Care at FMC and has been involved in Critical Care in the Calgary zone since 2003. She is a Registered Nurse and has a Bachelor of Science in Nursing from the University of Alberta and a Master of Health Studies, Leadership.

Caroline's professional interests include Quality Improvement and Leadership development. Her patient-driven focus on quality and engagement in healthcare have also led her to volunteer abroad, teaching Leadership and QI in Africa through the Department of Global Maternal Child Health, University of Calgary.

Caroline is married and has two young adult children. In her spare time, she enjoys the great outdoors, travelling and cycling.



Kelly Coutts, ICU Manager, FMC



Kelly Coutts is the Manager of the Foothills Medical Centre Intensive Care Unit since March of 2017. She graduated with a diploma in Respiratory Therapy from Thompson Rivers University in 1991 and has held leadership positions in Vancouver and Calgary over the last 20 plus years.

Kelly joined AHS in 2006 as a Clinical Educator at the Peter Lougheed Centre and has held the position of Manager for Respiratory Services at both Rockyview General Hospital and Foothills Medical Centre. She has a special interest in Patient and Family Centred Care. Kelly is married and has 2 children. Outside of work she spends many hours at the hockey rink and enjoys the outdoors and reading.

Pam Holberton, Executive Director, SHC



Pam is the Executive Director of Critical Care, Cardiac Sciences, Emergency, Medicine and Respiratory Services at South Health Campus and has been involved in Critical Care in the Calgary zone for many years.

She graduated from the Royal Alexandra School of Nursing with a diploma, has a Baccalaureate Degree from the University of Alberta and a Master of Nursing Degree from the University of Calgary.

Pam's passion is Patient and Family Centered Care. She has a 26 year old daughter, also a nurse, who lives in Australia.

Rachel Taylor, ICU Manager, SHC

Rachel Taylor is the Manager of the SHC ICU/CCU. She has a BScN from the University of Brandon, MB. Rachel has been in a leadership role for the past 17 years within AHS. She has presented at national and international conferences regarding care of Cardiology Patients and Patient and Family Centered Initiatives within critical care.



Teresa Thurber, Executive Director, RGH



Teresa is the Executive Director Critical Care, Emergency, Respiratory, Women's Health and NICU @ RGH.

Nursing Graduate of Lethbridge and Athabasca University, CNA Certification in 2003 (Critical Care). She is currently working towards completion of MBA (June 2019). Over 31 years of Nursing experience includes L&D, Medicine & Seniors Health, Critical Care (ICU & CCU). The past 13 years have been spent in progressive operational leadership roles in AHS.

Married with 3 adult children, the youngest will be my Nursing successor.

Melissa Redlich, ICU Manager, RGH

Melissa Redlich is the Manager for the Rockyview General Hospital's Intensive Care and Coronary Care Units, as well as the Manager for Respiratory Services. She is a graduate from the University of Calgary Nursing Program. She has over 30 years of experience in Critical Care nursing including experience in clinical nursing, critical care education, and operational management.

Melissa is the co-chair for the provincial Alberta Health Services - Critical Care Strategic Clinical Network's Delirium Project, an inter-professional team, which has been spearheading the development of a provincial critical care delirium assessment and management program.

Melissa was born and raised in Calgary. She is married and has 2 daughters, both who are following in their mother's nursing footsteps.



Jana Ambrogiano, Executive Director, PLC



Jana is the Executive Director of Critical Care, Cardiac Sciences, Medicine, NICU, Pediatrics and Respiratory Services at the Peter Lougheed Centre.

Jana is a Registered Nurse by trade and early in her Nursing career developed a keen interest in leadership. As a result she has rounded out her education to date with several Leadership certificates; a Project Management certificate and a Masters in Management degree.

Jana has held a diverse set of leadership roles in both acute care and community in the Calgary Zone over the past 16 years.

Patty Infusino, ICU Manager, PLC

Patty Infusino is the manager of the intensive care unit since Sept 2015. Patty graduated from the Foothills school of nursing and went to get her degree (with distinction) from the University of Athabasca. She has completed the Adult Critical Care program and was certified nationally.

Prior to the manager position of the ICU she was the unit manager in ICU and the unit manager of hematology and medical teaching. Most of her career though, has been spent in the critical care department.

She is married with 1 son. She loves to participate in triathlons, especially the ironman distance. This allows her to travel to different places.



Kevin Orton, CVICU Manager



Kevin Orton is the manager of PCU 91, CVICU, OR perfusion and the Mechanical Circulatory Support Program. Graduating with a diploma in respiratory therapy in 2001 from Fanshawe College and BA PE (hons) from University of Western Ontario in 1994. A Registered Respiratory Therapist with Alberta Health Services for the past 17 years.

Kevin previously held positions as Unit Manager and Manager with the Department of Respiratory Services at the Foothills Medical Centre and Rockyview General Hospital respectively.

Kevin is married with 3 young children all of whom are actively engaged in music and sports and community.

Scott H. Banks MBA, CITP, CPHR Calgary Zone Manager Critical Care Medicine & Emergency Medicine Co-Chair of Emergency Medicine Physician Manpower

Scott is the Calgary Zone Department Manager for Critical Care Medicine and Emergency Medicine. Scott assumed the Critical Care portfolio in Sept 2017, and has continued to serve as the Zone Manager in Emergency Medicine since 2008.

Scott completed his Master of Business Administration degree (MBA) at the University of Calgary in 1993 specializing in Human Resources and International Management, and his Bachelor of Arts Honors degree in 1989 from the University of Regina. Scott is a 22 year Chartered Professional in Human Resources (CPHR) in Alberta, and holds a Certified International Trade Professional Designation (CITP) in Canada. Previously Scott served as the Vice President of Operations & Human Resources at The Brenda Strafford Foundation, and as Senior Vice President & Chief Operating Officer at a for profit healthcare college in Oahu, Hawaii. He has also served as an International Development Consultant with the Canadian International Development Agency in Guyana, Manager of the Mount Royal University Small Business Training Centre, and as a Market Intelligence Research Officer at the Canadian High Commission in Trinidad. In addition, he served as the Manager of Business Training & Commercial Accounts with the Business Development Bank of Canada.



Scott has lived and/or worked in Hawaii, Canada, Trinidad, Guyana, Haiti, and Dominica. Scott is married and has very active 4 and 7 year old boys. He enjoys spending quality time with his family, his french bulldog, jogging, travelling, and volunteering with World Vision.



Pam Hruska, Clinical Nurse Specialist

Pam Hruska is the Clinical Nurse Specialist for the Department of Critical Care Medicine in Calgary, Alberta. She graduated from the University Of Calgary Faculty Of Nursing in 2003 and completed both the ACCN and Canadian Nursing Association Critical Care Certification programs. Pam completed her Masters of Science in Medical Education in 2015 during which she developed research interests in cognitive based education, reasoning, and decision-making.

Pam is married, has a tiny dog named Golaith, travels whenever possible, and loves to ski in untouched backcountry powder.

Devika Kashyap, Quality Improvement Lead

Devika Kashyap is the Quality Improvement (QI) Lead for the Department of Critical Care Medicine (DCCM) in the Calgary Zone. Devika has a Bachelor's Degree in Communication Studies from the University of Calgary, coursework towards an MSc in Neurosciences, a Green Belt certification in Lean Six Sigma and is certified as a Prosci Change Management practitioner. Devika is currently pursuing courses towards an MBA. With over 9 years of QI experience, Devika has had the opportunity to work with the Emergency Department (ED) at the Foothills Medical Centre and the Calgary Stroke Program.

Devika has extensive experience using QI tools in planning, evaluating, implementing and sustaining process change. Her QI expertise has been honed working with teams at a site and provincial level, the latter involving work to develop and embed QI capacity at many of the rural centers in Alberta. Some prior QI work Devika was involved in includes: streamlining time to diagnostic ECG for walk-in suspected ischemic chest pain patients (Prompt Ambulatory Chest Pain Treatment - PACT), leaning out supply carts, exploring different models of care for ED Inpatients, reducing door to needle times for stroke patients (Hurry-up Acute Stroke Treatment - HASTE), and embedding QI capacity for primary and tertiary stroke centres across Alberta (Alberta Stroke Improvement – ASI).



Currently, Devika is working on 'spreading' the standardized OR to ICU handover tool across the Calgary Zone, implementing an electronic Transfer Summary Note for patient transfers from the ICU to Inpatient Unit, reviewing the policy of reportable events for the DCCM, and optimizing the use of Continuous Renal Replacement Therapy for the Choosing Wisely campaign.

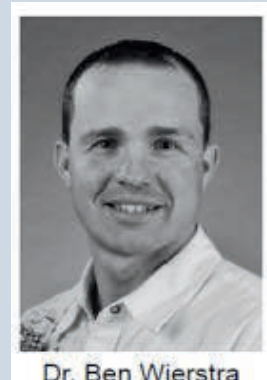
Critical Care Medicine Graduate Fellows

2017-2018



Dr. Andreeanne Cote

Dr. Andreeanne Cote completed her Medical Degree at the University of Sherbrooke. She completed an Internal Medicine and a Respiriology residency in University of Laval. She is a Fellow of the Royal College of Physicians and Surgeons of Canada in Respiriology. She is currently completing her Critical Care Medicine fellowship at the University of Calgary as well as a Master Degree in Clinical Epidemiology.



Dr. Ben Wierstra

Dr. Benjamin Wierstra joins the DCCM after completing his residency training in Internal Medicine at the University of Calgary. He is building on his distinguished career in the Canadian Armed Forces as a family physician with deployment experience to Afghanistan by completing his fellowship training in critical care. Dr. Wierstra will return to the Canadian Armed Forces at the completion of his training to continue to provide support to critically ill or injured Canadian soldiers wherever they serve on the globe.



Dr. Bikaramjit Mann

Dr. Bik Mann completed his undergraduate training at UBC.

Prior to joining the Department of Critical Care Medicine as a fellow he completed his residency and fellowship in internal medicine and nephrology at the University of Calgary.



Dr. Braedon McDonald

Dr. Braedon McDonald completed a degree in Microbiology and Immunology at McGill University, followed by medical school at the University of Calgary, as well as a PhD in Immunology studying neutrophil trafficking in inflammation.

Subsequently, he completed residency training in Internal Medicine at the University of British Columbia.

Dr. McDonald is currently a final year Critical Care Medicine Fellow, and a Postdoctoral Fellow with the International Microbiome Centre and Synder Institute for Chronic Disease, where he studies the interactions between the immune system and the microbiome in critical illness.



Dr. Tavish Barnes

Born and raised in White Rock BC, Dr. Barnes completed undergraduate and graduate studies prior to medical school training at UBC and four years of Internal Medicine training in Calgary.

He enjoys the outdoors including fly-fishing, tennis, squash, golf and hiking the Rockies.



Dr. Sean Spence

Dr. Spence was born and raised in Calgary, Alberta, before leaving to complete an undergraduate degree in Life Sciences at Queen's University.

He then returned to Calgary for medical school, before moving to Toronto for three years of Internal Medicine training.

