Alberta Health Services | University of Calgary

Department of Critical Care Medicine

2016 Annual Report

University of Calgary

Our 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.

Our 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.

Our Values

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

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

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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Alberta Health Services

UNIVERSITY OF CALGARY

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

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 strong presence on zonal and provincial patient and family centered committee, with an upcoming focus to improve the support of our patients, families and staff at End of Life Care (EOLC) over the next year.

We are committed to ensuring that our patients are cared for safely. This is exemplified through a recent quality improvement project to improve patient safety at the time of hand over from the operating room to the ICU. The "OR to ICU handover project" was successfully implemented in 2016 and while we continue to sustain this work, we will also be supporting the expansion of this project to the rest of the Calgary zone.

Addressing the incidence and prevalence of delirium is one of the main priorities at FMC ICU. This has included the implementation of delirium screening tools, delirium management guidelines, and multiple targeted interventions to address best practices for pain management, sedation therapy, extubation pathways, and early mobilization. We continue to work closely with our colleagues across the zone and province to audit our care and address issues as they arise through feedback and results.

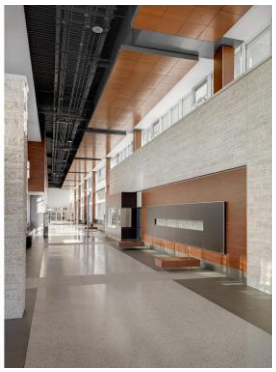
In an effort to create a workplace environment where all staff feel empowered to communicate with each other, we have begun town hall meetings for the unit. These meetings provide a forum for feedback on quality measures and safety issues and are meant to encourage open, honest dialogue between all team 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, continuous EEG, and cerebral microdialysis. 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. Within the past year, we have been fortunate to be able to send representation from both our ICU and Burns & Plastics Units to the Canadian and American burn conferences to support ongoing competency in this specialized area of knowledge.

Dr. Paul Boucher, FMC Site Director
Pam Hruska, FMC Clinical Nurse Specialist
Kelly Coutts, FMC Patient Care Manager



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 all patients 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.

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, so the ICU frequently supports these complex patients.

On average we have over 80% of our beds occupied in the year with peaks of 116% occupancy. Daily, we manage over 11 ventilated patient days on a regular basis. 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, Nursing attendants support by Clinical Nurse educators, Unit Clerks, Dietician, Physiotherapist, Occupation therapist, Clinical Pharmacist and a Social Worker. We also have accessed 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.

News

We continue to work on a number of Quality Improvement projects, including 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 are actively participating in the Calgary zone delirium protocols, medication reconciliation protocols and 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 Outreach team is available for consults for patients on the inpatient units and completes follow up visits on all ICU discharges to units. Over the last couple of year, there has been a change in the responsibilities for Outreach as team members spend time in providing and enhancing care of the population within the ICU to ensure skills are current and workload is evenly distributed.

Our current staffing model consists of a multidisciplinary team including Registered Nurse, Registered Respiratory Therapists, Nursing attendants, clinical Pharmacists, Allied Health, 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
- 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 development and implementation
- Medication Reconciliation on Transfer
- 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
  Readiness Mobilize

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 in Calgary which opened in February 2013. The ICU is a 10 bed unit that operates within the 4 pillars of the Campus: Innovation, Collaborative Practice, Wellness and Patient and Family Centered Care.

The ICU is a very collaborative team regarding 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 and Social Workers in the environment. Our Intensivist team are responsible for all patients within the unit and are the medical leads of the team.

The ICU 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

- Working within the mandates of OBP the unit has sustained a surplus budget
- Enrollment of patients into DCCM Research initiatives
- Participation with the SCN Delirium Innovative Collaborative and subsequent unit work and practice changes
- Initiation of a unit based PFCC Committee
- The unit serves as the home base and support for the zonal Outreach Education Consultant
- Referring of suitable patients to the DCCM ICU Recovery Clinic
- Implementation of slings to limit staff musculoskeletal injuries
- Slowly building our service with an average occupancy of 60%
- Addition of Clinical Clerk placements
- ICU patient to ward transfer process solidified
- Early mobilization by Physiotherapy
- Continued development of the NP model

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

Translating Evidence into Cost Practice

High-quality research should shape the practice of medicine as it is associated with effective, efficient, safe, and affordable healthcare. This includes research that suggests increasing use of new beneficial medical practices (tests and treatments), or decreasing use of current medical practices that new research finds to be ineffective or harmful.

This is especially important for patients admitted to intensive care units (ICUs) where:
1) multiple expensive, potentially risky tests, treatments and technologies are used to save lives;
2) there has been a fairly recent explosion in amount of research relevant to ICU patients.

Following an extensive review of ICU research, we identified 14 medical practices that high-quality research suggests are beneficial among patients admitted to ICUs, and 21 medical practices that are of no benefit or are harmful. Although addressing use of all 35 medical practices will improve quality of care provided to ICU patients, some practices should clearly receive greater priority over others. Therefore, prioritization is required to determine which practices to target first. However, there is currently no established method for determining this type of rank order.

Through funding applications submitted to the MSI Foundation and CIHR Project Scheme, we are developing an approach for determining within a list of medical practices supported by high-quality research, which ones should be given greater priority for use or removal from daily patient care.

We are developing our approach using practices relevant to ICU patients; however, our goal is to create an approach that may be used in many areas within healthcare.

First, using the 35 medical practices identified by our recent review of ICU research, and electronic health data from patients admitted to ICUs in the province of Alberta, we will determine the predicted patient outcomes and costs associated with changes in use of each of the 35 practices.

Second, we will invite a small group of healthcare providers, researchers, decision-makers, and patients (approximately 15 participants) to review the results of the first step, and develop a consensus opinion regarding the relative importance of changing use of each practice.

Third, surveys will be used to check the results of the second step against the opinion of a larger group of healthcare providers and former ICU patients and their family members in the province of Alberta. The information gathered in this third step will determine a list of medical practices relevant to ICU patients that should be considered priorities for increased use and decreased use, respectively.

This work is important because it will determine a rank order list of medical practices that should be used to improve care of ICU patients in Alberta, and in doing so, develop an approach to prioritizing medical practices for improvement that is driven by high-quality research, provincial electronic health data, and stakeholder opinion.

Dr. Tom Stelfox
Dr. Daniel Niven

Nursing Education & Development

Orientation Program

Registered Nurses (RNs) who are new to critical care are provided a 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 foundational knowledge to able to practice within Critical Care. RN's with previous critical care experience are supported through tailored orientation programs to cover content relevant to their unique learning needs. Welcoming an average of 4 RN's per month, or 60 staff per year to Calgary, managers, Clinical Nurse Educators, Nurse Clinician teams, and existing ICU bedside RNs work together to provide mentorship for new staff.

Partnerships

- As partners with Mount Royal University and the University of Calgary, student nurses are welcomed each semester for final practicums.
- Many critical care RNs within Calgary pursue post baccalaureate specialization through the Advanced Critical Care Nursing Program (ACCN) at Mount Royal University.
- Current 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.
- Calgary critical care RNs are supported by the Canadian Association of Critical Care Nurses (CACCN) Southern Alberta Chapter.

Continuing Education

After completion of orientation, ongoing educational support for RNs within the Department of Critical Care Medicine 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 such code blue response, continuous renal replacement therapy, advanced hemodynamics or other advanced courses that address care of specific patient populations (cardiac care, vascular surgery, neurologically injured, burn patients). As well, implementations of new initiatives or practices within the DCCM are supported through targeted education. Over the past year this type of education has encompassed topics such as falls prevention, donation post cardiocirculatory death, venous thromboembolism prophylaxis and delirium.

In effort to support RNs in the maintenance of the vast amount of information required for optimal practice, every existing Critical Care RN is provided an annual educational and qualification review day. Past this, the Clinical Nurse Educator team within the DCCM also offer a variety of professional workshops. These internally hosted events focus on 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.

Pam Hruska, Clinical Nurse Specialist

Communication Skills & Skillful Communication

Curriculum Development & Implementation

The purpose of the project was to develop and evaluate a communication skills program for critical care medicine trainees. Following Kern's model for curriculum development, the project began with a needs assessment for communication skills teaching amongst trainees enrolled in the Critical Care Medicine program at the University of Calgary. Surveys consisting of multiple choice and free text questions were sent to all trainees, staff physicians, nurses and social workers within the Department of Critical Care Medicine. Survey questions asked about trainee capacities and confidence in various communication skills, including building rapport, discussing serious news, goals of care conversations, family meetings, adverse event disclosure, addressing conflict, counselling about the emotional impact of emergency situations; challenges in communicating with patients and families; prior communication teaching; preferred learning methods; and staff physician confidence in teaching and assessing communication skills. The needs assessment was used to inform the design of a longitudinal communication skills session for critical care medicine trainees.

The curriculum involves 5 formal sessions delivered over a one year period, and 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, conflict, and organ donation.

Forms to guide multidisciplinary preceptors in observing and providing feedback to trainees on their communication skills in clinical practice were developed, and trainees are asked to obtain guided feedback twice per ICU rotation. 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. The principal investigator developed and implemented a simulation-based faculty workshop on the topic of approaches to feedback on communication skills, however none of the faculty in the Department of Critical Care Medicine participated.

To assess the impact of the curriculum, trainees 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.

The project has demonstrated the value of Kern's iterative model for curriculum development, with ongoing refinements based on trainee and healthcare provider feedback. Future evaluation may include pre-post video recordings of trainee communication skills to more objectively evaluate the impact of the curriculum and assessment of the feedback forms.

Dr. Amanda Roze des Ordons, Principle Investigator
Dr. Christopher Doig, Co-Investigator
Dr. Philippe Couillard, Co-Investigator

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 (formerly Jennifer Coulthard), 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 9 quality assurance reviews, with the last one completed in fiscal 2016- 2017. A total of 31 recommendations were made from the 9 completed reviews. Of these 31 recommendations from the QA reviews 11 have been implemented in the critical care units in response to these events, 9 recommendation is currently in the process of implementation, 4 have not been started or updated in the last 12 months and 6 have no current operational owners assigned to implement the accepted recommendations. QAC intake criteria have 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 reviews 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.

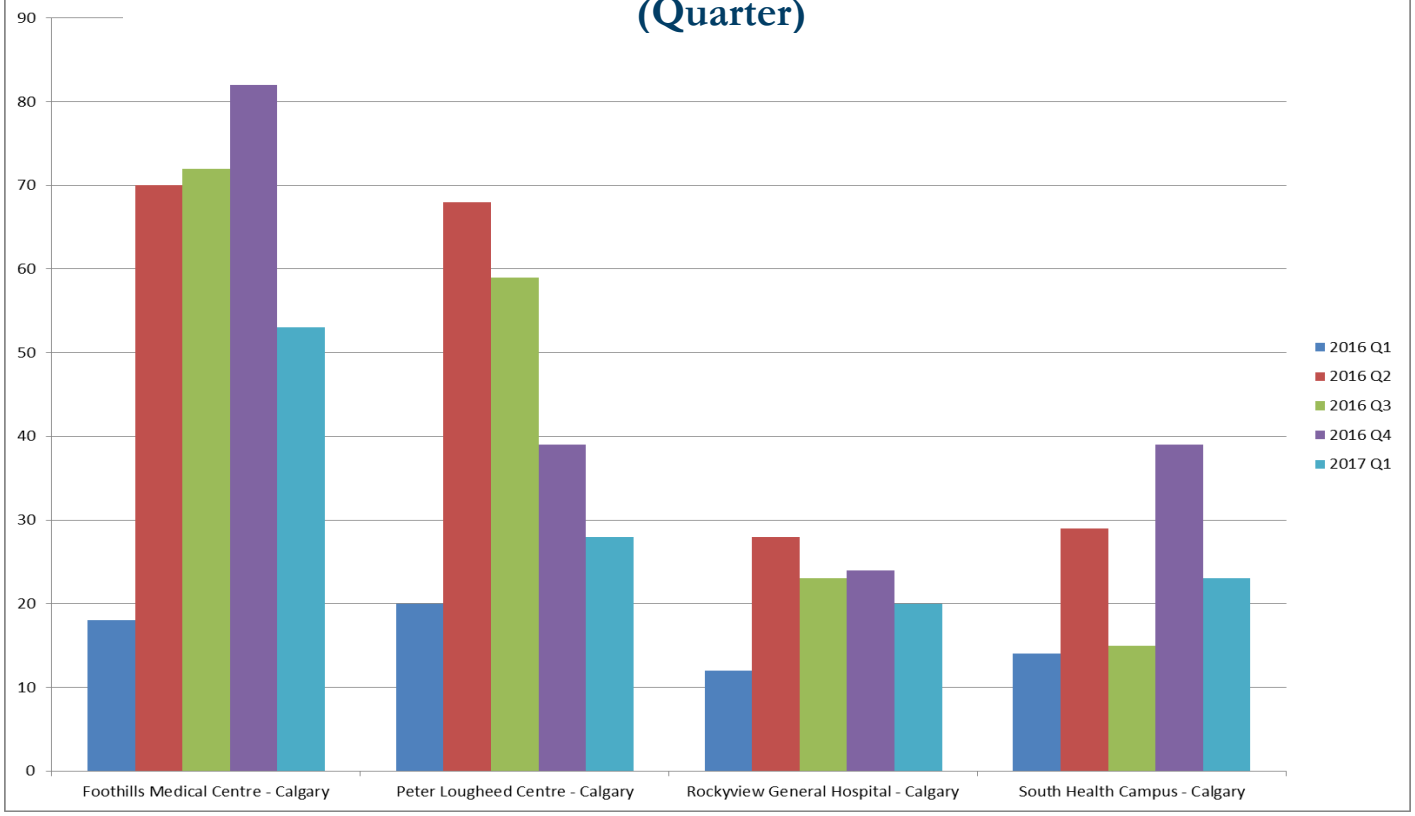
DCCM QAC and Critical Care Morbidity and Mortality working group reviews at all Calgary Adult sites are protected under section 9 of the Alberta Evidence Act. Safety learnings from reviews are edited to protect confidentiality and shared with staff, patient, and families in summary newsletters.