He is very happy to be back in Calgary as a first year Critical Care Fellow. When not preparing for his Royal College exams, Sean enjoys travelling, snowboarding, and spending time in Fernie.



Dr. Colin Casault

Dr. Colin Casault is a Canadian Neurologist and Critical Care fellow at the University of Calgary. Born and raised in Edmonton, Alberta, he grew up with a passion for neurophysiology which he pursued into his future career. He went on to receive his Medical Doctorate, Neurology and Critical Care Medicine training from the University of Calgary. Throughout his education, he was recognized for academic excellence, education and leadership receiving the University of Alberta Dean's Silver Medal in Science, University of Calgary distinguished service award in Education and the Canadian Medical Association's Young Leaders Award.

Dr. Casault naturally gravitated towards leadership roles as both a medical student and resident eventually becoming the President of the Calgary Medical Students' Association, as well as a Board Member of the Provincial Association of Residents of Alberta (PARA), and chaired the Alberta Medical Association student affairs committee amongst many other roles. As a resident, he furthered his interest in medical education by contributing to the training of undergraduate medical students, residents and international medical graduates in Clinical Neurosciences.

Currently, Dr. Casault is completing a two-year fellowship in Critical Care Medicine at the University of Calgary before seeking fellowship training in Neurocritical Care.



Dr. Angela Babuk

Dr. Babuk was born in Russia and after many years on the move settled in BC, where she completed her undergraduate education at SFU in biopsychology and molecular biology.

She obtained her MD and four years of Internal Medicine training at UBC and is currently completing her Critical Care Medicine fellowship at the University of Calgary and Echocardiography training at UBC.

She is passionate about global health, community development and providing sustainable health care solutions to under-served populations.

Her other interests include traveling, skiing and salsa dancing.



Dr. Adam Parry

Dr. Adam Parry completed his Bachelor of Health Sciences (BHSc) degree followed by medical school at McMaster University. Subsequently, he completed residency training in Internal Medicine at the University of Saskatchewan.

Dr. Parry is currently completing a two-year fellowship in Critical Care Medicine at the University of Calgary.

He enjoys running, soccer, reading everything that will inform and challenge and solving complex problems.

Critical Care Medicine Graduate Students 2017-2018



Chloe de Grood

Chloe de Grood started (Fall 2017) her first year in a Master's program of Community Health Sciences at the University of Calgary under the supervision of Drs. Stelfox and Parsons Leigh. Chloe's thesis project will focus on the role of the public in the removal of low value practices from critical care medicine. Chloe is a recipient of the 2017 Alberta SPOR graduate studentship



Emma Sypes

*Emma Sypes is a Masters student in the Department of Community Health Sciences specializing in Health Services Research at the University of Calgary. She is supervised by Drs. Tom Stelfox and Dan Niven. Emma received her Bachelor of Science Honours degree from the University of Guelph in 2017, majoring in Bio-Medical Science. Her current thesis work focuses on the role of the public in reducing low-value care.
Position/Title: Masters Student
Institution: University of Calgary
Department: Community Health Sciences
Supervisor(s): Dr. Dan Niven; Dr. Tom Stelfox*



Kyla Brown

Kyla Brown is a second year master's student in the Department of Community Health Sciences specializing in Health Services Research at the University of Calgary. She is supervised by Drs. Tom Stelfox and Kirsten Fiest. Kyla received her Bachelors of Health Science Honours degree from the University of Calgary in 2015 majoring in Health and Society with a concentration in Sociology. Her current research focuses on the role of delirium in the complex web of causation that connects ICU stays to subsequent neuropsychiatric disorders.

Publications:

Brown, KN., Rosgen, B., Guienguere, SO., Faris, P., Patten, SB., Stelfox, HT., Fiest, KM. The relationship between delirium in the intensive care unit and neuropsychiatric disorders post-stay: A systematic review and meta-analysis. In progress.

Brown, KN., Parsons Leigh, J., Kamran, H., Bagshaw, SM., Fowler, RA., Dodek, PM., Turgeon, AF., Forster, AJ., Lamontagna, F., Soo, A., Stelfox, HT. Transfer from Intensive Care Unit to Hospital Ward: A Multi-Centre Textual Analysis of Physician Progress Notes. Critical Care 2018, 22(19): 1-8.

Brown, KN. & Bierman, A. Work dissatisfaction and sleep problems among Canadians in the latter half of life. Canadian Journal of Aging 2017, 36(3): 351-365.

Parsons Leigh, J., Brown, KN., Buchner, D., & Stelfox, HT. Protocol to describe the analysis of text-based communication in medical records for patients discharged from intensive care to hospital ward. BMJ Open 2016, 6: 1-8.

Awards:

Graduate (MSc)

- 2018 Alberta Graduate Student Scholarship (\$3,000)
- 2017 Community Health Sciences Graduate Program (\$910)
- 2017 Queen Elizabeth II Scholarship (\$10,800)
- 2017 Health Research Methods (MDCH681) – Best Proposal
- 2016 Biostatistics I (MDCH611) Micro Conference – Best Presentation
- 2016 W21C Health Services Research Scholarship (\$30,000)

Undergraduate

- 2015 Dean's List – Faculty of Medicine
- 2014 Dean's List – Faculty of Medicine
- 2014 University of Calgary Undergraduate Merit Award (\$500)
- 2013 Jason Lang Scholarship (\$1000)
- 2011 Jason Lang Scholarship (\$1000)
- 2011 University of Calgary Entrance Scholarship (\$1250)



Khara Sauro

Khara Sauro is a postdoctoral fellow in the Department of Critical Care Medicine and the recipient of a several awards (CIHR, W21C-CRIO, and Cumming School of Medicine/O'Brien Institute of Public Health) for her postdoctoral work. She is currently examining the implementation of best practices in the ICU.

Khara graduated from the University of Calgary with a PhD in Community Health Science (health services research). She has over 26 publications; presented her work over 40 times at provincial, national and international conferences; has sat on provincial and international committees; and is a coauthor on a World Health Organization clinical practice guideline.

Khara has a particular interest in the application of knowledge translation and quality improvement methodologies for improving the quality of healthcare, and the application of administrative data in evaluating healthcare quality. As a health services researcher, Khara uses diverse methodologies in order to ask and appropriately answer clinically relevant research questions.

Current Research Project(s): VTE prophylaxis in Neurocritical care patients; organizational factors to implementing best practices

Link to Institutional Profile:

<https://criticalcareresearchscn.com/singleFull/597b70d5fab3180004418268>

Areas of Interest: Health Services Research; Knowledge Translation; Quality Improvement; Evidence-based Medicine; Quality of Healthcare



Dr. Jung Hwan (John) Kim PhD, BSc

John Kim recently graduated from Dr. Bryan Yipp and Dr. Paul Kubes laboratory. During his PhD study, he published 4 peer-reviewed papers and received an Award of Excellence for his PhD thesis.

PhD thesis: The role of B cells in regulating pulmonary neutrophils in vivo

Awards:

*Award for Thesis Excellence 2018 (\$1000)
Alberta Graduate Students Scholarship (Provincial) February, 2015 (\$3000)
Queen Elizabeth II Graduate Award (Provincial) May, 2014 (\$10,800)
Queen Elizabeth II Graduate Award (Provincial) May, 2013 (\$10,800)*

Publications:

*Kim, J.H., J. Podstawka, Y. Lou, L. Li, E. K. S. Lee, M. Divangahi, B. Petri, F. R. Jirik, M. M. Kelly, and B. G. Yipp. 2017. Aged Polymorphonuclear Leukocytes Cause Fibrotic Interstitial Lung Disease in the Absence of Regulation by B cells. *Nature Immunology* 19:2 (Published. IF: 21.5)*

*Lee, E. K. S., M. R. Gillrie, L. Li, J. W. Arnason, J. H. Kim, L. Babes, Y. Lou, A. Sanati-Nezhad, S. K. Kyei, M. Kelly, C. H. Mody, M. Ho, and B. G. Yipp. 2017. LT_{B4} Mediates Infection Induced Pulmonary Capillaritis During Lethal Fungal Sepsis. *23:1 Cell Host Microbes* (Published. IF: 14.9)*

*Liew, P., J. H. Kim, W. Y. Lee, and P. Kubes. 2017. Antibody-Dependent Fragmentation is a Newly Identified Mechanism of Cell Killing in vivo. *Scientific Reports* 7:1 (Published. IF: 4.26)*

*Yipp, B. G., J. H. Kim, R. Lima, L. D. Zbytnuik, B. Petri, N. Swanlund, M. Ho, V. Szeto, T. Tak, L. Koenderman, P. Pickkers, A. T.J. Tool, T. W. Kuijpers, T. K. van den Berg, M. R. Looney, M. F. Krummel, and P. Kubes. 2017. The Lung is a Host Defense Niche for Immediate Neutrophil-Mediated Vascular Protection. *Science Immunology* 2:10 (Published)*

Textbook Chapters

*Kim, Jung Hwan, and Bryan G. Yipp. "Neutrophil Mediated Vascular Host Defense." *Vascular Responses to Pathogens*, Elsevier, 2015 (Published)*



Mr. John Podstawka BHSoc

John Podstawka is a 2nd year Master's student, as well as a CIHR Frederick Banting & Charles Best Scholar (2017). After completing his undergraduate degree in the Bachelor at Health Sciences (Honours Program – First Class) at the University of Calgary, he joined the Yipp lab to characterize the functional and regulatory roles of pulmonary B cells.

Awards:

*Alberta Graduate Students Scholarship (Provincial) February, 2018 (\$3,000)
Canadian Institutes of Health Research - Frederick Banting and Charles Best Canada Graduate (MSc) Scholarship (National) March, 2017 (\$17,500)
Queen Elizabeth II Graduate (MSc) Scholarship (Provincial) February, 2017 (\$10,800)
Markin USRP Summer Studentship (Local) May, 2016 (\$6,000)*

Publications:

*Kim, J.H., J. Podstawka, Y. Lou, L. Li, E. K. S. Lee, M. Divangahi, B. Petri, F. R. Jirik, M. M. Kelly, and B. G. Yipp. 2017. Aged Polymorphonuclear Leukocytes Cause Fibrotic Interstitial Lung Disease in the Absence of Regulation by B cells. *Nature Immunology* 19:2 (Published. IF: 21.5)*



Ms. Elise Granton H.BSc

Elise is a second year Master's student who has switched to the PhD program in the Medical Science program. Elise completed her undergraduate training at McMaster University and received an honours in Life Sciences.

Awards:

Cumming School of Medicine Scholarship 2016-2020 (\$30,000/yr)

CIHR Banting and Best MSc scholarship. (2017) (\$17,500)

Publications:

Loss of SMAD3 Promotes Vascular Remodeling in Pulmonary Arterial Hypertension via MRTF

Disinhibition. Zabini D, Granton E, Hu Y, Miranda MZ, Weichert U, Breuils Bonnet S, Bonnet S, Morrell NW, Connelly KA, Provencher S, Ghanim B, Klepetko W, Olschewski A, Kapus A, Kuebler WM. Am J Respir Crit Care Med. 2018 Jan 15;197(2):244-260.