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). 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.

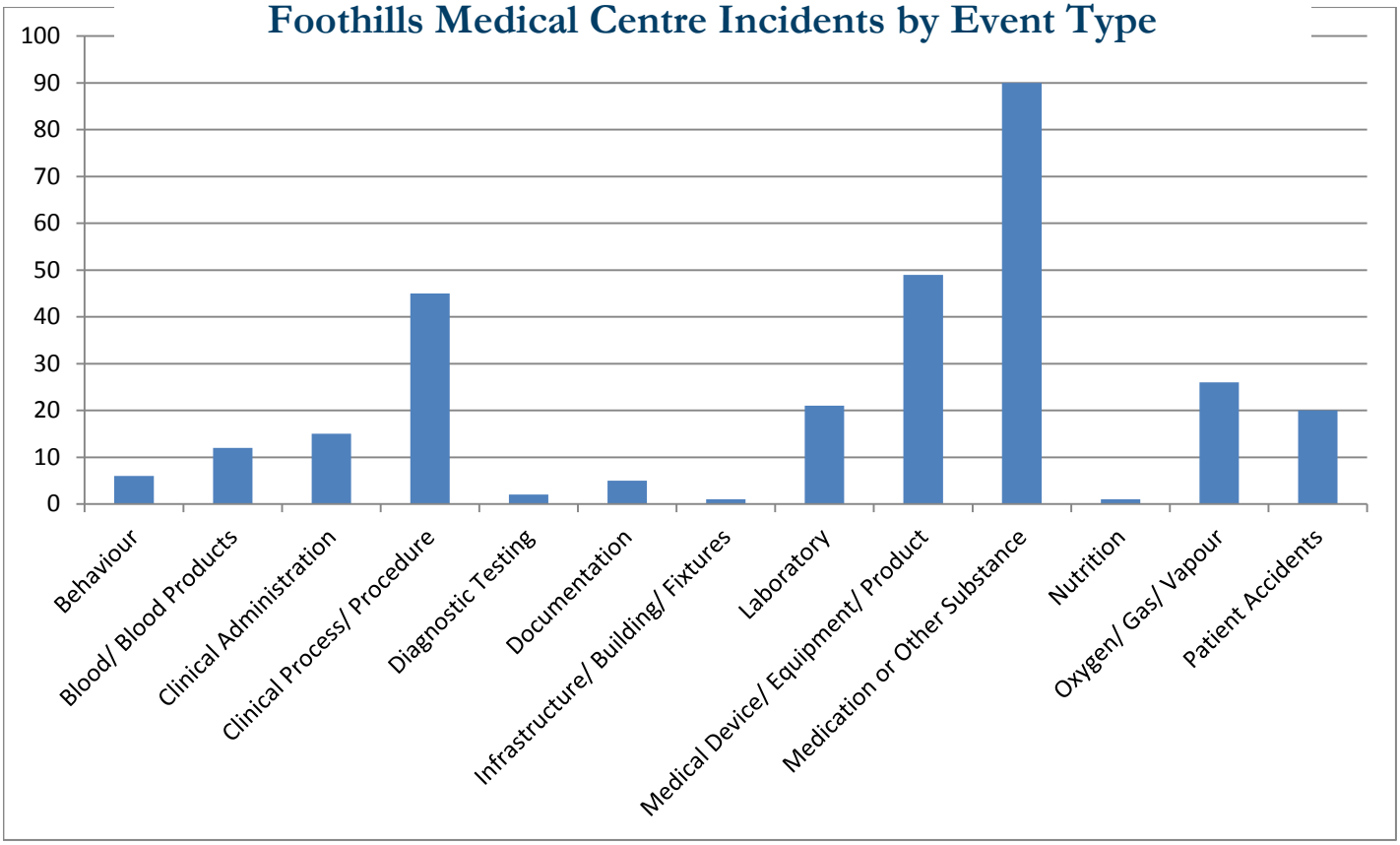
The AHS RLS is a voluntary reporting system that provides an opportunity for staff/physicians to report hazards, close calls and adverse events with varying degrees of harm. As the RLS is a voluntary reporting system, it does not provide a complete picture of all risks, hazards or system vulnerabilities within a clinical area. Other sources of information should also be used to complement RLS data when reviewing the system to improve patient safety. RLS reports need to be viewed in the context of all factors that influence what individuals choose to report.

For the fiscal year of March 2016 to March 1, 2017, 736 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.

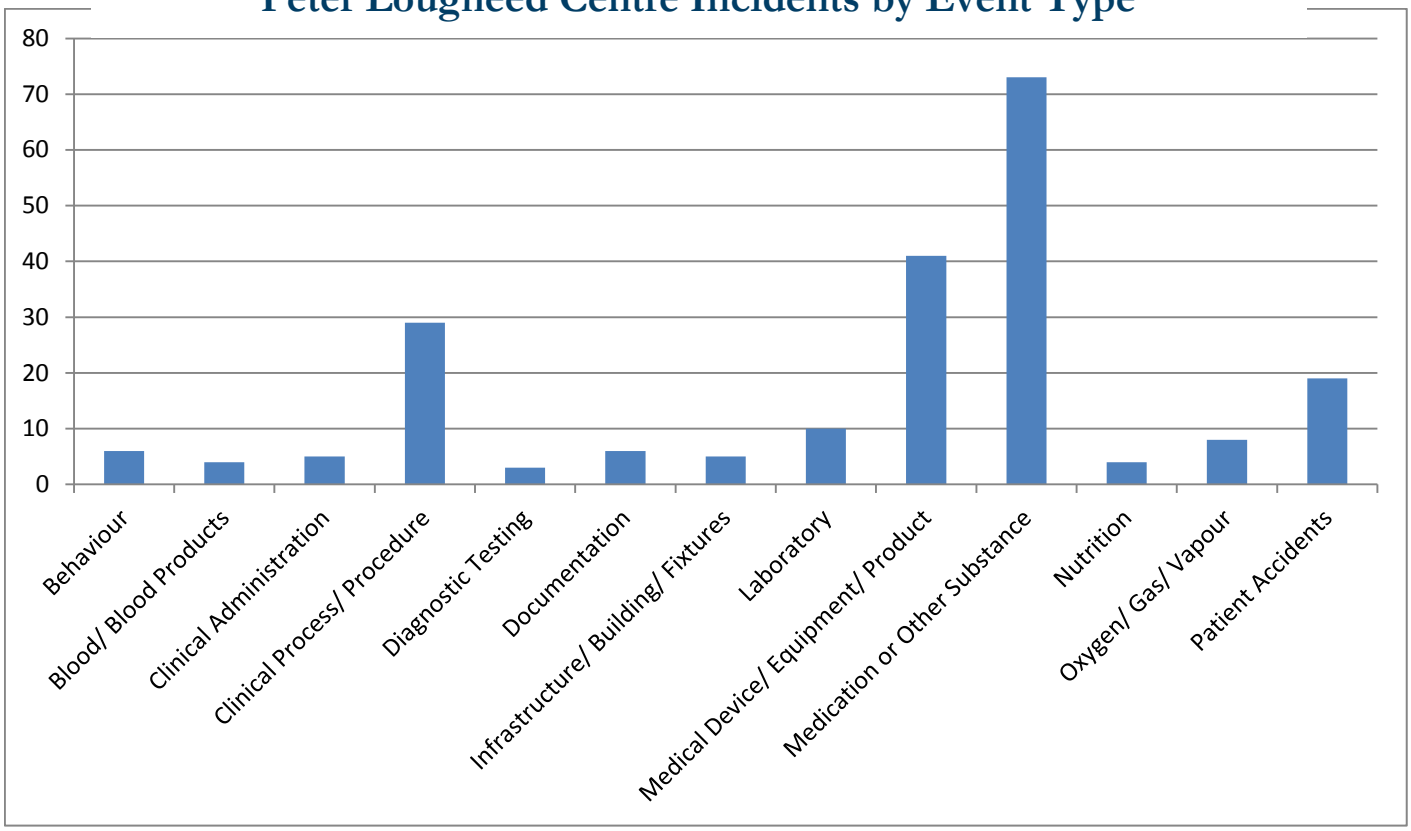
Incidents by Location Details: Facility and RLS: Date Reported (Quarter)



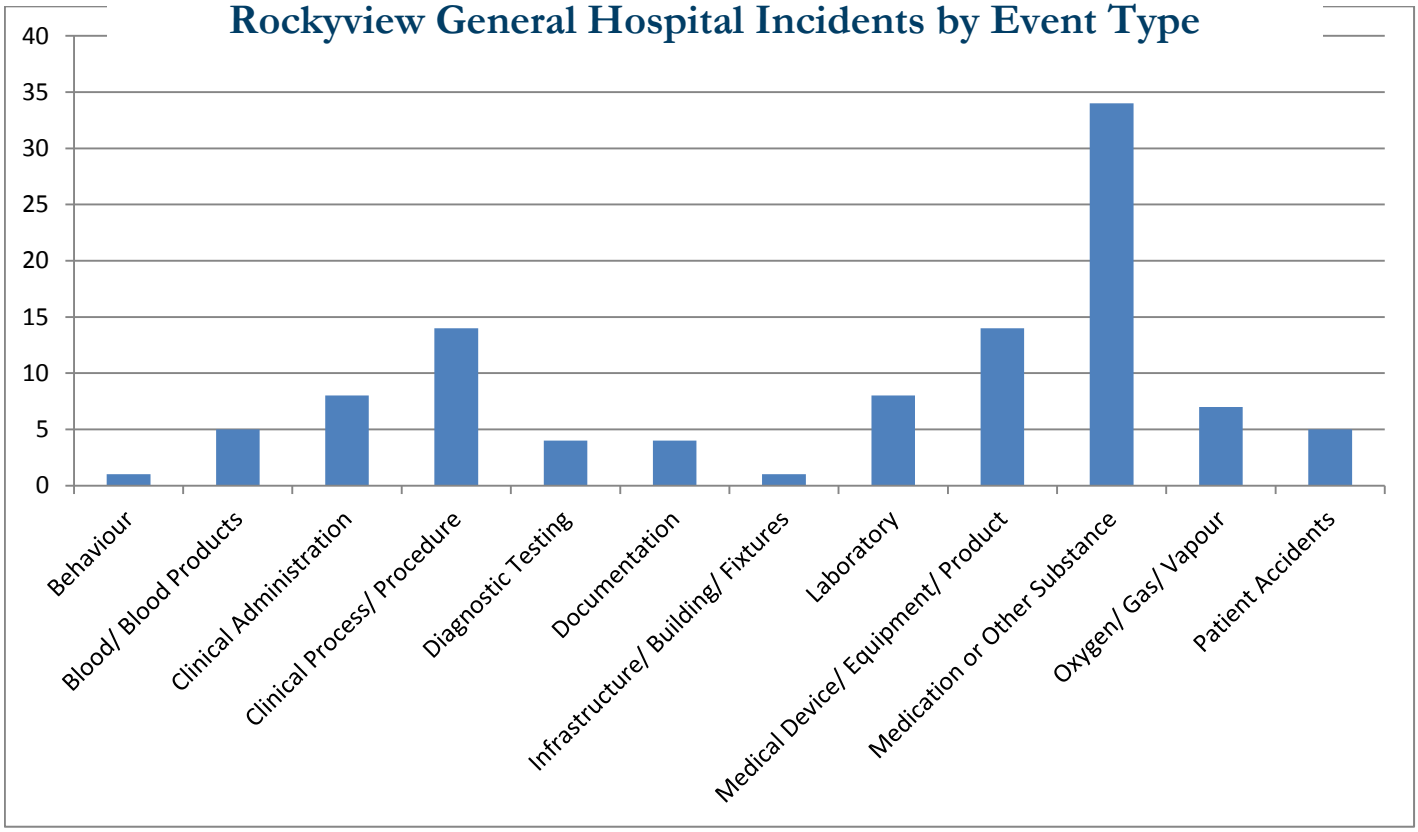
Foothills Medical Centre Incidents by Event Type