Pulmonary vascular changes 22 years after single lung transplantation for pulmonary arterial hypertension: a case report with molecular and pathological analysis.

Zhao YD, Peng J, Granton E, Lin K, Lu C, Wu L, Machuca T, Waddell TK, Keshavjee S, de Perrot M. Pulm Circ. 2015 Dec;5(4):739-43.

A Biochemical Approach to Understand the Pathogenesis of Advanced Pulmonary Arterial Hypertension: Metabolomic Profiles of Arginine, Sphingosine-1-Phosphate, and Heme of Human Lung.

Zhao YD, Chu L, Lin K, Granton E, Yin L, Peng J, Hsin M, Wu L, Yu A, Waddell T, Keshavjee S, Granton J, de Perrot M. PLoS One. 2015 Aug 28;10(8).



Ms. Esther Kyung Su Lee MSc. BSc

Esther recently finished her Master's degree at the Yipp lab, which she joined after graduating from McGill University with a Bachelor's degree in Physiology. After completing her MSc, Esther is now completing her medical degree at the University of Alberta.

MSc Thesis: The dynamic role of pulmonary neutrophils in the fungal clearance and immunopathology during systemic candidiasis in vivo

Awards:

Beverley Phillips Rising Star Scholarship 2014 (\$25,000)

Beverley Phillips Rising Star Scholarship 2015 (\$25,000)

Queen Elizabeth II Graduate Award (Provincial) September 2016 (\$7,200)

Alberta Graduate Student Scholarship (Provincial) Mar 2015 (\$3,000)

Publications:

Kim, J.H., J. Podstawka, Y. Lou, L. Li, E. K. S. Lee, M. Divangahi, B. Petri, F. R. Jirik, M. M. Kelly, and B. G. Yipp. 2017. Aged Polymorphonuclear Leukocytes Cause Fibrotic Interstitial Lung Disease in the Absence of Regulation by B cells. Nature Immunology 19:2 (Published. IF: 21.5)

Lee, E. K. S., M. R. Gillrie, L. Li, J. W. Arnason, J. H. Kim, L. Babes, Y. Lou, A. Sanati-Nezhad, S. K. Kyei, M. Kelly, C. H. Mody, M. Ho, and B. G. Yipp. 2017. LTB4 Mediates Infection Induced Pulmonary Capillaritis During Lethal Fungal Sepsis. 23:1 Cell Host Microbes (Published. IF: 14.9)



Dr. Lu Li, PhD

Dr. Lu Li got the PhD degree from University of Science and Technology of China and joined the Yipp lab as postdoctoral fellow in 2016. Her project is to investigate how lung sensory nerves regulate inflammation and host defense.

Publications:

Baral P, Umans BD, Li L, Wallrapp A, Bist M, Kirschbaum T, Wei Y, Zhou Y, Kuchroo VK, Burkett PR, Yipp BG, Liberles SD, Chiu IM. 2018. Nociceptor sensory neurons suppress neutrophil and $\gamma\delta$ T cell responses in bacterial lung infections and lethal pneumonia. Nature Medicine (Published. IF: 29.9)

Kim, J.H., J. Podstawka, Y. Lou, L. Li, E. K. S. Lee, M. Divangahi, B. Petri, F. R. Jirik, M. M. Kelly, and B. G. Yipp. 2017. Aged Polymorphonuclear Leukocytes Cause Fibrotic Interstitial Lung Disease in the Absence of Regulation by B cells. Nature Immunology 19:2 (Published. IF: 21.5)

Lee, E. K. S., M. R. Gillrie, L. Li, J. W. Arnason, J. H. Kim, L. Babes, Y. Lou, A. Sanati-Nezhad, S. K. Kyei, M. Kelly, C. H. Mody, M. Ho, and B. G. Yipp. 2017. LT_{B4} Mediates Infection Induced Pulmonary Capillaritis During Lethal Fungal Sepsis. 23:1 Cell Host Microbes (Published. IF: 14.9)

Zeng Z, Li L, Chen Y, Wei H, Sun R, Tian Z. 2016. Interferon- γ facilitates hepatic antiviral T cell retention for the maintenance of liver-induced systemic tolerance. J Exp Med. (Published. IF: 12.0)



Ms. Courtney Schubert, BHSc

Courtney Schubert is a 2nd year Masters student in the Leaders of Medicine program working towards a MD/MSc. She will be starting medical school at the University of Calgary in July 2018.

Awards:

*Cummings School of Medicine Scholarship, 2016-2018 (\$30,000/year)
Alberta Graduate Student Scholarship, 2018 (\$3,000)*

Publications:

Angonegui G, Zelinski EL*, Schubert CL, Knight D, Craig L, Winston BW, Spanswick SC, Petri B, Jenne C, Sutherland JC, Nguyen R, Jayawardena N, Kelly MM, Doig CJ**, Sutherland RJ**, Kubes P**. Targeting inflammatory monocytes in sepsis-associated encephalopathy and long-term cognitive impairment. JCI Insight, submitted.*



Mr. Ian Blanchard, MSc

Ian Blanchard has worked in Emergency Medical Services (EMS) systems in Canada and the United Kingdom for over twenty years.

He is the Research Lead for the Alberta Health Services (AHS) EMS system, the provincial co-chair of the AHS EMS Research Committee, and a past and first paramedic co-chair of the Canadian Emergency Medical Services Research Network - Réseau Canadien de Recherche en Soins Préhospitaliers (CERN-RCRSP). He is also an Adjunct Assistant Professor with the Department of Community Health Sciences, in the Cumming School of Medicine at the University of Calgary.

Most recently he has become a PhD student with the Department of Critical Care, in the Cumming School of Medicine, under the supervision of Dr. Christopher Doig and Dr. Eddy Lang.

He was recently awarded the Izaak Walton Killam Doctoral Scholarship



Mr. Simon Guienguere, MSc

Analyst, ICU CLINICAL

Simon Olivier Guienguere is currently pursuing his PhD in Community Health Sciences at the University of Calgary. His research interest area is in the ICU bed occupancy under the supervision of Drs. Christopher Doig and Tyler Williamson.

He graduated from Kennesaw State University (GA) with a Master of Science in Applied Statistics and a Master in Economics from University of Ouagadougou.

Coming from the business world (The Coca-Cola Company and IBM partners), he is actively learning from the healthcare industry.

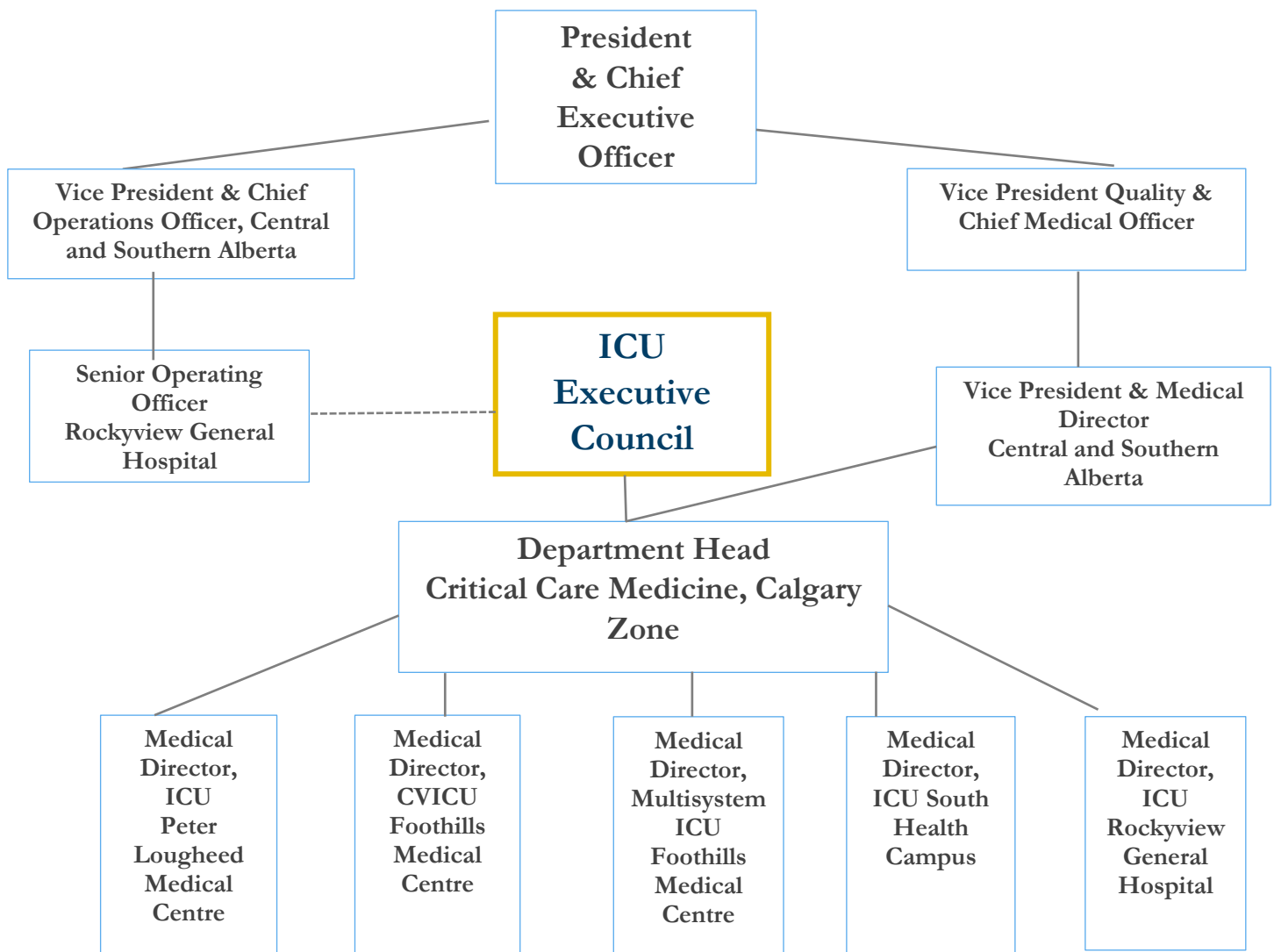
Simon enjoys playing soccer, guitar, and checker (draught) during his spare time.

Appendices

1. Department Structure and Organization

Governance

The Departmental functions are principally located at the four acute care sites, with the Peter Lougheed Medical Centre, Rockyview General Hospital and South Health Campus Hospital providing general intensive care services while the Foothills Medical Centre, in addition, provides tertiary services for Trauma and Neurosciences patients. Cardiovascular Surgery intensive care services are provided at the Foothills Medical Centre in a distinct ICU under the supervision of Intensivists from the Department of Critical Care Medicine.