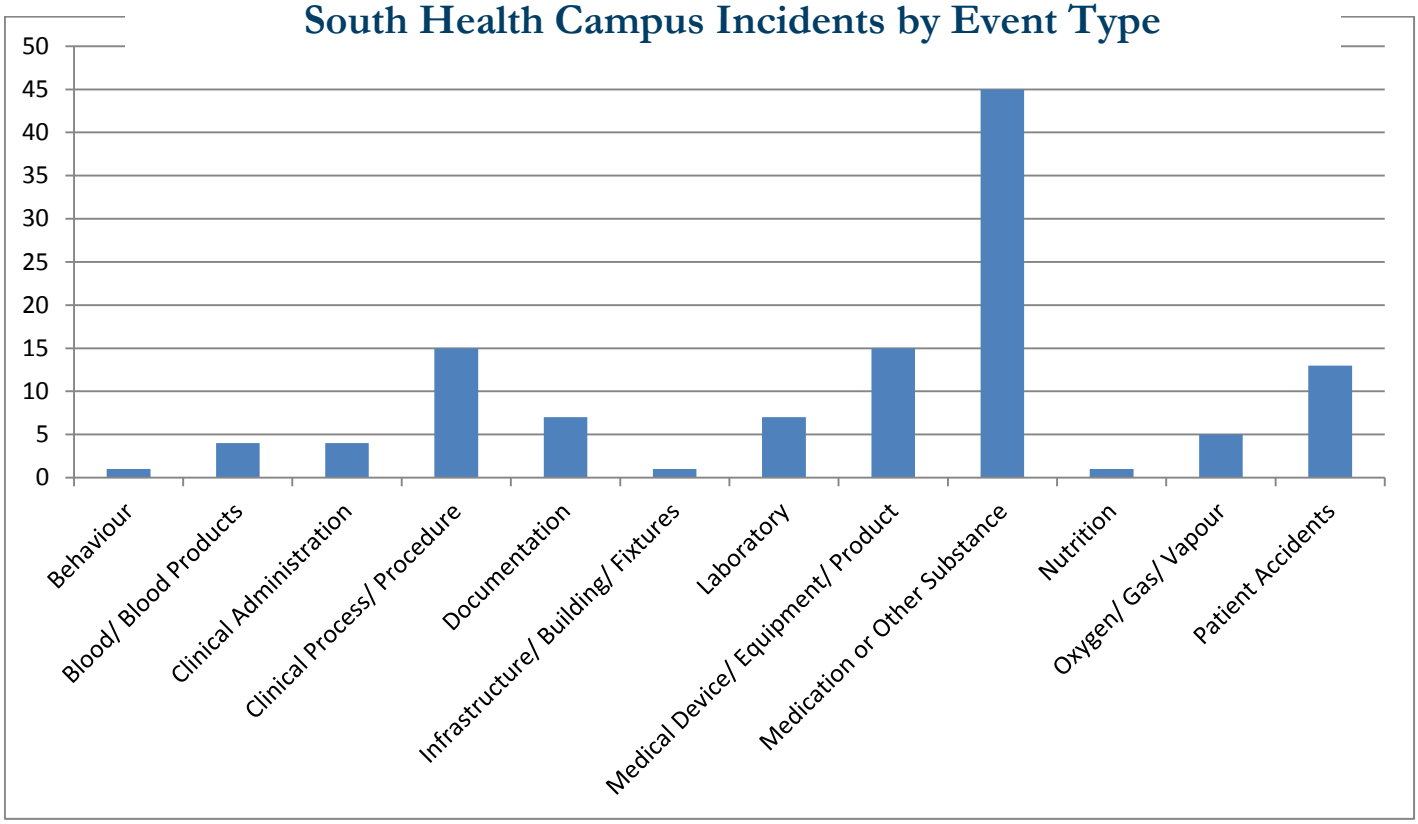


Peter Lougheed Centre Incidents by Event Type



Rockyview General Hospital Incidents by Event Type





Quality Improvement on a National Level

The Department of Critical Care Medicine is committed to excellence in patient care and supports initiatives aimed at quality improvement (QI) including information sharing with not only the community it serves but with other health care jurisdictions within and outside of Canada. This information sharing allows health care providers to more openly question their current practices as well as offer opportunities to learn from others and potentially emulate better practices. In 2016 this was demonstrated through the department's involvement in the Canadian Patient Safety Institute (CPSI) Pain, Agitation and Delirium (PAD) National Collaborative. A multidisciplinary team was formed to represent the department and was actively involved in national discussions to determine best practices in delirium screening, prevention and management and appropriate program measures.

Quality Improvement at a Local Level

The Department of Critical Care Medicine defines and prioritizes departmental quality improvement initiatives annually. Site and project leaders from each ICU and Medical Directors actively guide the work. Each project usually has a zonal multidisciplinary working group with defined leadership. The leaders of each project include a manager, physician lead and the department's QI lead (Karolina Zjadewicz), who work collaboratively to guide a multidisciplinary team in this work. The multidisciplinary team meets regularly to help plan, implement and sustain the specific quality improvement initiative. These multidisciplinary teams' draws tools from lean, 6Sigma and IHI Improvement Advisor tool kits, Alberta Improvement Way (AIW) and PROSCI change management to help facilitate their work.

Quality Improvement Priorities

OR-ICU Handover Project Process

QAC reviews conducted in the former CHR (now AHS-Calgary Zone) noted a system deficiency of inadequate handover from the Operating Room (OR) to the ICU (Intensive Care Unit) and a recommendation for a standardized handover process was made. The creation and implementation of a standardized interdepartmental (OR, PACU, and ICU) clinical handover process was undertaken by a multidisciplinary, cross-departmental team.

The project went live at the FMC site in November 2014, with successful implementation of all project elements (indicated by compliance measures) in April 2016. Project implementation was led by Dr. Paul Boucher, Jennifer Coulthard and the DCCM QI lead. The project formalizes the process of consultation and acceptance of the patient by the ICU team. In addition, this process optimizes and streamlines handover process from the OR to the ICU. This process is utilized by the OR team (nursing staff, unit clerks, surgeons, surgery residents, surgery fellows, anesthetists, anesthesia residents, anesthesia Fellows, Anesthetic RT's) and the ICU team (Intensivist, residents, fellows, unit clerks, RN's, nurse clinicians, LPN's, Respiratory Therapists, nursing attendants). Once compliance measures around the processes were consistently >85%, the program was evaluated using pre-post survey methodology. The project had made statistically significant improvements in all 13 dimensions of quality that were surveyed ($p < 0.001$, Wilcoxon rank sum test).

Preliminary work has been completed at the PLC for implementation of a similar process, with room for appropriate contextualization. The development of an inverse process (ICU to OR) is concurrently being worked on, and will be shared with other sites. It is clear from the pre-implementation surveys disseminated to PLC staff that the need for change is also evident at this site and will help with project engagement. Plans for full implementation at the PLC are slated for May/June 2017. This continues to be a relevant and important initiative zonally, as 2016 saw a total of 1030 transfers from the OR to the ICU (590 FMC, 263 PLC, 103 RGH and 74 SHC). As such, work continues to progress at the zonal level as well, with a scoping review completed by a team around what is known about OR to ICU handovers in the last year. The intent of the scoping review is to continue to inform the work that is being done across the sites.

Medication Reconciliation on Admission and Transfer

The DCCM continues to participate in the Medication Reconciliation initiative as led by the Calgary Zone Med-Rec team. Monthly audits are completed at each site and the DCCM Lead sorts, and trends the data by site and zone. Additionally, a multidisciplinary group was formed to construct and implement the process for Medication Reconciliation on Transfer. This included providers both from the ICU and representatives from the Outreach team and Internal Medicine. The process was standardized through the method of dictation for transfer summaries, and compliance continues to be audited quarterly by the DCCM QI Lead.

Calgary Zone Patient and Family Centered Committee

The DCCM PFCC continues to meet on a monthly basis with team membership comprising family advisors and members of the ICU team that represent multiple disciplines and leaders from all of the adult ICU's. This forum is chaired by Rachel Taylor and Dr. Paul Boucher. In the spring of 2016, a steering group was formed to help inform the direction of the future of Patient and Family Centered Care committees within the DCCM. Recommendations made by the steering committee included moving away from a zonal approach to PFCC to a site based approach led by respective operational leads/designates. The intent was to bring a new membership on from both staff and patient/family advisors. Another recommendation was the formation of a new zonal committee, consisting of membership from the local sites will start to meet in 2017 to help with collaborative PFCC efforts. Recommendations were approved by ICU Exec in the Fall of 2016 with implementation due in early 2017.

Delirium Screening, Management and Prevention

Work around integrating delirium prevention and management strategies at the bedside continues to move forward and is led by the zonal multidisciplinary team representing all adult sites. This group is chaired and led by the DCCM QI Lead. Accomplishments for the 2016 year include:

- Establishing, collecting and discussing data around preliminary process measures in relation to daily rounds discussion as it relates to delirium care. (audit implemented, results analyzed and disseminated at the site and zonal level)
- The development, approval and implementation of the delirium practice guidelines that support the existing guidelines of (Analgesia and Sedation, Wake Up and Breathe and Non-Pharmacological Guidelines). These guidelines also adopt the SCCM (Society of Critical Care Medicine) bundle method of "ABCDEF" to establish clear requirements of bedside care.
- An in-depth data analysis comparing the process, outcome and balancing measures as it relates to the "B" portion of the bundle was completed (representing both awakening and breathing trials). This included a total of 12, 197 ICU stays over the time period of January 2013 to December 2015. General conclusions from this in depth report include: there has been no change to the time that spontaneous breathing trials are being done across the site, as such little change in extubation times over the two year period analyzed. The median time for extubation in the zone is 11:00, with about 60% of extubation's occurring within 2 hours of a successful spontaneous breathing trial. CVICU saw a decrease from time of admission to first SBT, which impacted the extubation times and led to a notable decrease in ventilation time. Both prevalence of delirium and ICU length of stay remained unchanged during this time period, putting a call into action. Lastly, the number of unplanned extubation's/1000 mechanical ventilation day remains unchanged over the years (ranging from 2.9-7.7 across the zone).
- Informed by the data analysis, it was identified that there was no standard process in charting spontaneous awakening trials into ECritical. Through previous work done by this zonal team on establishing consensus around the operational definition and expectations around Spontaneous Awakening Trials (SATs), a standardized method for charting was implemented in the Fall of 2016. This will allow for further data collection and analysis around spontaneous awakening trials.

Creation and Implementation of an Electronic ICU Transfer Summary

Through the work of meeting accreditation standards around medication reconciliation, it was quickly identified that the need for an electronic transfer summary for patients leaving ICU was required. The need for a longitudinal chart that can be updated daily by end users, whilst providing a record of pertinent information for the receiving service was quickly identified. The DCCM QI Lead has partnered with Dr. Stelfox and his research team to use rigorous research and QI methodology including RAND-UCLA consensus methods to determine what elements of information are required for such a transfer summary. In addition, a strong partnership has been made with the team of SCM (Sunrise Clinical Manager) to operationalize such transfer form in mid-2017.

Dr. Selena Au, QI-QAC Director
Karolina Zjadewicz, Quality Improvement Lead

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. ARDS develops in a subset of patients admitted to the Intensive Care Unit (ICU) with hypoxemic respiratory failure. ARDS results in the impairment of lung function leading to low blood oxygenation and poor carbon dioxide clearance. 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 Calgary Zone CMO/Medical Affairs) has 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. A staggering 58.5% of ICU patients who are mechanically ventilated for greater than 24 hours go on to meet full ARDS criteria. 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 (both basic and advanced) is variable and low, particularly in the severe ARDS category. For example, despite the fact that lung protective ventilation (LPV) has a proven absolute mortality risk reduction of 22%, patients with ARDS in Calgary received lung protective ventilation only 56% of the time while on controlled ventilation.

Our future work aims to test if a simple bundle for diagnosis and basic interventions will improve evidence based treatment compliance and local outcomes in patients with ARDS. Using Delphi methodology, we will be working with a multidisciplinary local clinical expert group to devise a clinical practice bundle. 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 2017 from the Calgary Zone CMO/Medical Affairs office to carry out this work.

Dr. Ken Parhar, QI ARDS Research Project Lead
Karolina Zjadewicz, Quality Improvement Lead
Dr. Andrea Soo, Senior Biostatistician

Extracorpeal 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.