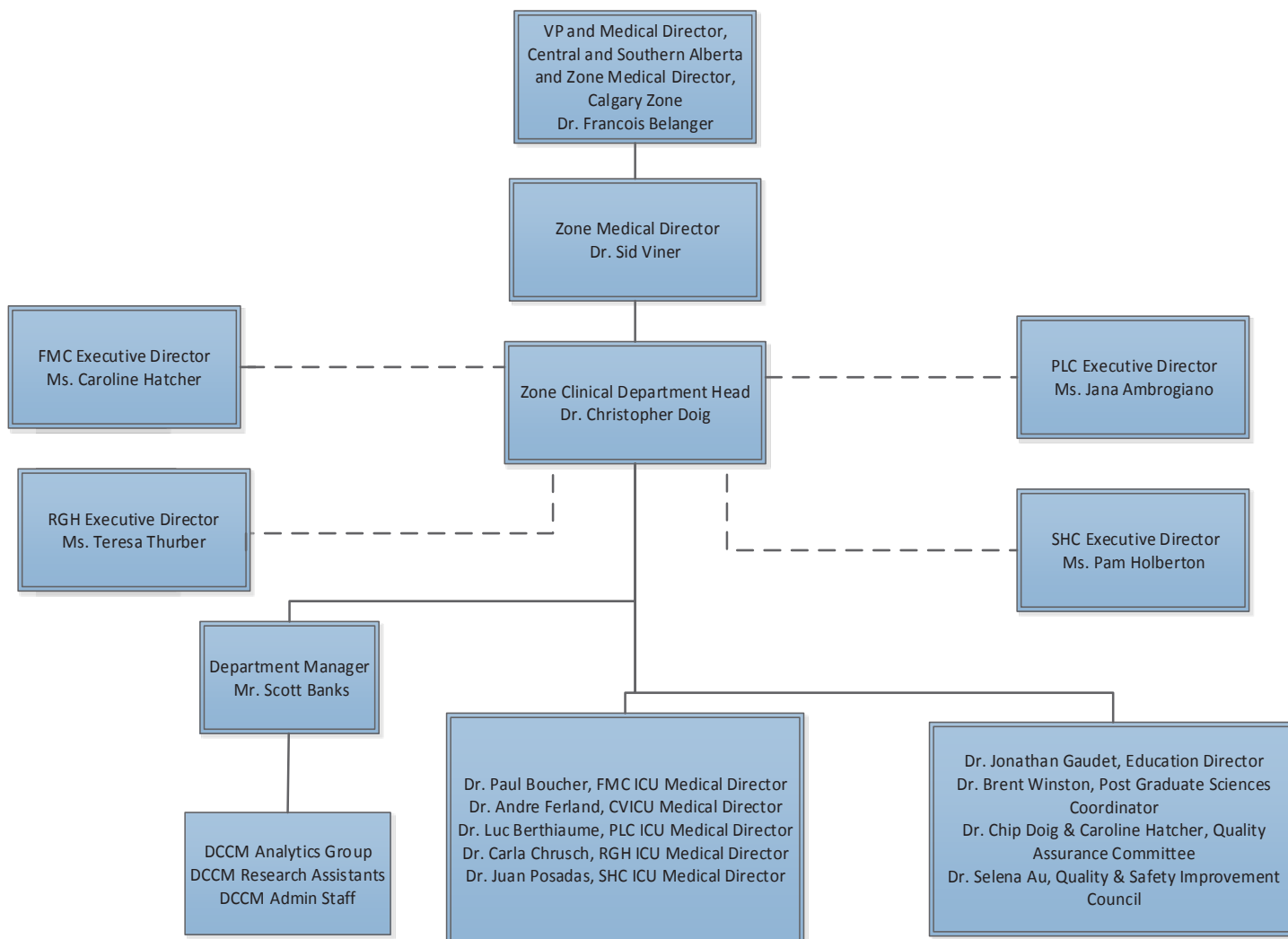
The Calgary Zone reporting relationships and governance of DCCM are provided in the schema outlined above. The DCCM Head is a member of the Zonal Medical Advisory Committee. All DCCM members share responsibility for the vision, goals and advancement of all facets of the Department: excellence in clinical service, administrative leadership, and scholarly initiatives in education and research that are aligned with the University's vision to be one of the top five Universities in Canada. The DCCM Head has frequent council with the members of the Department, Medical Executive Committee and also with the Zonal ICU Executive Council for operational issues. Participation by medical and non-medical ICU practitioners in our Departmental Research Seminar, our site based Zonal Morbidity and Mortality working group review processes with direct links to our Departmental Quality Assurance Committee and finally social programs foster our strong Zonal and inter-disciplinary cooperation.

Departmental Committees

The following Departmental Councils and Committees meets on a regular basis based on the Terms of Reference for each group. Councils more often have a zone mandate and a broader inter-professional representation than committees.

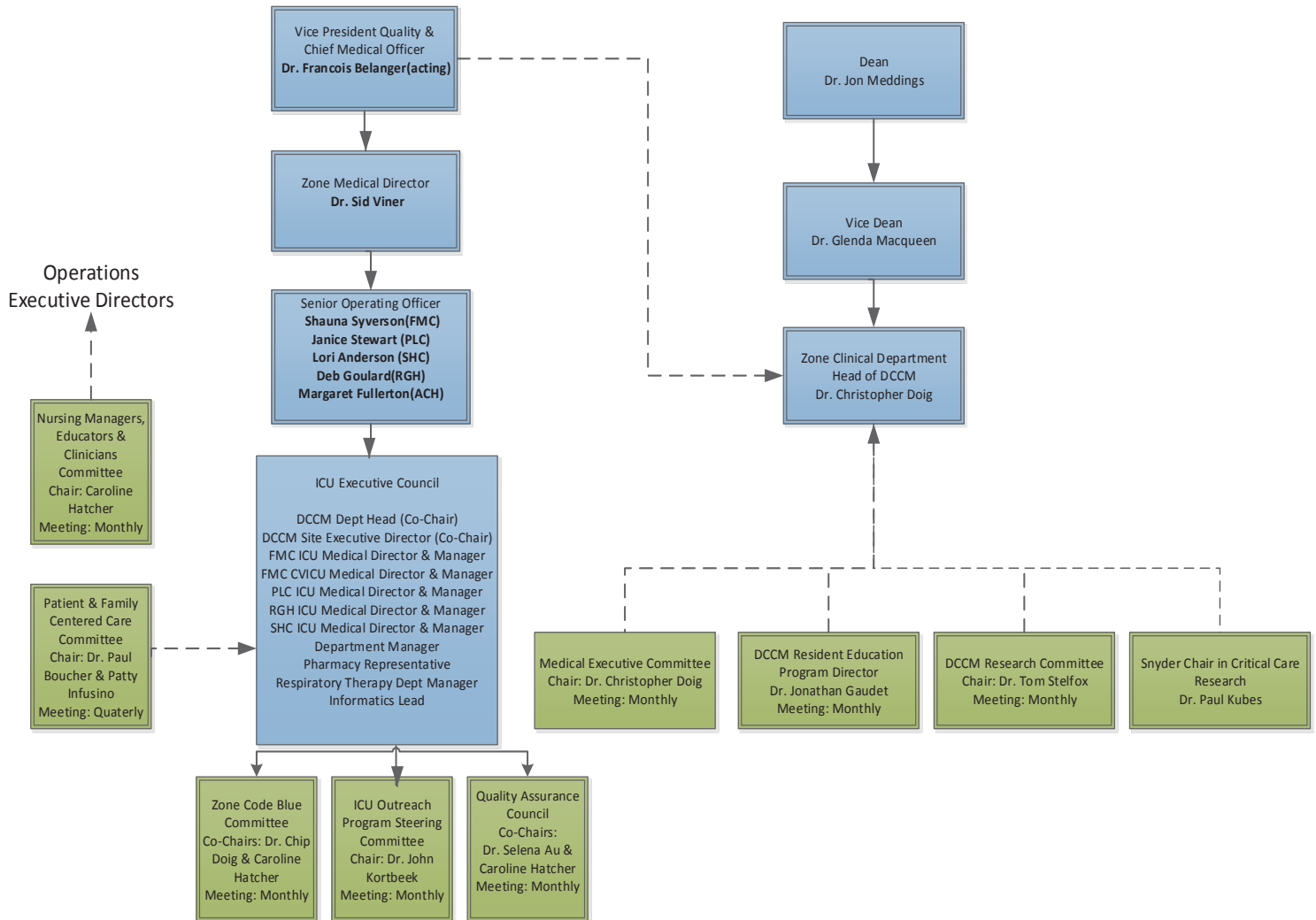
- ICU Executive Council
- Quality Assurance Committee
- Zonal Resuscitation Council
- ICU Medical Executive Committee
- Zonal ICU Outreach Steering Committee
- Zonal Code Blue Committee Meeting
- DCCM Physicians Business Meeting
- Mortality Working Group
- DCCM Clinical Research Meeting

II. Medical Leadership & Administration

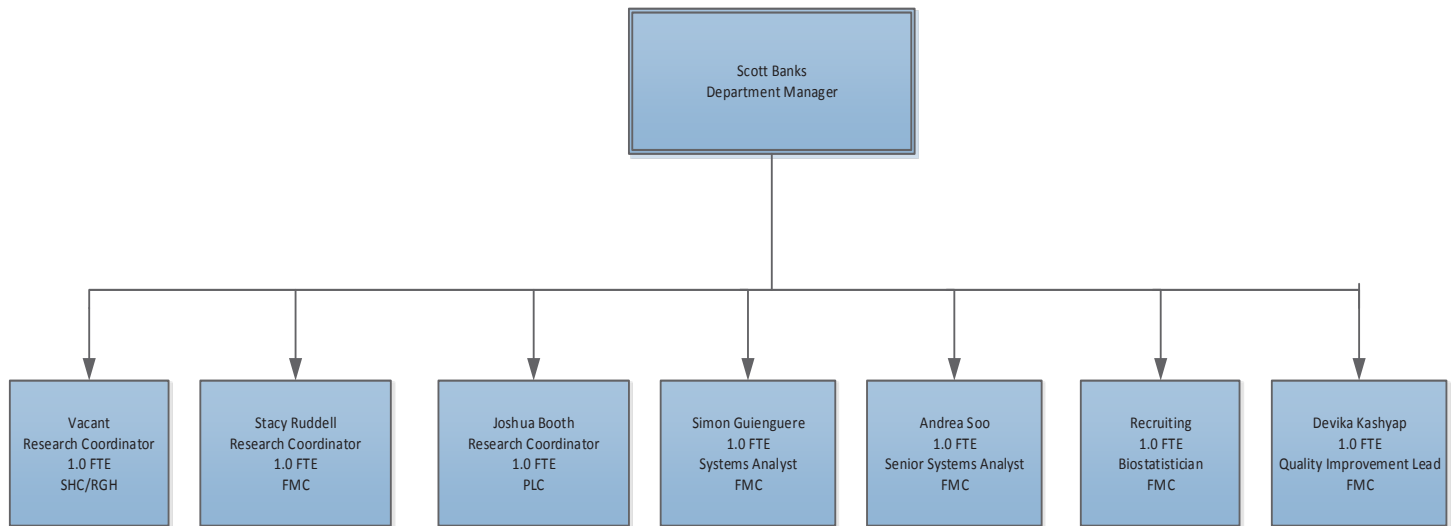


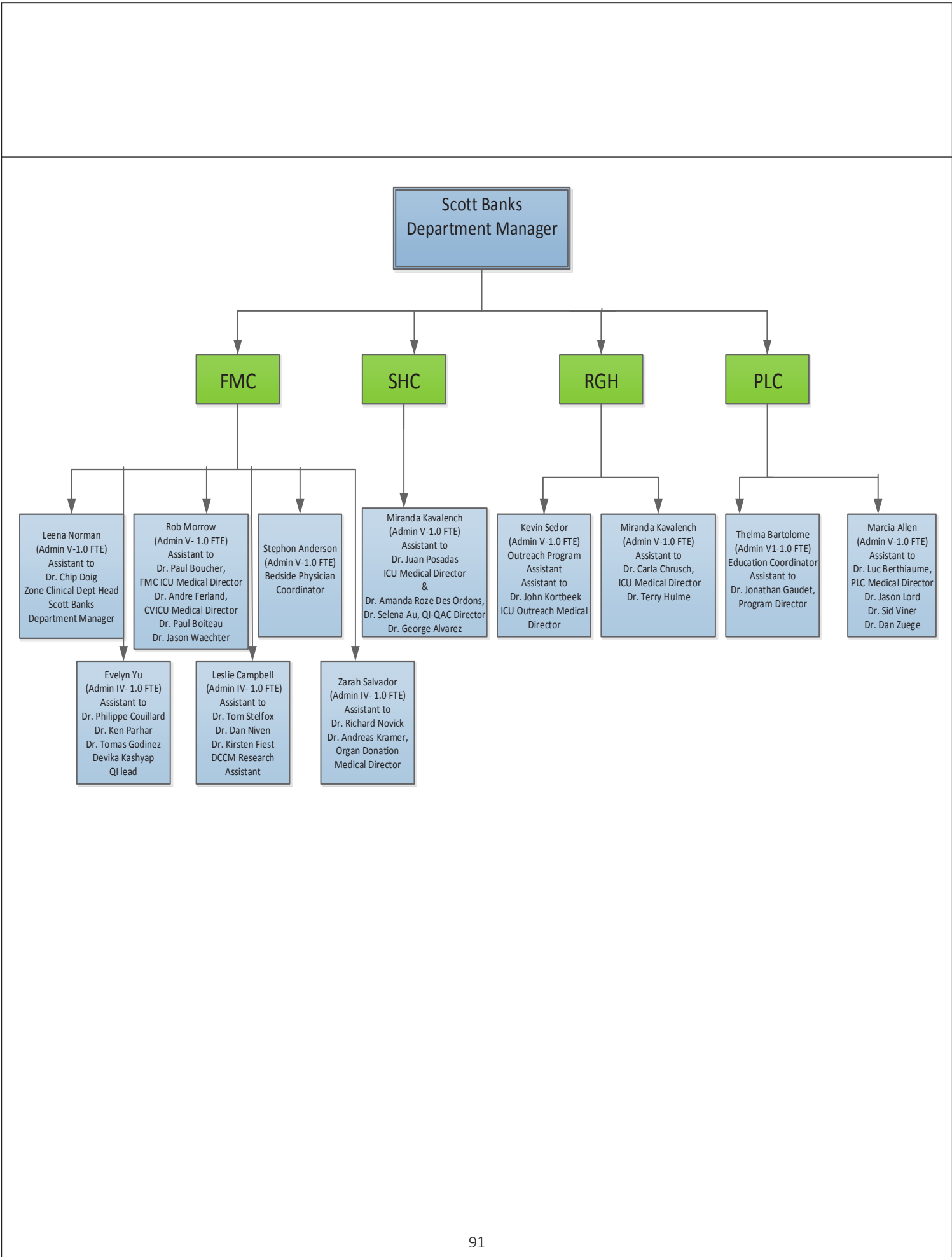
AHS Calgary Zone Acute Care

University of Calgary Faculty of Medicine



III. Department of Critical Care Medicine Support Staff





IV. Clinical Activity & Organization

The Calgary Zone serves a population in Calgary of approximately 1,100,000 and a regional referral of an additional 300,000 patients from south and central Alberta, southeastern British Columbia and occasionally southwestern Saskatchewan.

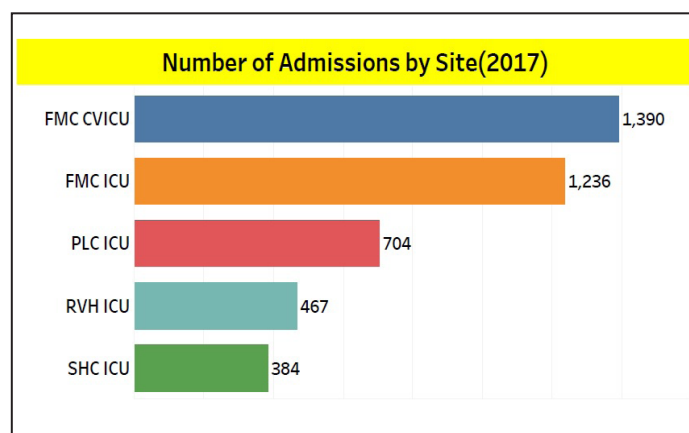
Adult critical care is provided in five ICU's; the multi-system ICU's (MSICU) are located at each of the Calgary hospitals and one cardiovascular ICU (CVICU) for the management of post-operative heart patients is located at the FMC, and is medically administered and staffed by our Department. The FMC provides regional trauma and tertiary neurologic services within a state of the art 28 bed ICU. It is divided into 3 distinct pods to meet the needs of the critically ill neurologic and trauma patients, the general medical and surgical patient's as well high dependency type patients. The PLC provides regional vascular surgery services and also has an 18 bed MSICU while the RGH provides regional urology services and has a 10 bed MSICU. The SHC, our newest facility currently serving the southern portion of the city has a 10 bed MSCICU. The RGH ICU has a slightly older and classic medical-surgical distribution of patients. The FMC-CVICU has 14 funded beds. The provision of coronary or medical cardiac intensive care is under the purview of the Department of Cardiac Sciences.

Approximately 3.5% of all ICU patients are referred from outside of Calgary. The adult MSICU's in cooperation with Referral, Access, Advice, Placement, Information & Destination (RAAPID) call center and the Shock Trauma Air Rescue Society (STARS) air ambulance system manage referrals so as to maximize bed utilization while respecting the necessity to offer regional services, such as vascular surgery, at only one site. Currently, any out-of-town physician with a critically ill patient can contact the Department of Critical Care Medicine through RAAPID. The RAAPID dispatcher engages in a conversation with the most appropriate site Intensivist according to patient needs and regional ICU capacity.

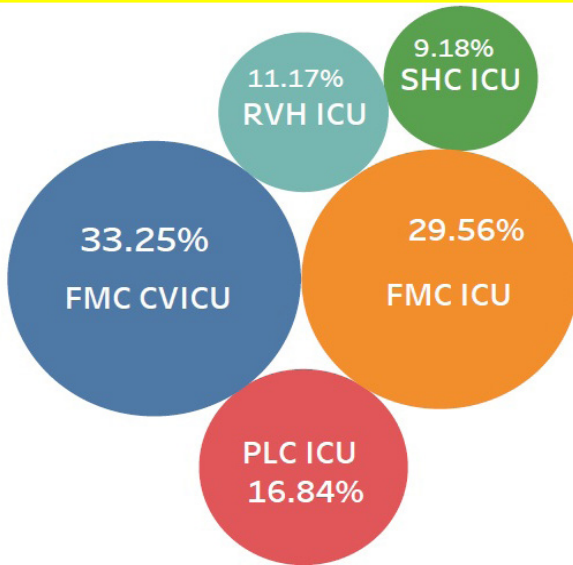
This process is facilitated by a flow map which is a joint initiative of the Department and RAAPID (see DCCM website). The key to the success of this process is for all participants and stakeholders to demonstrate the necessary flexibility as our Zonal and Provincial landscape changes.

A conference call with the ICU attending, the referring physician, the STARS 'flight' doctor, and any other specialist can be immediately arranged by this service. Within the city, the adult ICU's have adopted a policy of '1 ICU across 4 hospitals' and frequently the Department coordinates inter-institutional transfers of critically-ill patients. These patients may be transferred directly between ICU's or from an Emergency Department to an ICU. These two mechanisms of referral and transfer have helped ensure that all ICU's provide tertiary care referral service, maximize bed utilization across the zone, and continue the spirit of zonal cohesiveness and cooperation. Over the years, our Zonal "Out of Region Referrals" policy has been changed to reflect our bed capacity issues and subsequently to reflect the creation of one healthcare system under Alberta Health Services (AHS). We are committed to the repatriation of non-Calgary zone patients to their home jurisdictions (Healthcare Zones) once the need for tertiary care services no longer exists. The cancellation of elective surgeries and the transfer of patients to alternate Health Zone ICU's as Departmental bed capacity management strategies only proceeds once all site over capacity measures have been exhausted within the city of Calgary (see DCCM website). Discussions continue to ensure however, that the needs of our usual referring Alberta Health Zones as well as neighboring Eastern BC Health Systems are met through the endorsement of timely policy revisions by the Departmental ICU Executive Council in collaboration with our Zonal Senior Leadership group.

There were 4181 admissions in 2017 in the Departmental ICU's.



Percentage of Admissions by Site(2017)



All ICU's perform standard critical care monitoring and physiologic support. All units are equipped with similar equipment. All adult ICU's have state of the art bedside ultrasound equipment to secure vascular access and perform limited diagnostic thoracic (cardiac, chest) and abdominal scans 24 hours a day. All ICUs can provide continuous renal replacement therapy (CRRT) with accountability for this service falling under the department of critical Care Medicine. A Zonal CPG with clear policies and

procedures guides the provision of this service. Intermittent hemodialysis is provided at both the PLC and FMC with the assistance of the Nephrology service.

Patients experiencing catastrophic lung failure, in the absence of multi-system organ failure, may be referred to our Zonal Extra-Corporeal Lung Assist Program, a collaborative effort between Departmental Intensivists working in the FMC CVICU, cardiovascular surgeons and perfusionists from the Department of Cardiac Sciences at the FMC. Intracranial pressure monitoring is performed at the FMC-MSICU; the standard is percutaneous ventricular drains placed by Neurosurgery, and managed by Critical Care. Jugular venous oxygen saturation monitoring, interventional hypothermia and continuous EEG recording are also commonly used. In the past few years, the FMC ICU has been using cerebral microdialysis in association with the placement of intra-parenchymal Codman microsensor ICP transducers and brain tissue Po2 probes as part of a program in neurocritical care led by our 2 neurocritical care intensivists. The decision to concentrate the provision of neurologic critical care services into one pod at the FMC (C Pod) will allow the development of advanced competencies for both nursing and medical staff while enabling the Critical Care Residency Training Program to move forward with establishing a Neurocritical Care Fellowship program for physician trainees following the completion of 2 years of general critical care medicine training.