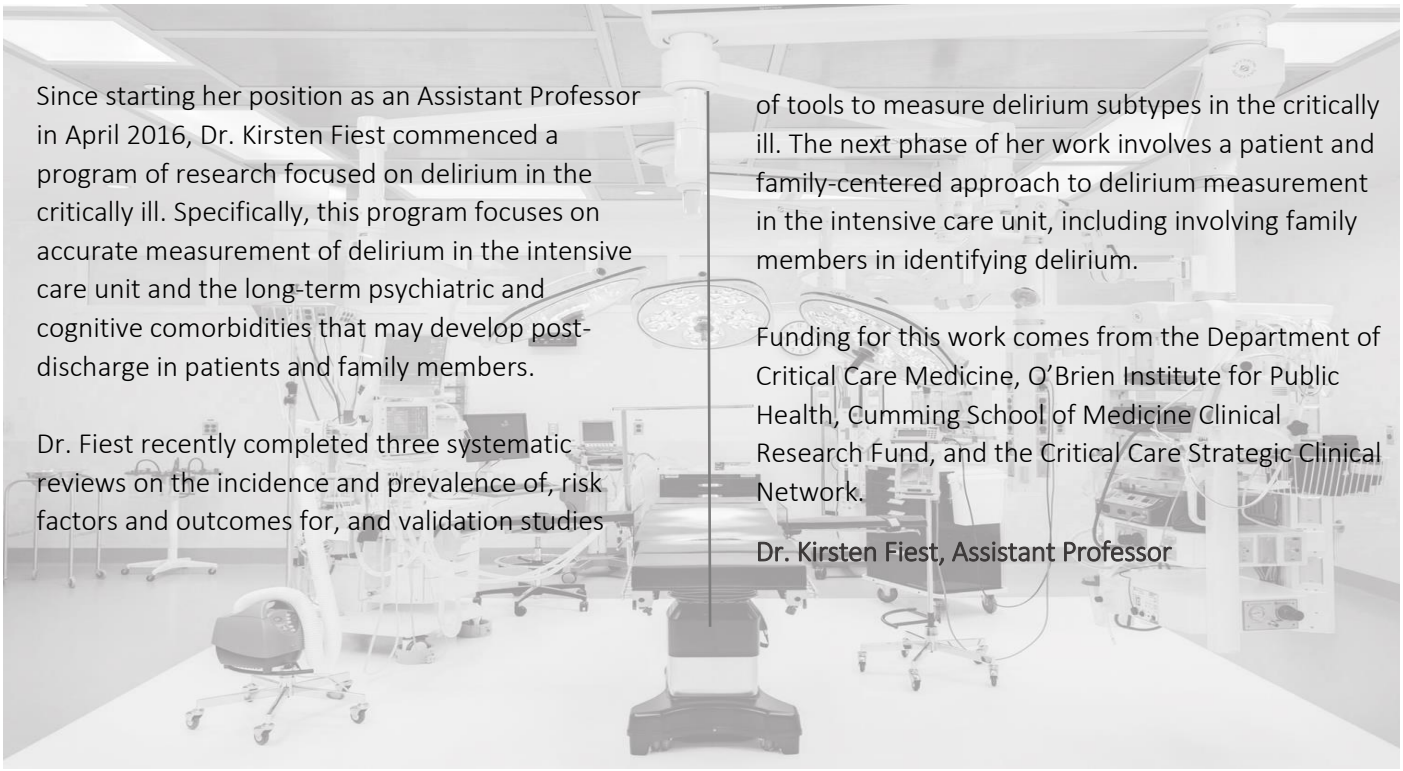
ECLS has been provided at the Foothills Medical Center CVICU for several years. Since 2005, over 150 patients have received ECLS support. During the 2008/2009 H1N1 influenza epidemic there was a renewed interest in expanding the use of ECLS worldwide and also locally. Since then it has been used increasingly for refractory respiratory and cardiac failure. In 2015 a multidisciplinary ECLS committee was created to oversee and improved 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 program. A record number of ECLS runs were performed, with 28 in total (20 VA-ECMO and 8 VV-ECMO). In addition several notable accomplishments were made. The ECLS cannulas and circuit was reviewed, simplified and standardized to prioritize safety. Standard operating protocols for transfusions, and prevention of leg ischemia were developed. A clinical practice guideline for the use of ECLS in cardiac arrest for hypothermia was also developed in collaboration with Trauma Surgery. A formal ECLS quality improvement process was initiated and now all cases are reviewed biannually. All survivors of ECLS are referred to and seen in the ICU follow up clinic.

In 2017, we look to continue our momentum by formalizing our capital equipment plan for the next five years in order to replace and update our aging equipment. In addition we will be working on clinical practice guidelines for the use of ECLS post myocardial infarction and post-cardiotomy.

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 delirium in the critically ill. Specifically, this program focuses on accurate measurement of delirium in the intensive care unit and the long-term psychiatric and cognitive comorbidities that may develop post-discharge in patients and family members.

Dr. Fiest recently completed three systematic reviews on the incidence and prevalence of, risk factors and outcomes for, and validation studies of tools to measure delirium subtypes in the critically ill. The next phase of her work involves a patient and family-centered approach to delirium measurement in the intensive care unit, including involving family members in identifying delirium.

Funding for this work comes from the 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 on week days with the aim of integrating patient care, providing teaching for residents and medical students, and promoting research for patients with neurological injuries and diseases in the Foothills Medical Center 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.

More recently, a neurologist and a neurosurgeon have trained in the DCCM residency program and have had exposure and training in multimodality neurologic monitoring exposure to continuous EEG monitoring and have developed expertise in neurological critical care and neuroprognostication. To expand and build on the current program, we hope to attract two fellowship trained neurointensivists.

The Neurocritical Care service has supported numerous local and national clinical trials over the past several years. Ongoing studies include clinical trials assessing prognosis in patients with severe traumatic brain injury (TBI); transfusion thresholds in patients with subarachnoid hemorrhage and TBI; care of post-cardiac arrest patients; blood pressure targets and neuroprotective strategies in spinal cord injury; the physiology of the dying process in relation to opportunities for organ donation; and the care of organ donors.

Dr. Philippe Couillard
Dr. Andreas Kramer

Critical Care Rehabilitation

The Critical Care Rehabilitation Service provides rehabilitation assessment and triage resources for ICU patients. Our goal is to improve the speed and quality of recovery for patients during and after their critical illness.

ICU Recovery Clinic

The ICU Recovery Clinic is an outpatient rehabilitation triage and assessment clinic focusing on former ICU patients who have risk factors that suggest they may be slower to recover in the community. One month after leaving the hospital, referred patients are invited to be assessed in clinic to ensure that the appropriate resources and strategies are being used to improve their recovery. The clinic focuses on education and exercise prescription as a foundation and refers to community resources as appropriate.

The ICU Recovery Clinic is available to ICU care providers as an outpatient rehabilitation resource. We currently routinely screen and triage patients from the Foothills Medical Centre (FMC) as well as the Peter Lougheed Centre (PLC).

Research

In 2017, we have set a specific goal of building tools and resources for the department to facilitate three- and six-month outcomes research for our patient populations. To address this, we have been successful in winning several clinical innovation grants. Over the coming year we will use these funds to build technology platforms that will facilitate research into important patient and family-centered outcomes (e.g. patient reported outcomes). This in turn, will act as a foundation for future research and departmental initiatives in this field.

New Developments

After piloting the ICU Recovery Clinic at the FMC ICU, the clinic has been relocated into the FMC Special Services Building to take advantage of their excellent outpatient's infrastructure.

We are in the process of developing a satellite outpatient clinic at the PLC. In this way, former PLC ICU patients can be followed-up locally as outpatients which will hopefully reduce transportation burdens for this population.

In 2017, the ICU Recovery Clinic will expand to provide rehabilitation follow-up services to all adult ICUs in the Calgary zone. In our current state, any Calgary Zone former ICU patient can be referred directly to the ICU Recovery Clinic, but at the moment automatic screening and referral processes are only in place for FMC and PLC. This will be addressed in the coming year so that outpatient recovery resources are equivalent across the city (regardless of which ICU a person may have happened to receive care in).

The ICU Recovery Clinic has started to integrate in-unit measures into our outpatient follow-up clinic. For example, the PLC has piloted the Chelsea Physical Assessment (CPAx) as a routine in-unit measure, and this has in turn been integrated into the referral criteria from that site.

Dr. Chris Grant, Physical Medicine & Rehabilitation

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.

There were 34 deceased organ donors in Southern Alberta in 2016. This was the highest annual number in more than a decade. Research from the Department of Critical Care Medicine has demonstrated that a declining proportion of neurocritical care patients, particularly those with traumatic brain injury, progresses to neurological determination of death (NDD).[1] Another recent study using data from Calgary and the Canadian Institute of Health Information demonstrated that a growing proportion of deceased NDD organ donors die from hypoxic-ischemic encephalopathy.[2] These donors tend to have a greater degree of organ injury, such that fewer organs can be procured and transplanted per donor. As such, high quality care aimed at optimizing organ function in deceased donors will remain an important facet of critical care practice.

In late 2013, the Department of Critical Care Medicine Medical Executive Committee approved the formation of a multi-disciplinary working group to evaluate how best to introduce the practice of donation after cardiocirculatory determination of death (DCD) in the Calgary Zone. There were physician and nursing representatives from each of the adult ICUs in Calgary, as well as Alberta Children's Hospital. In addition, the committee had a social worker, lawyer / ethicist, previously brain-injured patient, and family members of a previous patient and organ donor. Consultative input was sought from nephrology, transplant surgery, hepatology, respiratory medicine, operating room staff, and the Alberta Health Services (AHS) Legal department. Over a period of approximately 12 months (February 2014 to February 2015), the DCD Working group systematically addressed the various steps in the DCD process, and provided recommendations in April 2015.

These recommendations were used to develop policies and procedures, which were approved by Department of Critical Care Medicine and AHS Leadership in December, 2015. One of the recommendations was to initiate a "pilot project" at the Foothills Medical Center (FMC), which is the site that is expected to have the majority of DCD donation opportunities. January and February of 2016 were spent educating staff in the FMC multi-system ICU, operating room, and Southern Alberta Organ and Tissue Donation Program (SAOTDP). The DCD pilot project commenced at FMC on March 1, 2016.

Between March 1, 2016 and February 28, 2017, there were 143 deaths in the FMC ICU that were attributable to a neurologic cause (Figure). Thirty-three patients (23% of deaths attributable to neurologic cause) progressed to NDD. In five cases, this occurred among patients who were initially not neurologically deceased, but progressed to NDD several hours after a decision had been made to proceed with DCD. Importantly, without a DCD program, these patients would not have met criteria to be organ donors, and WLST would have occurred *prior to* progression to NDD. Of the remaining 28 NDD patients, consent for organ donation was provided in 17 (61%).

A total of 30 patients met criteria for DCD. DCD was not discussed with patients' families in four of these cases, for various reasons. Consent for DCD was provided in 15/26 patients whose families were approached (58%). Of the 11 patients in whom consent was refused, 9 (82%) died in a time frame in which organ donation would have been possible.

Outcomes of the 15 patients in whom consent was obtained were as follows:

- 3 became DCD donors, resulting in 5 kidney and 1 liver transplant
- 5 progressed to NDD (as discussed above)
- 2 potential donors did not die within the requisite time frame (with subsequent changes to policies, one of these would have been eligible)
- 1 potential donor went to the operating room for

organ procurement, but was found to have a kidney nodule that was suspicious for malignancy
- 2 potential donors had hepatitis C, and no recipient could be found
- 2 potential donors had organs refused by the transplant team (one with poor function, another with amyotrophic lateral sclerosis)

One additional patient from ACH became a DCD organ donor. Although ACH did not have a DCD protocol at the time, the patients' parents strongly advocated for the opportunity to donate organs, and the adult DCD protocol was adapted slightly to meet the needs of the ACH ICU and operating room.

Of seven local recipients of DCD kidneys, four required dialysis post-transplant (but 2 of the recipients were pre-dialysis), but only two required more than one session of dialysis. None of the recipients required dialysis after three months, with an average creatinine of 131 µmol/L (range 89-208 µmol/L).