Percentage of Class Admissions by Site(2017)

Class	FMC CVICU	FMC ICU	PLC ICU	RVH ICU	SHC ICU
SURGICAL	96.5%	20.1%	23.0%	16.9%	13.8%
MEDICAL	2.9%	42.8%	75.0%	81.2%	79.9%
NEURO	0.4%	21.7%	1.6%	1.9%	3.6%
TRAUMA_WITH_INJURY		7.6%			0.5%
TRAUMA_WITHOUT_INJURY		6.9%			0.3%
Unknown	0.3%	1.0%	0.4%		1.8%

IV. Clinical Activity & Organization *continued*

In the summer of 2006, the ICU Outreach Team (Code 66) was born from the realization that our healthcare system needed to recognize critical illness early and to respond to patients wherever they are in the hospital. The goal of having such a Team was to facilitate timely admission of patients to ICU when required, allow direct access of all health care personnel to the expertise of a critical care team to assist in the care of their patients, share critical care skills and expertise through educational partnerships, promote continuity of care by providing follow-up to patients transferred out of ICU and ultimately to improve communication and relationships among health care teams within our acute care sites. The novelty of this concept resides with the fact that the Team can be activated by any health care provider guided by predetermined triggers (e.g., Respiratory rate $< 8 > 30$ / min, Change in O₂ saturation to $< 90\%$ when O₂ > 5 L/min, Pulse rate $< 40 > 140$ / min, Systolic BP < 90 mmHg or acute decrease in systolic BP, etc.). The system was first implemented in the summer of 2006 at the FMC followed by a fall implementation at the PLC and a summer of 2007 implementation at the RGH.

The vision of the eCritical Alberta Project (formerly the Critical Care Clinical Information System (CC CIS) Project), is to deliver the most comprehensive, multimodal and integrated data repository of patient-specific critical care clinical information in the nation, which will present real-time information in an intuitive fashion for optimal and timely patient-specific decision making, while also enabling the creation of timely unit, zonal and provincial reports for administrative, quality improvement, education and research purposes. Ultimately, the Project will deliver a single system – eCritical Alberta – with a single access point for critical care where all charting, documentation, decision support and interfaces to other dependant systems will occur. To accomplish this, eCritical Alberta requires two key components – a bedside clinical information system (MetaVision) and a data warehouse (TRACER). eCritical is now present throughout Alberta’s adult, and neonatal ICU’s. It is currently expanding to all coronary care units.

The Department of Critical Care Medicine continues to be involved in the initiatives to develop a national critical care data set. A breakthrough in reaching a consensus on ICU data elements necessary for the creation of an initial “Report Card” occurred in February 2005 at the Rocky

Mountain Critical Care Conference held in Vernon, British Columbia. Representatives from the following organizations subsequently partnered in submitting a grant to the Canadian Patient Safety Institute in July 2006 on the value of a Critical Care Report Card in driving institutional quality improvement and patient safety initiatives: Vancouver Coastal Health Region, Calgary Health Region, Winnipeg’s Regional Health Authority, London Health Sciences Centers, the Ottawa Hospital, Sunnybrook Health Sciences Centre and the Sir Mortimer B. Davis Jewish General Hospital in Montreal. The grant application was successful and critical care leaders from across the country have been working earnestly on the project since early 2007 with an objective to agree upon indicators and their definitions and standardized methodologies for the collection/reporting of key data elements in critical care as well as encouraging participants to share their administrative and clinical data for the benefit of their respective organizations and ultimately patients across the country.

Our department developed, housed and maintained a prototype web-based Canadian Critical Care Score-card application which was used by 24 ICUs in 7 Canadian cities to submit data for 23 quality indicators for benchmarking by peer groups. The application generated on-line benchmark and individual reports using statistical control charts which assisted the leadership of individual Intensive Care Units (ICUs) for purposes of quality improvement and administration. After the success of the prototype applicator a new grant was requested for further development.

Continuous development and enhancements on our departmental web site made this site an important communication tool. Among the many useful features of our internet website we can mention; a unit bed capacity monitor, online quizzes and surveys, physician’s call schedule, policies and procedures, documentation and access to multiple reports and online applications, just to name a few. Apart from the secured intranet website, we have a fairly comprehensive site available for our families and an external site available to the public.

V. Challenges

Response to Issues

Issue: Patient Safety

The Department continues to be an active participant in many of the Patient Safety Initiatives that have resulted from the work initiated by the Quality, Safety and Health Information portfolio and continues to espouse the building of a “Culture of Safety” within the work place.

Issue: Recruitment of Physicians

Refer to Section VI. Workforce Planning

Ongoing Matters and Plan of Action

Capacity

Short Term 1 – 3 Years: The Critical Care leadership will continue to meet with AHS Executive to provide utilization data and justification to ensure the most important consideration is a patient centered system.

Longer Term 4 – 7 Years: The RGH ICU Functional Programming Team has been dormant given the absence of designated funding thus far. The importance of ensuring appropriate support services (e.g. ICU bed capacity) at each of the sites continues to be stressed to planners in view of our commitment to patient safety.

Future Risks

Inadequate physical resources and the lack of human resources will require the development of a coordinated province-wide strategy to deal with the critically ill. This should include:

- The development of provincial programs of advanced competencies in critical care for allied health disciplines.
- The DCCM website has been hosted on the FTP Server: iwebftp.calgaryhealthregion.ca. However the source file for the whole website is housed on the drive: Jeeves which share the ICU files.

Risks associated are:

- Using a shared server, if any one site on the server is compromised, it could literally open a gateway for the attacker to gain access to the other sites hosted on the same server as well.

- One of the disadvantages could be also the incapacity to harden the server, for example if you are on the shared hosting server, you would not have access to the PHP and Apache configuration of the server.
- Secured and hard password to guess against multiple attempts thru SSH or mail server, brute force detection could prevent that.
- Server protection against Botnet and Open Relay.
- Cross Site scripting and Denial of Service are some of the server threats.
- Securing the server with potential threats will mitigate the risks.

VI. Workforce Planning

Summary of Recruitment

Academic Department Members in Critical Care Medicine in 2017:

- Dr. Tom Stelfox assumed the role of Deputy Department Head and Director Research and Innovation

Physician Promotions in 2017:

- Dr. Tom Stelfox- Professor
- Dr. Luc Berthiaume – Clinical Associate Professor
- Dr. Jason Lord- Clinical Associate Professor

Ongoing recruitment for the following positions:

- Cardiovascular Intensivist (MPT)
- Clinician Scientist (GFT)
- Health Services Researcher (GFT)
- Intensivist/Neuro Critical Care (MPT)

Future Needs

The Department of Critical Care Medicine also recognizes the challenges posed by the continued growth of our Zone, the aging population, the increasing complexities of advanced life support technologies and the need to deliver top-notch critical care 24/7.

A week of clinical service usually consists of over 100 hours. Currently some members of our Department are working the equivalent of 1.5 or more FTE. It is not infrequent for Intensivists to sleep in-house either because of volume/acuity of patients or because of a shortage of bedside physicians. We acknowledge that this pace is not sustainable. Ideally, a workweek should consist of no more than 50 hours and every patient should receive critical care specialist oversight no matter what time of day. This can only be accomplished with a change in, service delivery. A Committee has been struck to examine how to change medical service delivery for ICU in Calgary Zone.

VII. Future Directions & Initiative

Major Initiatives are Planned

1. Changes in the models of service delivery.
2. Applications for, and if successful, implementation of an Alternate Academic Funding plan to physician remuneration. This is a provincial initiative involving government, the medical faculties at the University of Calgary and University of Alberta, Alberta Health Services, The Alberta Medical Association, and the Department on behalf of its physician members.
3. Delirium collaboration in association with the Critical Care Strategic Clinical Network.

VIII. Department Research Report – Quarter 4

Current DCCM Clinical Studies

Active Clinical Studies		
Industry Trial	Non-Industry Trial	Local Initiated Trial
2	5	3

Department Member Participation (n=)	
PI	Co-I
10	9

On-going Enrolment – Calgary Zone

Study Name	# Active Enrolment Sites	Patient Enrolment		Start Date
		Most Recent Quarter	Total	
ART-123 Sepsis Coag	4	1	11	Jul-12
BALANCE	1	0	9	Jan-16
STARRT-AKI	2	7	17	Dec-16
Re-Energize	1	2	6	May-16
Lyric "Promote" Trial	4	2	10	May-17
PROSPECT	2	3	20	Jun-17
IMPACT	2	0	0	Apr-17
CAN TBI	1	2	6	Jun-17
ASN Pilot	1	5	5	Jan-18
INDEX	1	4	4	Feb-18

Patient Enrolment (April 2017 – March 2018)

2017/18	Foothills Medical Centre (n=1,252)		Rockyview General Hospital (n=480)		Peter Lougheed Centre (n=677)		South Health Campus (n=372)		Calgary Region (n=2,781)	
	Total	N° per 100	Total	N° per 100	Total	N° per 100	Total	N° per 100	Total	N° per 100
Screened	807	64	112	23	232	34	121	33	1,490	54
Missed*	11	9	1	13	3	17	0	0	16	11
Enrolled	110	9	7	1	15	2	9	2	135	5

*potentially eligible patients not considered for participation

Research Finances

Period: 2017/18	Total Cost	Total Revenue	Variance
Quarter 1 (April - June)	\$ 94,725.00	\$ 130,966.98	\$ 36,241.98
Quarter 2 (July - September)	\$ 61,650.00	\$ 22,363.07	\$ (39,286.93)
Quarter 3 (October - December)	\$ 61,050.00	\$ 16,525.89	\$ (44,524.11)
Quarter 4 (January - March)	\$ 61,830.00	\$ 106,161.34	\$ 44,331.34
YTD	\$ 279,255.00	\$ 276,017.28	\$ (3,237.72)
Period: 2016/17	\$ 334,950.00	\$ 177,249.37	\$ (157,700.63)

IX. Grants and Publications

Department of Critical Care Medicine Research Grants

Granting Agency	Title of Project	Period of Support	Funds Received
Alberta Children's Hospital Foundation - Department of Pediatrics Innovation Award Co-Investigator: Dr. Kirsten Fiest	The Road to Recovery- Assessing Functional Outcomes of Pediatric Critical Care Survivors	2017-2018	\$25,000
Alberta Health Services – Calgary Zone Chief Medical Office/Medical Affairs Dr. Ken Parhar , Principal Investigator	Optimization of Acute Respiratory Distress Syndrome Management	2017	\$19,900
Alberta SPOR Graduate Studentship - Joint Initiatives, Alberta Innovates and Canadian Institutes of Health research (CIHR) Dr. Chip Doig , Principal Investigator	An Assessment of the Impact of Time to Paramedic Treatment on Patient Outcomes in the Alberta Emergency Medical Services System: Building a Comprehensive Database and Identifying Patient priorities in Outcomes (Supervisor to Ian Blanchard)	2018	\$30,000
Critical Care Strategic Clinical Network Dr. Ken Parhar , Principal Investigator	Optimization of Acute Respiratory Distress Syndrome Management	2017	\$10,000
Canadian Frailty Network Dr. Danny J. Zuege , Co-Principal Investigator	Applying Clinical Frailty Scale documentation in a province-wide Electronic Health Record (eCritical) to improve the care of frail critically ill patients in Alberta	2017-Present	TBD
Canadian Frailty Network Dr. Thomas Stelfox , Principal Investigator Co-Investigators: Dr. Daniel Niven , Dr. Danny J. Zuege	Improving ICU-to-Ward Transfers of Care: Evaluation of a KT Tool Kit and ICU Transfer Tool	2017-2019	\$265,148
Canadian Institutes of Health Research (CIHR) Co-Investigator: Dr. Andreas Kramer	Aneurysmal SubArachnoid Hemorrhage – Red Blood Cell Transfusion and Outcome (SAHaRA): a Randomized Controlled Trial	2017-	\$1,384,650
Canadian Institutes of Health Research (CIHR) - Late Life Issues Team Grant; Critical Care Strategic Clinical Network (AHS) Co-Investigator: Dr. Daniel Niven	Comparative safety and efficacy of pharmacological and non-pharmacological interventions for the behavioural and psychological symptoms of dementia: A systematic review and network meta-analysis	2017-2018	\$10,000

IX. Grants and Publications *continued*

Granting Agency	Title of Project	Period of Support	Funds Received
Canadian Institutes of Health Research (CIHR) Nominated Principal Applicant: Dr. Thomas Stelfox Principal Investigators: Dr. Kirsten Fiest, Dr. Christiane Job McIntosh, Dr. Daniel Niven, Dr. Jeanna Parsons Leigh, Co-Investigators: Dr. Danny J. Zuege, Dr. Chip Doig, Dr. Chris Grant, Andrea Soo, Karolina Zjadewicz	Critical Care Strategic Clinical Network: Innovative Clinical Trials and Implementation Science for Health System Quality (LOI)	2017	
Canadian Institutes of Health Research (CIHR) Dr. Jeanna Parsons Leigh, Dr. Thomas Stelfox, Principal Investigators Co-Investigators: Dr. Daniel Niven, Dr. Kirsten Fiest	De-adopting Low-value Practices in Critical Care Medicine	2017-2019	\$321,300
Canadian Institutes of Health Research (CIHR) Dr. Kirsten Fiest, Dr. Thomas Stelfox, Principal Investigator	Delirium Assessment in the Critically Ill: A Patient and Family-Centred Approach	2017-2018	\$50,000
Canadian Institutes of Health Research (CIHR) - Late Life Issues Team Grant; Critical Care Strategic Clinical Network (AHS) Dr. Kirsten Fiest, Principal Investigator	Patient and Family-Centered Delirium Assessment in Critically Ill Older Adults	2017-2018	\$10,000
Canadian Institutes of Health Research (CIHR) Co-Investigators: Dr. Kirsten Fiest, Dr. Thomas Stelfox	SPOR REACH Network	2017-2022	\$15,826,000
Canadian Institutes of Health Research (CIHR) Co-Investigator: Dr. Brent Winston	SuDICCU clinical trial	2017-2020	
Canadian Institutes of Health Research (CIHR) Co-Investigator: Dr. Andreas Kramer,	Transfusion in traumatic brain injury	2017-	\$1,100,000
2017 Research Enhancement Program Cumming School of Medicine (CSM) and the University of Calgary, the Office of the Associate Dean Research	To assist in revisions for manuscripts under review at a major impact journal- Nature Immunology	2017	\$5,000

Granting Agency	Title of Project	Period of Support	Funds Received
Janssen Ortho Dr. Danny J. Zuege , Principal Investigator	A Study to Explore the Distribution of Influenza, RSV and hMPV in Adults Hospitalized with Acute Respiratory Tract Infection	2017 - Present	On-going
Lyric Pharmaceuticals Inc. Dr. Thomas Stelfox, Dr. Juan Posadas Principal Investigators Co-Investigators: Dr. Chip Doig, Dr. Paul Boucher, Dr. Andreas Kramer, Dr. Brent Winston	A Phase 2, Multicenter, Randomized, Double-Blind, Comparator-Controlled Study of the Efficacy, Safety, and Pharmacokinetics of Intravenous Ulimorelin (LP101) in Patients with Enteral Feeding Intolerance	2017-2019	\$12,000/ patient
The Lung Association of Alberta & NWT Dr. Craig Jenne , Principal Investigator	Role of intravascular thrombin on platelet activation and lung inflammation during Influenza A virus infection	2017-2018	\$30,000
The Lung Association of Alberta Dr. Brent Winston , Principal Investigator	Validation of metabolomics-defined ARDS endotypes	2017 – 2018	\$30,000
MSI Foundation Dr. Kirsten Fiest , Principal Investigator Co-Investigator: Dr. Henry Stelfox	Patient and family-centered delirium measurement in the critically ill	2017-2019	\$76,000
MSI Foundation Dr. Daniel Niven , Principal Investigator Co-Investigator: Dr. Danny J. Zuege	Prioritization of Evidence-based Best Practices for Adoption/De-adoption in Adult Critical Care Medicine in Alberta.	2017-2019	\$89,000
Physical Medicine and Rehabilitation Clinical Seed Grant and Department of Critical Care Medicine Dr. Christ Grant , Principal Investigator Co-Investigator: Dr. Kirsten Fiest	Critical Care Clinical and Research Rehabilitation Database	2017-2018	\$40,000
Royal College of Physicians and Surgeons of Canada Co-Investigator: Dr. Jason Lord	Royal College Competence by Design Residency Implementation Award	2017	\$25,000
University of Calgary – URG Seed Grant Dr. Craig Jenne , Principal Investigator	Mapping the host inflammatory response to highly pathogenic influenza A infection	2017-2018	\$14,999

IX. Grants and Publications *continued*

Granting Agency	Title of Project	Period of Support	Funds Received
Visterra Inc. Co-Investigators: Dr. Danny J. Zuege, Dr. Juan Posadas	Phase 2b, Multicenter, Randomized, Double-blind, Controlled Study to Evaluate the Efficacy and Safety of Intravenous VIS410 in Addition to Oseltamivir (Tamiflu®) Compared with Oseltamivir Alone in Hospitalized Adults with Influenza A Infection Requiring Oxygen Support	2017 – Present	On-going

Department of Critical Care Medicine Research Publications/Presentations

Peer Reviewed Manuscripts

January 2017

- Boulet LP, Turmel J, Cote A. Asthma and exercise-induced respiratory symptoms in the athlete: new insights. *Curr Opin Pulm Med* 2017.
- Fiest KM, Sauro KM, Wiebe S, Patten SB, Kwon CS, Dykeman J, Pringsheim T, Lorenzetti DL, Jetté N. Prevalence and incidence of epilepsy: A systematic review and meta-analysis of international studies. *Neurology*. 2017 Jan 17;88(3):296-303. doi: 10.1212/WNL.0000000000003509.
- Ismail Z, Elbayoumi H, Fischer CE, Hogan DB, Millikin CP, Schweizer T, Mortby ME, Smith EE, Patten SB, Fiest KM. Prevalence of Depression in Patients With Mild Cognitive Impairment: A Systematic Review and Meta-analysis. *JAMA Psychiatry*. 2017 Jan 1;74(1):58-67. doi: 10.1001/jamapsychiatry.2016.3162.
- Kramer AH, Baht R, Doig CJ. Time trends in organ donation after neurologic determination of death: a cohort study. *CMAJ OPEN*. doi: 10.9778/cmajo.20160093 *CMAJO* January 13, 2017 vol. 5 no. 1 E19-E27.
- Moore L, Champion H, O'Reilly G, Leppaniemi A, Cameron P, Palmer C, Abu-Zidan FM, Gabbe B, Gaarder C, Yanchar N, Stelfox HT, Coimbra R, Kortbeek J, Noonan V, Gunning A, Leenan L, Gordon M, Khajanchi M, Shemilt M, Porgo V, Turgeon AF (International Injury Care Improvement Initiative). Impact of Trauma System Structure on Injury Outcomes: a Systematic Review protocol. *Syst Rev (England)*, Jan 21 2017, 6(1) p12
- Moore L, Evans D, Hameed SM, Yanchar NL, Stelfox HT, Simons R, Kortbeek J, Bourgeois G, Clement J, Lauzier F, Nathens A, Turgeon AF. Mortality in Canadian Trauma Systems: A Multicenter Cohort Study. *Ann Surg (United States)*, Jan 2017, 265(1) p212-217
- Parsons Leigh J, Niven DJ, Boyd J, Stelfox HT. Developing a framework to guide the de-adoption of low-value clinical practices in acute care medicine: a study protocol. *BMC Health Serv Res* 2017;17(1):54 (ePub Jan 19, 2017).
- Wong CH, Jenne CN, Tam PP, Léger C, Venegas A, Ryckborst K, Hill MD, Kubes P. (2017). Prolonged Activation of Invariant Natural Killer T Cells and TH2-Skewed Immunity in Stroke Patients. *Front Neurol*. 2017 Jan 19;8:6. doi: 10.3389/fneur.2017.00006. eCollection 2017.

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- Bagshaw S, Wang X, Zygun D, Zuege D, Dodeck P, Garland A, Scales D, Berthiaume L, Faris P, Chen G, Opgenorth D, Stelfox HT. Association between strained capacity and mortality among patients admitted to intensive care: A path-analysis modeling strategy. *Journal of Critical Care*. 43:81-87, 2017.