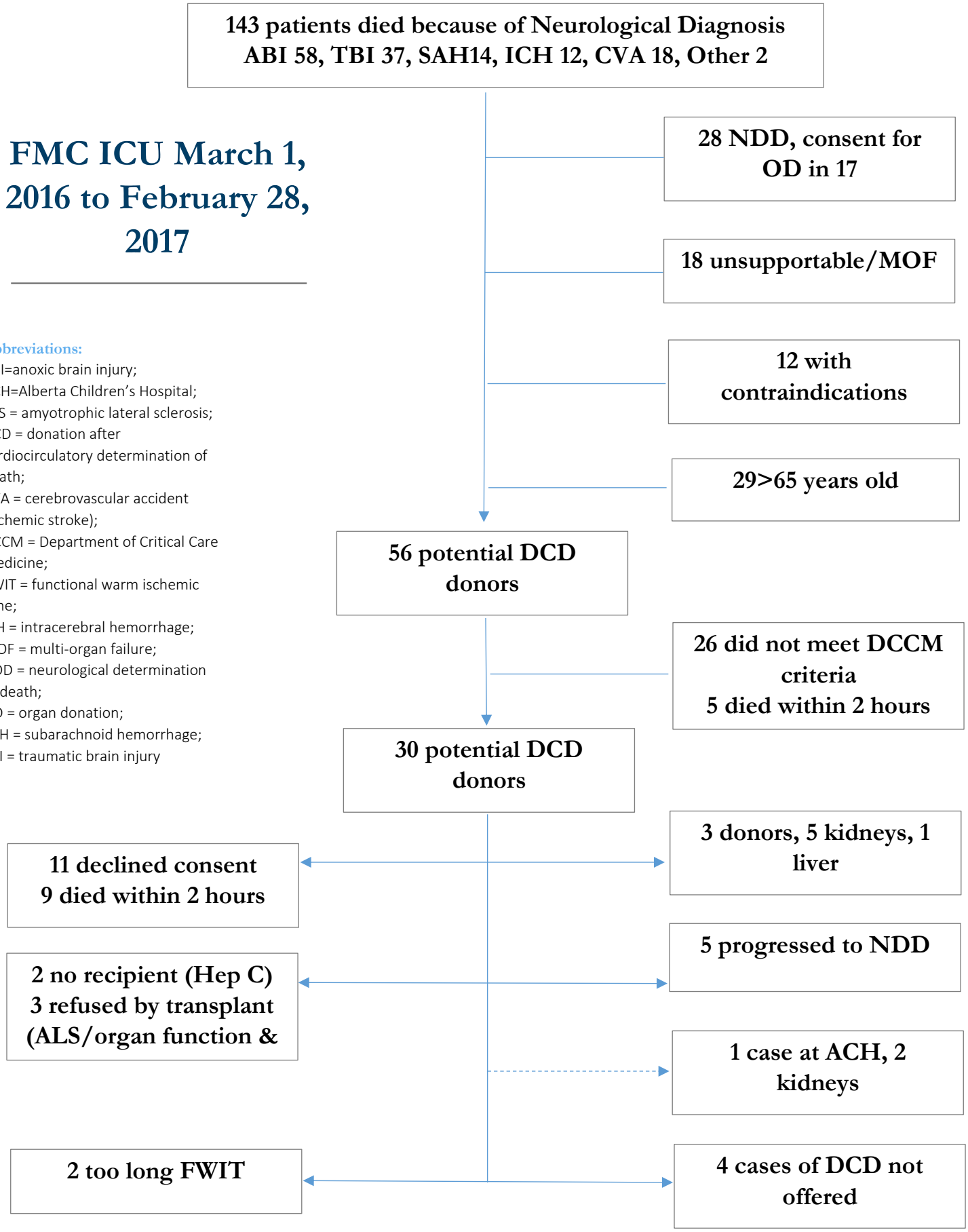
In the next 1-2 years, the DCD program will sequentially expand to other ICUs across Calgary, beginning with ACH (program has commenced) and the Peter Lougheed Centre (program scheduled to begin in June of 2017). During the pilot project, only kidneys and livers were procured and transplanted in either Calgary or Edmonton. As of March of 2017, SAOTDP has started offering DCD kidneys as part of the national Highly Sensitized Patient registry and DCD livers to "high status" patients across the country. Beginning in late spring of 2017, DCD lung procurement will be considered in selected cases.

DCD eligibility criteria, including organ-specific age and warm ischemic time thresholds, will require ongoing (re) evaluation. Other aspect of the DCD protocol will undergo ongoing refinement based on initial experience.

Dr. Andreas Kramer

Figure: Flow chart describing one year DCD pilot project at Foothills Medical Center.

FMC ICU March 1, 2016 to February 28, 2017



Abbreviations:
ABI=anoxic brain injury;
ACH=Alberta Children's Hospital;
ALS = amyotrophic lateral sclerosis;
DCD = donation after cardiocirculatory determination of death;
CVA = cerebrovascular accident (ischemic stroke);
DCCM = Department of Critical Care Medicine;
FWIT = functional warm ischemic time;
ICH = intracerebral hemorrhage;
MOF = multi-organ failure;
NDD = neurological determination of death;
OD = organ donation;
SAH = subarachnoid hemorrhage;
TBI = traumatic brain injury

ICU Outreach Program

ICU Outreach Team

The ICU Outreach Program continues to function as a physician-led team within the Critical Care Programs at all four adult acute care sites: Foothills Medical Centre, Peter Lougheed Centre, Rockyview General Hospital and South Health Campus.

During the reporting period of January 01, 2016 to December 31, 2016, our ICU Outreach Teams have responded to 1814 Code 66 calls which translate to approximately 151 calls per month. The vast majority of patients remain on their respective nursing units with about 18% requiring transfer to one of our ICUs. The most common reason for the team activation is a decrease in patient level of consciousness (54%) followed by respiratory distress (36%). The median response time for a code 66 is 5 minutes (3, 7) with the median length of time spent at a call around 45 minutes (27, 70). In 2016, a total of 4401 follow-up visits were completed by the team, with the majority (68.1%) occurring for patients leaving the ICU. The rest of the follow up visits were for patients who experienced a Code 66, Code Blue or an ICU consult.

Program Objectives:

- Reduce cardiac arrest rates, Code Blue calls and overall hospital mortality through early recognition of changes in patient's physiology and clinical status
- Decrease the number of admissions and re-admissions to the ICU by promoting continuity of care for patients discharged from ICU and provision of specific follow-up visits for patients deemed at high risk of ICU admission
- Ensure optimal use of Critical Care resources
- Improve care delivery to patients by sharing critical care skills and expertise through an educational partnership with non-critical care unit staff.
- Facilitate positive relationships between health care teams

System Improvement

Last year the ICU Executive Council endorsed the plan to transition from a physician led model to a RN/RT led, physician supported model of delivery for Outreach services. This model of delivery involves the RN/RT attending all code 66 calls with the Intensivist (or delegate) called upon as needed. Over the last year a multidisciplinary working group representing the Calgary zone convened with the purpose to define how this model would be contextualized to each of the 4 adult sites. This team was led by the Nursing Director for Critical Care and the DCCM QI Lead. This has required the team to process map current state and define the future state, ensuring clarity around not only processes but roles and responsibilities of each team member. The following has been accomplished over the last year:

- Understanding current state through process mapping of Code 66 responses and follow up visits
- Defining the 4 different response types the Code 66 team would respond to (A, B, C, D) as it relates to patient status and required physician resources.
- Constructing supporting processes (or future state process mapping) that outline the response mechanism of the team as it relates to the different call categories. This includes explicitly defining roles, responsibilities and expectations.
- The team preliminary capturing the type of calls (and the ease of categorization) within the Calgary Zone by carrying out a pre-implementation survey from April 1 2016 to June 30th 2016, capturing a total of 345 Code 66 calls (response rate=75%). Generally there was great confidence in categorizing the calls within 1-3 minutes of arrival, with high inter-rater reliability amongst Outreach RN's, RRT's and Outreach Physicians/Intensivists/delegates (>0.9) with a weighted kappa of 0.78.

- The appropriateness of the proposed model change is validated through the results as the Calgary Zone experiences approximately 43%-77% of Code 66 calls that would be categorized as a “C” or “D” call. As it has been defined, both “C” and “D” categorization of calls do not require an intervention by the Intensivist/delegate.
- The working group has reviewed all guiding documents surrounding the Outreach team (26 in total) to help inform the construction of three new documents that would eventually replace existing material. A good portion of the team’s time was constructing these documents that will help clarify the process. These include:
    - Code 66 Response Policy (completed February 2016) for ICU Exec Approval
    - Code 66 Internal Guiding Document (nearing completion)
    - Outreach Follow-Up Guidelines (nearing completion)
- Current follow-up processes of the Outreach team were reviewed systematically. This included a review of current follow up activity, relevant literature and local data showcasing both the ICU readmission rates (24 and 48 hours), and cardiac arrest rates/1000 discharges. With the direction of the ICU Executive leadership team, the follow-up process led by the Outreach RN and Outreach RRT have been redefined.
    - Outreach Program measures (key performance indicators) including, process, outcome and balancing measures were identified and finalized by the working group. As such, the web-application tracking the activity and other KPI measures of the Outreach Program was reviewed and changed to ensure program measures would be tracked accurately, without the need for duplicate charting from the Outreach RN/Outreach RRT.

In the meantime a Calgary zone Outreach Educator has been engaged to review current Calgary zone practices of orientation to Outreach, certification practices, ongoing education, and skills enhancement for RN and RRT Outreach team members. An evaluation of the different approaches to education and skills enhancement necessary to operationalize the new model is underway.

Dr. Bill Walker, ICU Outreach Program Director

Code 66 Active Team Summary

Goals of Care Before

Resuscitative	1,295	72.23%
Medical	479	26.72%
Comfort	2	0.11%
N/A	17	0.95%
Grand Total	1,793	

Change Goals of Care

R -> M	50	2.79%
R -> C	17	0.95%
M -> R	7	0.39%

Shift

0701 - 1600	803	44.79%
1601 - 2300	505	28.17%
2301 - 0700	485	27.05%

Age

Median	25 Percentile	75 Percentile
68	55	79

Sex

Male	1,006	55.46%
Female	808	44.54%

Trigger

Decrease LOC	618	40.66%
Respiratory Distress	391	25.72%
Tachycardia/Hypotension	383	25.20%
Seizures	59	3.88%
Airway	38	2.50%

Criteria

Decrease LOC	866	54.13%
Respiratory Distress	576	36.00%
Tachycardia/Hypotension	560	35.00%
Airway	88	5.50%
Seizures	78	4.88%
Failure to Respond to Treat..	72	4.50%
Unable to Obtain MD Assist..	31	1.94%
Urine Output	18	1.13%

Outcomes

Remained on Floor	1,181	65.87%
Admitted to ICU	324	18.07%
Transferred to Other Unit	252	14.05%
Died During the Call	36	2.01%
Code Blue Called	21	1.17%

Worry

Others	339	78.47%
Peripheral Signs of Shock	72	16.67%
Change in Vitals That Don't ..	14	3.24%
Goals of Care Issue	13	3.01%
Peripheral Signs of Respirat..	13	3.01%

Length of Time Spent by Outreach Team

Median	25 Percentile	75 Percentile
45	27	70

Response Time by Outreach Team

Median	25 Percentile	75 Percentile
5	3	7

DCCM Health Services Research

Mission: As researchers and innovators, we lead and partner research initiatives to improve the delivery of healthcare services to critically ill patients

Each year, thousands of people are admitted to an intensive care unit (ICU) with life-threatening conditions. These patients have complex medical problems that require twice as many tests and treatments as other hospitalized patients, and leave them with limited physiological reserve to tolerate additional illness and a vulnerability to adverse events related to patient need/clinical care mismatches. As such, there is urgency to optimize the quality of patient care in the ICU.

"Health services research is the multidisciplinary field of scientific investigation that studies how social factors, financing systems, organizational structures and processes, health technologies, and personal behaviors affect access to health care, the quality and cost of health care, and ultimately our health and well-being. Its research domains are individuals, families, organizations, institutions, communities, and populations."

The Health Services Research Group in Critical Care Medicine, under the direction of Dr. Tom Stelfox continues to foster collaborative initiatives amongst an interprofessional group of clinicians and scientists locally and nationally to develop and test innovative ways of delivering care to critically ill patients. Departmental members include Jeanna Parsons Leigh, Selena Au, Amanda Rose des Ordons, Ken Parhar, Andrea Soo and Karolina Zjadewicz. This past year two new scientists jointed the group. Dr. Kirsten Fiest is a clinical epidemiologist with expertise in knowledge synthesis methods and neuropsychiatric illnesses, who recently completed a postdoctoral fellowship at the University of Manitoba. Dr. Daniel Niven is a clinician scientist with expertise in health services research methods and knowledge translation who recently completed his PhD under the supervision of Drs. Tom Stelfox and Sharon Straus.

Sample of Ongoing Projects:

1. How should we engage critically ill patients and their family members in care?

Integrating patient and family needs and values into patient care is a core component of high quality health care. Members of the DCCM are leading programs of research to establish best practices to support patient and family participation in ICU care including communication and shared decision-making.

- Engaging patient families to participate in ICU rounds (Selena Au)
- Identifying Spiritual Distress in Families of Older ICU Patients: The INSPIRE Study (Amanda Rose des Ordons)
- Development and evaluation of a family partnered care pathway for critically ill older patients (Tom Stelfox)

2. How to implement research evidence into patient care?

Health care systems routinely fail to make optimal use of evidence, which results in suboptimal patient care (overuse, underuse & misuse of therapies). Members of the DCCM are leading programs of research to identify gaps between knowledge and practice and to develop interventions to address deficiencies.