10. Cristancho SM, Lingard L, Forbes T, Ott M, Novick RJ. Putting the puzzle together: The role of problem definition in complex clinical judgment. *Med Educ* 2017; 51: 207-14.
11. Curtis K, Mitchell R, McCarthy A, Wilson K, Van C, Kennedy B, Tall G, Holland A, Foster K, Dickinson S, Stelfox HT. Development of the major trauma case review tool. *Scand J Trauma Resusc Emerg Med*. 2017 Feb 28;25(1):20. doi: 10.1186/s13049-017-0353-5.
12. Fiest KM, Bernstein CN, Walker JR, Graff LA, Hitchon, CA, Peshcken, CA, Zarychanski R, Abou-Setta AM, Patten SB, Sareen J, Bolton JM & Marrie RA. Systematic Review and Meta-Analysis of Interventions for Depression and Anxiety in Persons with Rheumatoid Arthritis. *Journal of Clinical Rheumatology*. 2017 February 17. doi: 10.1097/RHU.0000000000000489
13. Jiahuan Chen, Anutosh Ganguly, Ashley D. Mucsi, Junchen Meng, Jiacong Yan, Pascal Detampel, Fay Munro, Zongde Zhang, Mei Wu, Aswin Hari, Melanie D. Stenner, Wencheng Zheng, P. Kubes, Tie Xia, Matthias W. Amrein, Hai Qi, and Yan Shi. Strong adhesion by regulatory T cells induces dendritic cell cytoskeletal polarization and contact-dependent lethargy. *J. Exp. Med*. 2017 Feb;214(2):327-338. doi: 10.1084/jem.20160620. Epub 2017 Jan 12.
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17. Hogan DB, Maxwell CJ, Afilalo J, Arora RC, Bagshaw SM, Basran J, Bergman H, Bronskill SE, Carter CA, Dixon E, Hemmelgarn B, Madden K, Mitnitski A, Rolfson D, Stelfox HT, Tam-Tham H, Wunsch H. A scoping review of frailty and acute care in middle-aged and older individuals with recommendations for future research. *Can Geriatr J*. 2017 Mar 31;20(1):22-37.
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22. Bagshaw SM, Opgenorth D, Potestio M, Hastings SE, Hepp SL, Gilfoyle E, McKinlay D, Boucher P, Meier M, Parsons-Leigh J, Gibney RT, Zygun DA, Stelfox HT. Healthcare Provider Perceptions of Causes and Consequences of ICU Capacity Strain in a Large Publicly Funded Integrated Health Region: A Qualitative Study. *Crit Care Med*. 2017 Apr;45(4):e347-e356. doi: 10.1097/CCM.0000000000002093.

IX. Grants and Publications *continued*

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Abstracts

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2. Fiest, KM; Parsons Leigh, J; Farris, M; Doig, L; Codan, C; Ely, W; Stelfox, HT. Incidence and Prevalence of Delirium Subtypes in the ICU: A Systematic Review and Meta-Analysis. Presented at Society of Critical Care Medicine, Honolulu, HI, January 2017.
3. Mann B, Bagshaw SM, Straus SE, James MT, Niven DJ. Initial Renal Replacement Therapy Modality and Recovery of Renal Function in Acute Kidney Injury: Protocol for A Network Meta-Analysis. Poster presentation (presented by lead author) at Alberta Society of Intensive Care Physicians 29th annual general meeting (January 20, 2017).

4. McDonald B, and Jenne CN. Collaboration between platelets and neutrophils drives microvascular dysfunction in sepsis. Alberta Society of Intensive Care Physicians annual meeting. Lake Louise, AB (Jan 21, 2017). Oral platform.
5. Sauro KM, Niven DJ, Soo A, Brundin-Mathers R, Parsons Leigh J, Bagshaw SM, Stelfox HT. Venous thromboembolism prophylaxis among neurocritical care patients: what is the current practice? Oral presentation (presented by lead author) at Alberta Society of Intensive Care Physicians 29th annual general meeting.
6. Soo A, Zuege D, Fick G, Niven D, Berthiaume L, Stelfox HT, Doig C. Describing Organ Dysfunction in the ICU. Presented at SCCM Conference, Honolulu, Jan 2017.
7. Winston, B.W., Donnelly, S., Banoei, M., Samra, S., Mourad, A., Vogel, H., Fiehn, O. & the CCCTBG. Examining ARDS endotypes using serum metabolomics. Accepted for oral presentation at the SCCM Annual Meeting, Hawaii, 2017. Selected for a Research Snapshot Award Presentation, 2017

February 2017

8. Blanchard I, Patel A, Lane D, Couperthwaite A, Chisholm D, Yergens D, Lorenzetti D, Lazarenko G, Lang E, Doig C, Ghali W. Systematic Review of The Association Between EMS Time Factors And Survival. *Pre Hospital Emergency Care* January/ February 2017 Volume 21, Number 1.
9. Couperthwaite Amy B, Blanchard I, Chisholm DA, Doig CJ, Aguirre AN, Vogelaar GA, Almansoori W, Embree T, Voaklander D, Hagel BE. Emergency Medical Services Response Time and Pediatric Mortality and Morbidity in Two Urban Centers in Alberta, Canada. *Pre Hospital Emergency Care* January/ February 2017 Volume 21, Number 1.
10. Soo A, Zuege DJ, Fick GH, Niven DJ, Berthiaume LR, Stelfox HT, Doig CJ. Describing Organ Dysfunction in the ICU. Poster Presentation (presented by lead author) at SCCM Congress 2017 (Honolulu, Hawaii).

April 2017

11. Lord J, Palacios Mackay M, Zuege D, Roze des Ordons A, Lockyer J. Impact of a one month ICU rotation on resident confidence and competence in central line insertion. Presented at OHMES conference, Calgary, Apr 2017

May 2017

12. Mickiewicz B, Thompson G, Blackwood J, Jenne CN, Winston BW, Vogel HJ, Joffe AR. Biomarker Phenotyping for Triage of Sepsis to the Pediatric Intensive Care Unit. Presented at the ATS Annual Meeting 2017.
13. Mickiewicz B, Thompson G, Blackwood J, Jenne CN, Winston BW, Vogel HJ, Joffe AR. Metabolomics and Inflammatory Protein-Mediator Profiling for Early Diagnosis and Triage of Sepsis in Young Children. Presented at the ATS Annual Meeting 2017.
14. Vis D, Zuege D. Ventilator Associated Events: Development and validation of an automated detection algorithm and application in a population-based cohort of adult critical care patients in Alberta. Presented at Department of Medicine Resident Research Day, Calgary, May 2017 (Best Poster Award – Health Services Research).
15. Winston, B.W., Donnelly, S., Banoei, M., Metwaly, S., Mourad, A., Vogel, H. & the Canadian Critical Care Translational Biology Group (CCCTBG). Using Metabolomics to Define ARDS Endotypes. Presented at the ATS Annual Meeting 2017

June 2017

16. Banoei M, Scott B, Kubes P, and Winston BW. A metabolomics analysis of a traumatic brain injury (TBI) mouse model. Presented at the CCCTBG meeting in Auberge Lac-à-l'Eau Claire, St-Alexis-des-Monts, Quebec, June 2017.
17. Lord J, Palacios Mackay M, Zuege DJ, Roze des Ordons A & Lockyer J. Assessing Competence in Central Line Insertion During Residency Training: A Dependability

Study of Four Assessment Tools. Oral presentation. ICRE, Quebec. 2017.

18. McDonald B. The role of the microbiome in abdominal compartment syndrome. 8th World Congress of the Abdominal Compartment Syndrome Society. Banff, AB (June 15-18, 2017). (Invited speaker).
19. Sauro KM, Bagshaw SM, Niven DJ, Soo A, Brundin-Mather R, Parsons Leigh J, Cook DJ, Stelfox HT. Barriers and facilitators to adoption of high value practices and de-adoption of low value practices in the Intensive Care Unit. Poster presentation (presented by lead author) at KT Canada Scientific Meeting 2017. Quebec, Canada.
20. Winston BW, Banoei M, McIntyre LA, Stewart DJ, Mei S, Courtman D, Watpool I, Granton J, Marshall J, dos Santos C, Walley KR and Fergusson DA for the Canadian Critical Care Trials Group and the Canadian Critical Care Translational Biology Group. Metabolomics Substudy of Cellular Immunotherapy for Septic Shock (CISS): A Phase I Clinical Trial. Presented at the CCCTBG meeting in Auberge Lac-à-l'Eau Claire, St-Alexis-des-Monts, Quebec, June 2017.

August 2017

21. Lord J, Palacios Mackay M, Zuege DJ, Roze des Ordons A & Lockyer J. Observed discrepancies between competence and confidence in central line insertion following a one month ICU rotation. Accepted - Poster. AMEE, Helsinki. 2017.
22. Lord J, Palacios Mackay M, Zuege DJ, Roze des Ordons A & Lockyer J. Assessing the dependability of four assessment tools for central line insertion. Accepted - Poster. AMEE, Helsinki. 2017.

September 2017

23. Easton P, Jagers J, Ji M, Tagliabue G, Scott N, Johnson M, Wilde E. Respiratory Inhaled vilanterol trifenate/fluticasone furoate (VFF) improves respiratory muscle function and walking performance in severe COPD without change in pulmonary function muscles during hypoxia. Eur Respir J 2017; 50: Suppl. 61, P3256, September 2017.

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24. Easton E, Ji M, Yamada T, Yokoba M, Katagiri M, Abe T, Easton PA. Respiratory activity of four abdominal muscles during hypoxia. *Eur Respir J* 2017; 50: Suppl. 61, P2973, September 2017.
 25. Jagers J, Ji M, Lee W, Easton P. Generation of in-vivo length-tension curve in severe COPD with magnetic stimulation. *Eur Respir J* 2017; 50: Suppl. 61, P2191, September 2017.
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 27. Ji M, Jagers J, Tagliabue G, Wilde E, Easton P. Time dependent loss of the ventilatory response to hypoxia in severe COPD. *Eur Respir J* 2017; 50: Suppl. 61, P2310, September 2017.
 28. McDonald B. Activation and trafficking of platelets and neutrophils: From imaging to prevention. International Xenotransplantation Association Congress (IXA-2017). Baltimore, MA (Sept. 21, 2017). (Invited speaker).
 29. Parhar K, Zjadewicz K, Soo A, Sutton A, Zjadewicz M, Doig L, Ferland A., Lam C, Stelfox HT, Doig C. Epidemiology and predictors of outcome in patients with acute respiratory distress syndrome: the Calgary experience. Oral Presentation. (Presented by lead author) at European Society of Intensive Care Medicine. LIVES 2017 meeting; Vienna Austria. *Intensive Care Medicine Experimental* 2017, 5(Suppl 2):0408.
 30. Tagliabue G, Ji M, Jagers J, Dean D, Wilde E, Easton P. Limitations of superficial EMG estimate of parasternal intercostal muscle activity. *Eur Respir J* 2017; 50: Suppl. 61, P1866, September 2017.
- October 2017*
31. Lord J, Palacios Mackay M, Zuege D, Roze des Ordons A, Lockyer J. Using generalizability theory to assess the dependability of scores from four assessment tools for central line insertion. Presented at International Conference on Residency Education, Quebec City, Oct 2017.
 32. Lord J, Palacios Mackay M, Zuege D, Roze des Ordons A, Lockyer J. Establishing validity evidence: assessing the dependability of scores from four assessment tools for central line competency. Presented at International Conference on Residency Education, Quebec City, Oct 2017.
 33. Swinamer S, Fox S, Nagpal D, Chu M, Quartz M, Guo R, Novick R, Kiaii B, Sy J, Gelinas J. Endoscopic radial artery harvest; outcomes and lessons learned after 1000 harvests. *Can J Cardiol* (in press, October 2017).
 34. Wolfe D, Champagne J, Thompson M, Mei S, Lalu MM, Fergusson D, Winston BW, Marshall JC, Walley K, English S, dos Santos C, Granton J, Stewart DJ, McIntyre L, for the Canadian Critical Care Trials Group. Safety of Cell Therapy with Mesenchymal Stromal Cells: An Updated Systematic Review and Meta-Analysis of Randomized Controlled Trials (SafeCell Update). Presented at the CCCF, 2017, Toronto.