- Identifying facilitators and barriers to the de-adoption of low value clinical practices (Jeanna Parsons Leigh)
- Prioritizing low value practices for de-adoption (Dan Niven)

3. How do we ensure continuity of patient care across the continuum?

The transfer of patients from the ICU to a hospital ward is challenging, high-risk, and inefficient, because the patients are very sick and complex, the level of care changes from high-intensity to lower-intensity, and many professionals are involved representing different clinical settings, focuses, and cultures. Members of the DCCM are leading programs of research to develop strategies to facilitate continuity of care for patients across the care continuum.

- Developing an electronic transfer of care summary tool (Karolina Zjadewicz).
- Evaluating the safety of discharging patients directly from the intensive care unit to the community (Andrea Soo).

DCCM Research Summary

The Translational Laboratory in Critical Care Medicine, under the direction of Dr. Paul Kubes, continues to foster collaborations between clinicians and basic scientists. These endeavors help support the work of Department members including Dr. Andonegui, Dr. Kirkpatrick, Dr. Kramer, Dr. McDonald, Dr. Winston and Dr. Yipp. Additionally, the Snyder lab has partnered with Critical Care researchers from other Canadian hospitals, continuing to expand the mandate to facilitate and support clinical research. Over the past two years, the Snyder Lab has contributed to the publication of 10 manuscripts and has provided pilot data for a number of national and international grant applications. 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.

The Jenne Lab focuses on the study of infectious disease, using intravital microscopy to better understand how the immune system recognizes and responds to infectious pathogens. This research aims to identify mechanism that will allow for the modulation of 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. 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 (*Blood*. 2017 Mar 9;129(10):1357-1367)

In 2016, Dr. Andonegui has been working in collaboration with Dr. Kubes, Dr. Doig and Dr. Sutherland (University of Lethbridge) in a project related to cognitive impairment in sepsis-associated encephalopathy (SAE) and the role of the immune cells in this pathology. The basic research has been completed in the translational laboratory in Critical Care Medicine and we are currently working on gathering the clinical data associated with this pathology to complete 2016 the manuscript. This project fosters collaborations between basic and clinical scientists. As a continuation of this study, Dr. Andonegui has been researching for therapeutic ways to inhibit the early monocyte recruitment into the septic brain. Noteworthy, in April Miss Courtney Schubert (4th year student, BHSc, U of C) under the supervision of Dr. Andonegui, successfully completed the research and her Honours Thesis about SAE. In addition, Dr. Andonegui has established a collaboration with Dr. Fiest to find markers to distinguish between different types of delirium.

The eCritical program under the leadership of Dan Zuege was implemented into every ICU in the province. It serves as a single clinical documentation system with TRACER supporting the data analytics needs. The platform provides investigators across the Province with invaluable population-based data to support research endeavors.

Dr. Winston completed a one year sabbatical in July 2016. His sabbatical was undertaken at UC Davis where he focused on learning liquid chromatography mass spectrometry with a focus on ARDS in Dr. Oliver Fiehn's laboratory. Dr. Winston is the co-ordinator of the Critical Care Medicine Graduate Program (part of the Medical Sciences Graduate Program). There are currently 7 students in the program: 5 PhD students and 2 MSc students.

Dr. Tom Stelfox, Deputy Department Head
Director, Research & Innovation

Notable Highlights

Peer Reviewed Grants Led by DCCM Members from Provincial or National Organizations

1. Amanda Roze des Ordons. M.S.I Foundation grant ($102,600). Identifying Spiritual Distress in Families of ICU Patients: The INSPIRE Study.
2. Jeanna Parsons Leigh. M.S.I Foundation grant ($115,446). Developing a Framework for the De-Adoption of Low-Value Clinical Practices in Acute Care Facilities.
3. Tom Stelfox. Embedded Clinician Researcher Salary Award, Canadian Institutes of Health Research ($300,000).
4. Tom Stelfox, Jeanna Parsons Leigh, Kirsten Fiest, Amanda Roze des Ordons, Selena Au, Dan Niven. CIHR Late Life Team Grant ($1,388,754 plus $1,040,464 in matching industry and health system contributions).
5. Jeanna Parsons-Leigh. Canadian Institutes of Health Research Planning and Dissemination Grant ($19,992).
6. Jeanna Parsons-Leigh. Alberta Innovates-Health Solutions Community Engagement and Conference Grant ($5,000).
7. Tom Stelfox. Canadian Frailty Network Catalyst Grant ($99,938).

High Impact Publications

1. Campsall P, Colizza K, Straus S, Stelfox HT. Financial relationships between organizations that produce clinical practice guidelines and the biomedical industry. PLoS Med. 2016 May 31; 13(5): e1002029. doi: 10.1371/journal.pmed.1002029.

2. Stelfox HT, Bastos J, Niven DJ, Bagshaw SM, Turin TC, Gao S. Critical Care Transition Programs and the Risk of Readmission or Death after Discharge from an ICU: A Controlled Interrupted Time Series Analysis. Intensive Care Med. 2016 Mar;42(3):401-10. doi: 10.1007/s00134-015-4173-7. Epub 2015 Dec 22.nt ($99,938).

3. Fiest KM, Walker JR, Bernstein CN, Graff LA, Zarychanski R, Abou-Setta AM, Patten SB, Sareen J, Bolton JM, Marriott JJ, Fisk JD, Singer A, Marrie RA; CIHR Team Defining the Burden and Managing the Effects of Psychiatric Comorbidity in Chronic Immunoinflammatory Disease. Systematic review and meta-analysis of interventions for depression and anxiety in persons with multiple sclerosis. Mult Scler Relat Disord. 2016 Jan;5:12-26. doi: 10.1016/j.msard.2015.10.004.
4. Roze des Ordons AL, Doig CJ, Couillard P, Lord J. From communication skills to skillful communication – a longitudinal integrated curriculum for critical care fellows. In press, 2016.
5. Bagshaw SM, Majumdar SR, Rolfson DB, Ibrahim Q, McDermid RC, Stelfox HT. A prospective multicenter cohort study of frailty in younger critically ill patients. Crit Care. 2016 Jun 6;20(1):175. doi: 10.1186/s13054-016-1338-x.
6. Moore L, Stelfox HT, Evans D, Hameed M, Yanchar N, Simons R, Kortbeek J, Bourgeois G, Clement J, Turgeon A, Lauzier F. Trends in Injury Outcomes Across Canadian Trauma Systems. JAMA Surg. 2016 Nov 9. doi: 10.1001/jamasurg.2016.4212. [Epub ahead of print]
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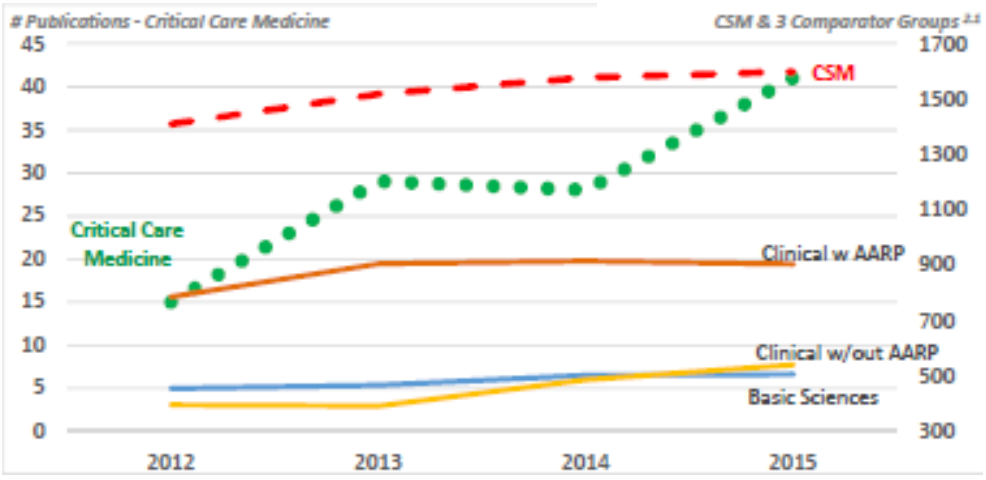

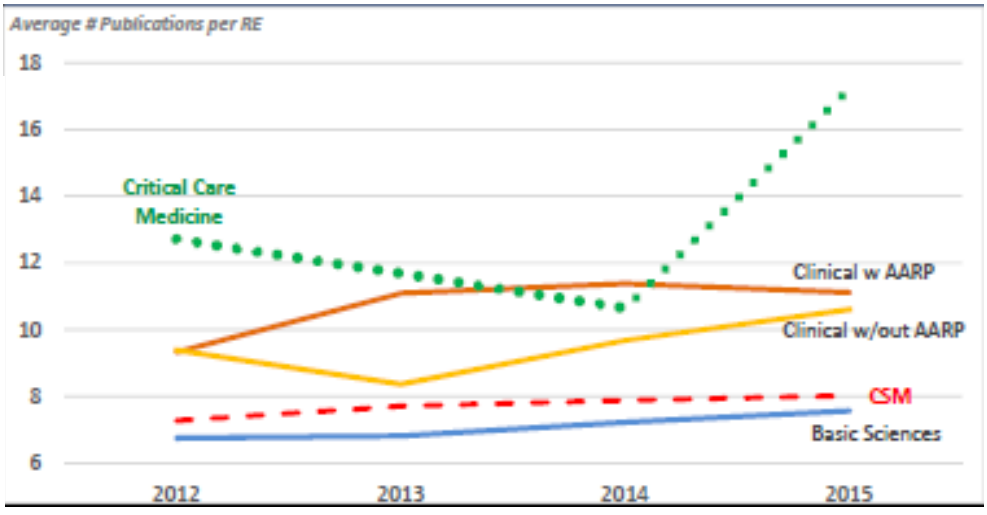

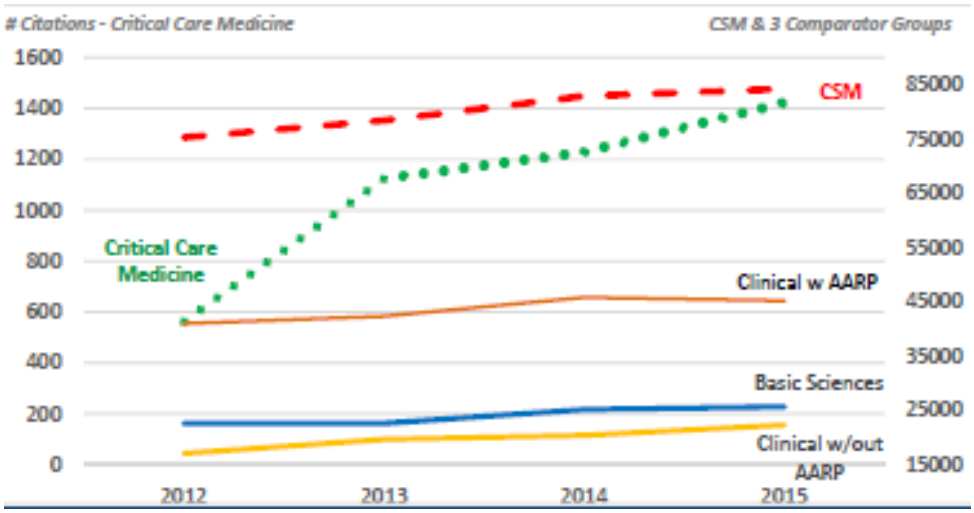
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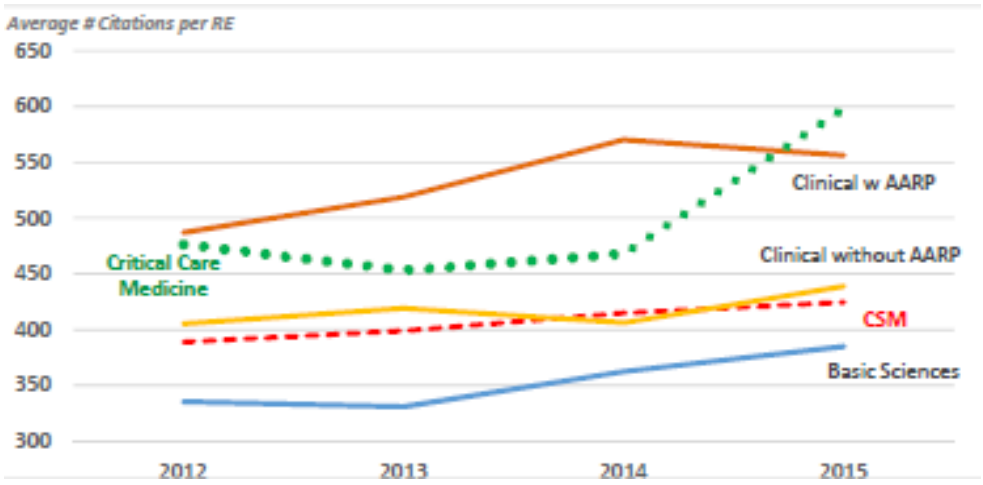
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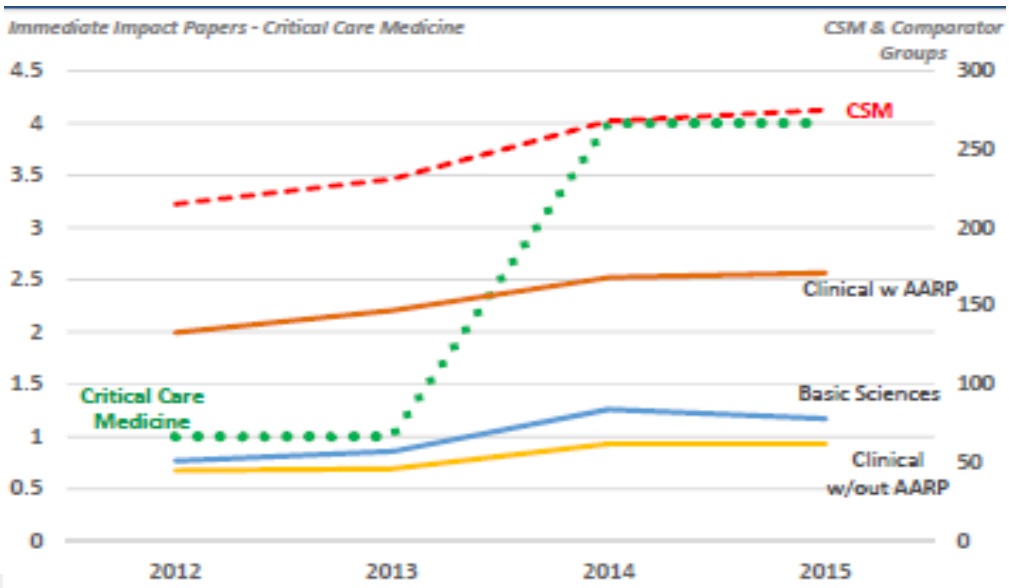
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Education

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 seven trainees in our CCM Training Program. We continue to provide entry positions for four trainees each year with a guarantee of two years of 'ministry' 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.

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, 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 fifth year and targets approximately 40 participant learners per workshop from a number of disciplines including CCM, Anesthesia, Emergency Medicine, Otolaryngology and Respirology. 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 expand to also include residents from Cardiology and General Internal Medicine in our participant pool.

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 and plans are underway to expand additional simulation opportunities for DCCM attending physicians in future in order to augment team-based competence and multi-professional trust. High caliber citywide CCM Grand rounds continue weekly and are recorded and available for review on our website: http://iweb.calgaryhealthregion.ca/clin/icu/education/index.html.

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, seven 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.

Several new curriculum innovations have been implemented in recent years as well. In 2016 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. As well, a novel IT solution that enables us to archive images 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 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.

Two additional important curricula have also been implemented in 2016 to 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 developed and 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.

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 year our two senior fellows participated in this rotation supported by the Distributed Learning and Rural Initiative Program offered by the U of C.

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 235 months of Critical Care Medicine training for rotating residents this past academic year. Rotating residents came from the following core programs: Internal Medicine, Respirology, 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. In the absence of residents available for in-house coverage, DCCM has recruited a group of 'bedside physicians' (resident extenders) who provide in- house coverage for all five intensive care units in the Calgary Zone.

Funding for this program is provided by Alberta Health Services, with the DCCM responsible for the coordination of the call schedules. Our CCM ICU Outreach Program works collaboratively with the existing ICU resident on-call system to ensure prompt, experienced critical care coverage within all hospitals, twenty-four hours per day.

We are pleased to report that our clinical rotation continues to be highly desired by the undergraduate medical students. For the fifth consecutive year, the number of medical students from the University of Calgary who have chosen Critical Care Medicine remains very high. This year, forty-four students rotated within our critical care units. 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.

One significant opportunity and challenge that lies ahead for the DCCM CCM Training Program will be 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, "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. Implementation of this new educational model across disciplines will unfold over several years and CCM is currently scheduled to transition to CBD in July 2018. This transition offers the DCCM an important opportunity for transformational educational change and provides good opportunity for further education scholarship as we explore our experience with and outcomes associated with the transition to CBME.

Dr. Jonathan Gaudet, DCCM Education Director

Critical Care Medicine Fellows 2016-2017

Dr. Tavish Barnes

Dr. Luc Benoit

Dr. Andreanne Cote

Dr. Julie Kromm

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.

Luc Benoit

Dr. Benoit completed his MD degree at the University of Alberta in 2010, then did residency training in internal medicine and respirology. He is currently completing a critical care medicine fellowship at the University of Calgary.

Andreanne Cote

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

Julie Kromm

Dr. Julie Kromm completed her Bachelor of Science, Medical Degree, and Neurology residency at the University of Alberta. She is a Fellow of the Royal College of Physicians and Surgeons of Canada in Neurology, and is certified by the Canadian Society of Clinical Neurophysiologists in electroencephalography. She is currently completing her Critical Care Medicine fellowship at the University of Calgary, with a final year of Neurocritical Care training confirmed at Columbia University New York, NY.

Dr. Bikaramjit Mann

Dr. Braedon McDonald

Bikaramjit Mann

Bik 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.

Braedon McDonald

Following a degree in Microbiology and Immunology at McGill University, Dr. McDonald completed medical school at the University of Calgary, as well as a PhD in Immunology studying neutrophil trafficking in inflammation. Subsequently, he completed training in Internal Medicine at the University of British Columbia. Dr. McDonald is currently a first year Critical Care Medicine Fellow, and a post-doctoral researcher with the Synder Institute for Chronic Disease, where he studies the interactions between the immune system and the microbiome in critical illness.

Dr. Alasdair Nazerali Maitland

Dr. Ben Wierstra

Alasdair Nazerali-Maitland

Alasdair came to join the ICU family in Calgary following short stops in London and Kingston. He developed an interest in Medical Education and has pursued additional fellowship training at the Centre of Health Education Scholarship in Vancouver where he now works and lives.

Benjamin 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.

Critical Care Medicine Faculty 2016-2017

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, Research Assistant Professor

Dr. Graciela Andonegui has been in the Department of Critical Care Medicine since July 1, 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 cognitive impairment in sepsis. Dr. Andonegui has 30 peer-reviewed publications including journals such as Journal of Clinical Investigation, Blood and Journal of Immunology. Dr. Andonegui is involved in teaching Independent Studies 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

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Paul Boiteau, Professor (GFT)
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 and interest in a systems approach to Patient Safety.

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

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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 – September, 2010. Dr. Doig has over 130 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. Despite obvious French Canadian roots Dr. Ferland and his wife (an ophthalmologist in town) have had no problem endorsing the Western Canadian way of living. Their two adults sons, who are currently studying at the University of Toronto, also enjoy similar pastime including scuba diving and world travels.

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, Internal 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 Chronis 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: 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, Anaesthesia 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 and Community Health Sciences 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 applying epidemiologic methods to evaluate (i) psychiatric comorbidities in chronic neurological conditions and (ii) long-term cognitive, psychiatric, and physical outcomes in critically ill patients. In her spare time, Kirsten enjoys live music, rock climbing, yoga, and knitting.

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 Board of the journal Neurocritical Care, and will soon be joining that of the journal 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 6 and 14

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 Assistant Professor (MPT)
Clinical Activities: PLC-MSICU
Administrative Responsibilities: Lead, PLC Simulation Laboratory
Fellowship and Postgraduate Training: Critical Care Medicine, Emergency Medicine, M.Sc.

Dr. 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. Currently, Dr. Lord is dual appointed as a Clinical Assistant 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. Dr. Lord is currently completing a Master's degree in Community Health Sciences with a specialization in Medical Education. 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 on July 1st, 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 University of Calgary. He has over 45 peer-reviewed publications and is currently developing a program to support the use of thrombelastography in trauma and the critically ill patients. In his free time Dr. McBeth enjoys running, cycling and flying.

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.

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 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 Cardiac 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.

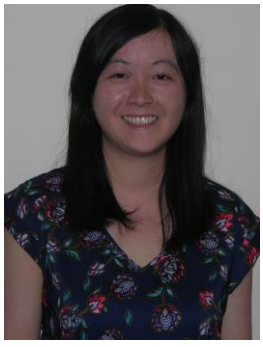
Amanda Roze des Ordons, Clinical Assistant Professor (MPT)
Clinical Activities: RGH-MSICU, SHC-MSICU, FMC-MSICU
Administrative Responsibilities: DCCM CME Coordinator, SHC Site Education Coordinator
Fellowship and Postgraduate Training: Critical Care Medicine, Anesthesiology, Palliative Care, Masters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

Dr. Amanda Roze des Ordons 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 resulting in over 15 publications. These areas include outcomes and adverse events of adults and children with kidney disease and of adults in assisted living facilities. Andrea is an avid fan of the Boston Bruins, crafter of anything using textiles and enjoys DJ'ing.

H. Tom Stelfox, Associate Professor (GFT)
Clinical Activities: FMC-MSICU
Administrative Responsibilities: Scientific Director, Critical Care OCN (Operational Clinical Networks). Member of the Executive, University of Calgary Institute for (CIPH); Head, Health Care System Performance Improvement Research Subgroup, CIPH; Chair, Performance Improvement and Patient Safety (PIPS), Trauma Association of Canada; Chair, Benchmarking Committee, National Trauma Registry Advisory Committee; Member of the Executive, Canadian Critical Care Trials Group (CCCTG)
Fellowship and Postgraduate Training: Critical Care Medicine, Internal Medicine, Ph.D., Health Policy - Statistics & Evaluative

Dr. Tom Stelfox is an Associate Professor of Critical Care Medicine, Medicine and Community Health Sciences at the University of Calgary. He is the Scientific 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 and outpatient 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 the Acting Zone 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
Administrative Responsibilities: Coordinator for Post Graduate Sciences Chair, Canadian Critical Care Translational Biology Group (CCCTG); Chair, Lung Association of Alberta
Fellowship and Postgraduate Training: Critical Care Medicine, Pulmonary Medicine, Internal Medicine

Dr. Winston has research interests in metabolomics and pulmonary fibrosis.

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: Medical Director eCritical Alberta; Leader, Infection Prevention Program; Co-Chair, VAP and CRBSI QI Teams
Fellowship and Postgraduate Training: Critical Care Medicine, Pulmonary Medicine, Internal Medicine, M.Sc. Resp 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 and on the ski hills.

Membership

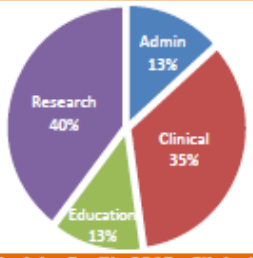
There are many different types of membership in University of Calgary (academic) component of the department. There are two major categories: geographic full time or clinical/adjunct/research.

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.

Cumming School of Medicine Activity Profile

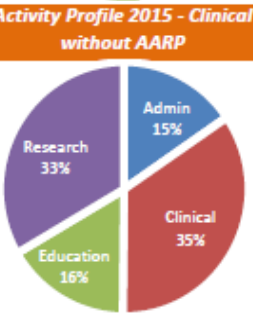
FTE[2]

FTE[2] of Professors, Associate Professors and Assistant Professors	2012	2013	2014	2015 [1]
Critical Care Medicine	**4**	**6**	**6**	**6**
Basic Sciences	133	130	131	126
Clinical Depts w. AARP	237	231	225	220
Clinical Depts w/out AARP	146	151	154	152
CSM	516	512	510	498



RE[3]

Research Equivalents RE[3]	2012	2013	2014	2015
Critical Care Medicine	**1.2**	**2.5**	**2.6**	**2.4**
Basic Sciences	67.3	68.4	69.4	66.8
Clinical Depts w. AARP	84.1	81.6	80.3	81.4
Clinical Depts w/out AARP	42.1	46.7	50.2	50.9
CSM	**193.6**	**196.7**	**199.9**	**199.1**



Total Research Revenue[4]

Total Research Revenue[4]	2013	2014	2015	2016	Total Research Revenue per RE 2013	2014	2015	2016
Critical Care Medicine	**$1.2 M**	**$2. M**	**$1.1 M**	**$1.5 M**	**$1.1 M**	**$.8 M**	**$.4 M**	**$.6 M**
Basic Sciences	$47.3 M	$48.3 M	$45.7 M	$43.7 M	$.9 M	$.7 M	$.7 M	$.7 M
Clinical Depts w. AARP	$49.5 M	$53.9 M	$54.4 M	$65.6 M	$.6 M	$.7 M	$.7 M	$.8 M
Clinical Depts w/out AARP	$22.9 M	$27.2 M	$25.9 M	$24.2 M	$.5 M	$.6 M	$.5 M	$.5 M
CSM	**$168. M**	**$158.6 M**	**$172.7 M**	**$167.1 M**	**$.9 M**	**$.8 M**	**$.9 M**	**$.8 M**

CIHR Revenue[5]

CIHR Research Revenue[5]	2013	2014	2015	2016	CIHR Research Revenue per RE 2013	2014	2015	2016
Critical Care Medicine	**$.3 M**	**$.3 M**	**$.3 M**	**$.4 M**	**$.3 M**	**$.1 M**	**$.1 M**	**$.2 M**
Basic Sciences	$16. M	$16. M	$15.3 M	$14.6 M	$.2 M	$.2 M	$.2 M	$.2 M
Clinical Depts w. AARP	$7.4 M	$8.5 M	$10.5 M	$12.5 M	$.1 M	$.1 M	$.1 M	$.2 M
Clinical Depts w/out AARP	$1.9 M	$1.8 M	$2.6 M	$3.3 M	$. M	$. M	$.1 M	$.1 M
CSM	**$25.3 M**	**$26.3 M**	**$28.4 M**	**$30.4 M**	**$.1 M**	**$.1 M**	**$.1 M**	**$.2 M**

Clinical Research Revenue[6]

Clinical Research Revenue[6]	2013	2014	2015	2016	Clinical Research Revenue per RE 2013	2014	2015	2016
Critical Care Medicine	**$.145 M**	**$.35 M**	**$.355 M**	**$.405 M**	**$.123 M**	**$.141 M**	**$.135 M**	**$.17 M**
Basic Sciences	$.1 M	$.2 M	$. M	$1.8 M	$. M	$. M	$. M	$.03 M
Clinical Depts w. AARP	$10.1 M	$11.3 M	$12.3 M	$16.1 M	$.12 M	$.14 M	$.15 M	$.2 M
Clinical Depts w/out AARP	$1.8 M	$2.8 M	$2.4 M	$3.9 M	$. M	$.1 M	$. M	$.1 M
CSM	**$12.1 M**	**$14.4 M**	**$14.8 M**	**$23.2 M**	**$.1 M**	**$.1 M**	**$.1 M**	**$.1 M**

Critical Care Medicine Managers 2016-2017

Kelly Coutts, 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 (2010-2013) and Foothills Medical Centre (2013-2017). Kelly is married and has 2 children. She spends her winter weekends cheering on her boys at the hockey rink and summers camping.

Pam Hruska, FMC

Pam Hruska is the Clinical Nurse Specialist for the Department of Critical Care Medicine who supports all four Adult Critical Care units within the Calgary zone since April 2013. She graduated from the University Of Calgary Faculty Of Nursing (RN BN with distinction) in 2003 and specialized in caring for acute neuroscience and critically ill patient populations. Pam has completed the ACCN Critical Care Certification program in 2005, achieved her Canadian Nursing Association Critical Care Certification in 2006, and completed her Masters of Science in 2015. Her research interests include cognitive based education, reasoning and decision-making. Pam is married, has a tiny dog named Golaith, travels whenever possible, is a fanatic for backcountry skiing and otherwise keeps active through cycling, yoga, and occasional speed skating laps at the Olympic oval.

Caroline Hatcher, FMC

Caroline is the Executive Director of Critical Care Medicine. She has a Masters in Health Studies, Leadership from Athabasca University and a Bachelor of Science in Nursing from the University of Alberta.

Patty Infusino, 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 allow s her to travel to different places.

Kevin Orton, CVICU

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 16 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. Passionate for nearly all sports, specifically hockey. Peculiar for someone who is such a poor skater.

Melissa Redlich, 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.

Rachel Taylor, 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 16 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.

Karolina Zjadewicz, Quality Improvement Lead

Karolina Zjadewicz is the Quality Improvement Lead for the Calgary Department of Critical Care of Medicine (DCCM) of Alberta Health Services. She has been a nurse for nearly 10 years with clinical leadership experience in both Burns/Plastic Surgery and Critical Care. She received both her Bachelor and Masters of Nursing through the University of Calgary. Her Masters' research concentrated on the role of middle managers in the implementation of mandated quality improvement projects. Her daily work and intents for future research are focused around Improvement Science, specifically around operationalizing QI projects at the frontline and the application of change models and models for knowledge transfer and translation. Recent accomplishments have included co-leading the successful implementation of a standardized OR to ICU handover at one hospital with work being led to spread across the Calgary zone, leading Calgary's ICU's to a successful Accreditation Cycle (94%) and successfully securing CMO funding for a QI project aimed at optimizing of ARDS (Acute Respiratory Distress Syndrome) Management. Outside of work Karolina enjoys hot yoga, manages a food blog and loves being in the mountains as much as possible.

Awards and Recognitions

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

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. Tom Stelfox, Best Paper Award, Trauma Association of Canada

Dr. Dan Niven was recognized 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" (you've previously been copied on his article). I hope you'll take a moment to recognize Dan's accomplishment.

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.

Congratulations to Kenneth Blonde, Julie Robichaud and Lovedeep Kheera who completed their training at the end of this academic year 2016.

Alasdair Nazerali-Maitland has been working on his Master's concurrently, and completed his clinical training this December 2016.

Department of Critical Care Medicine congratulates Dr. Carla Chrusch for being promoted to the rank of Clinical Associate Professor effective July 1, 2016.

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

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

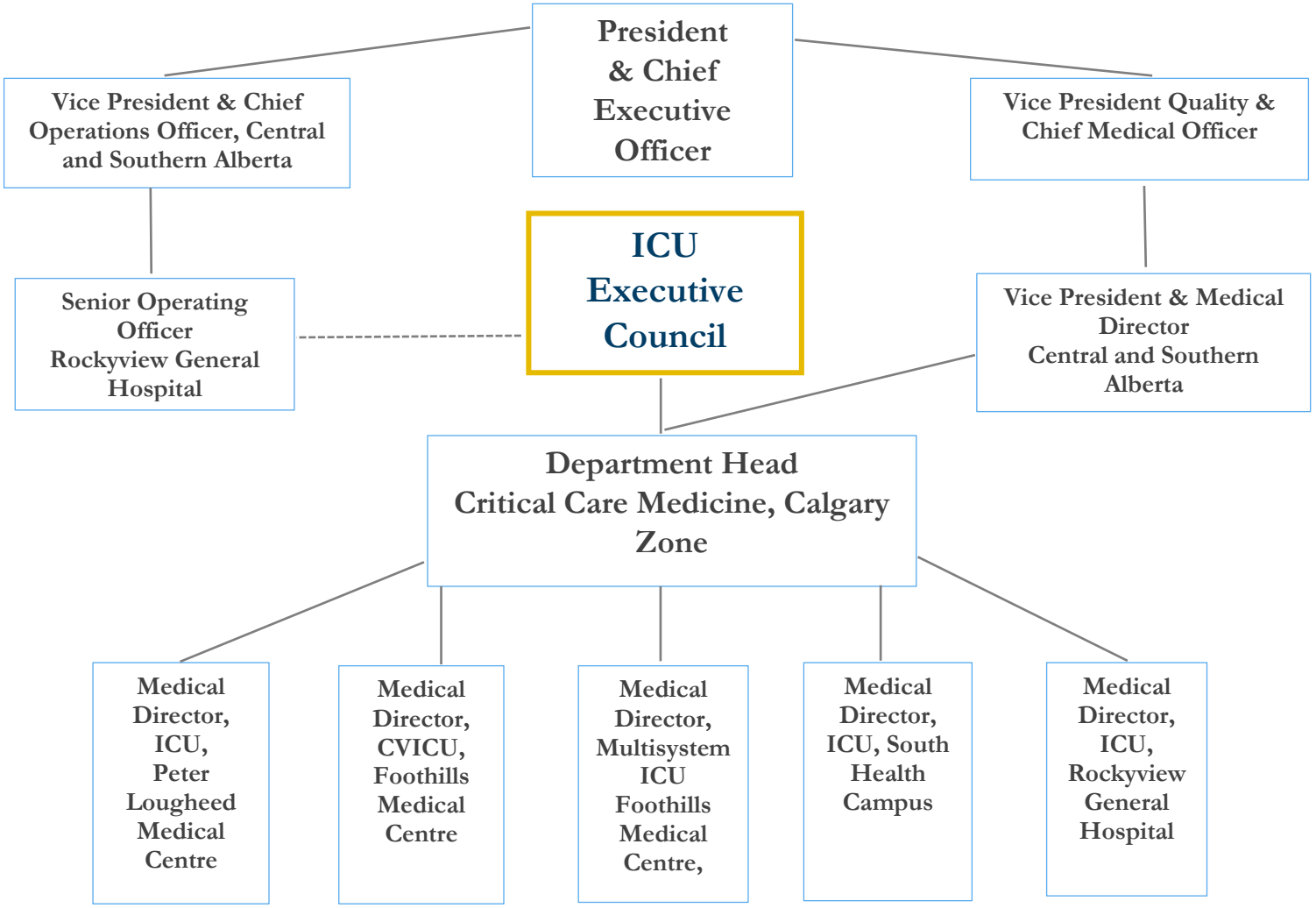
Mount Assiniboine Award
Outstanding Clinician
FMC, Zonal, Laura Robinson
FMC CVICU, Site, Sarah Araneta
PLC ICU, Site, Brad Stoich
RGH ICU, Site, Karen Nadeau
SHC ICU, Site, Kari Taylor

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

Appendices
I. 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 by 2016. 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

DCCM Research Committee

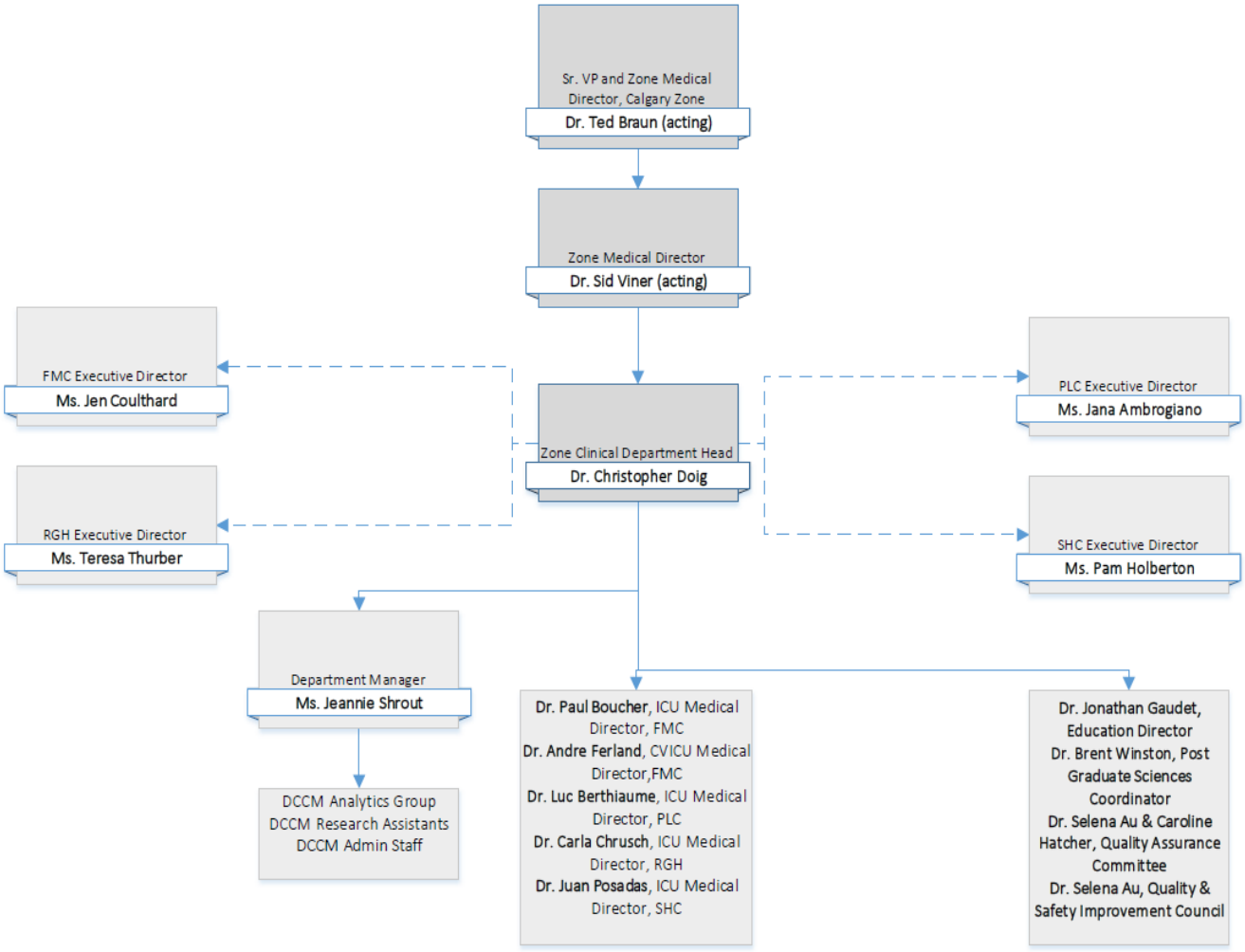
ICU Medical Executive Committee

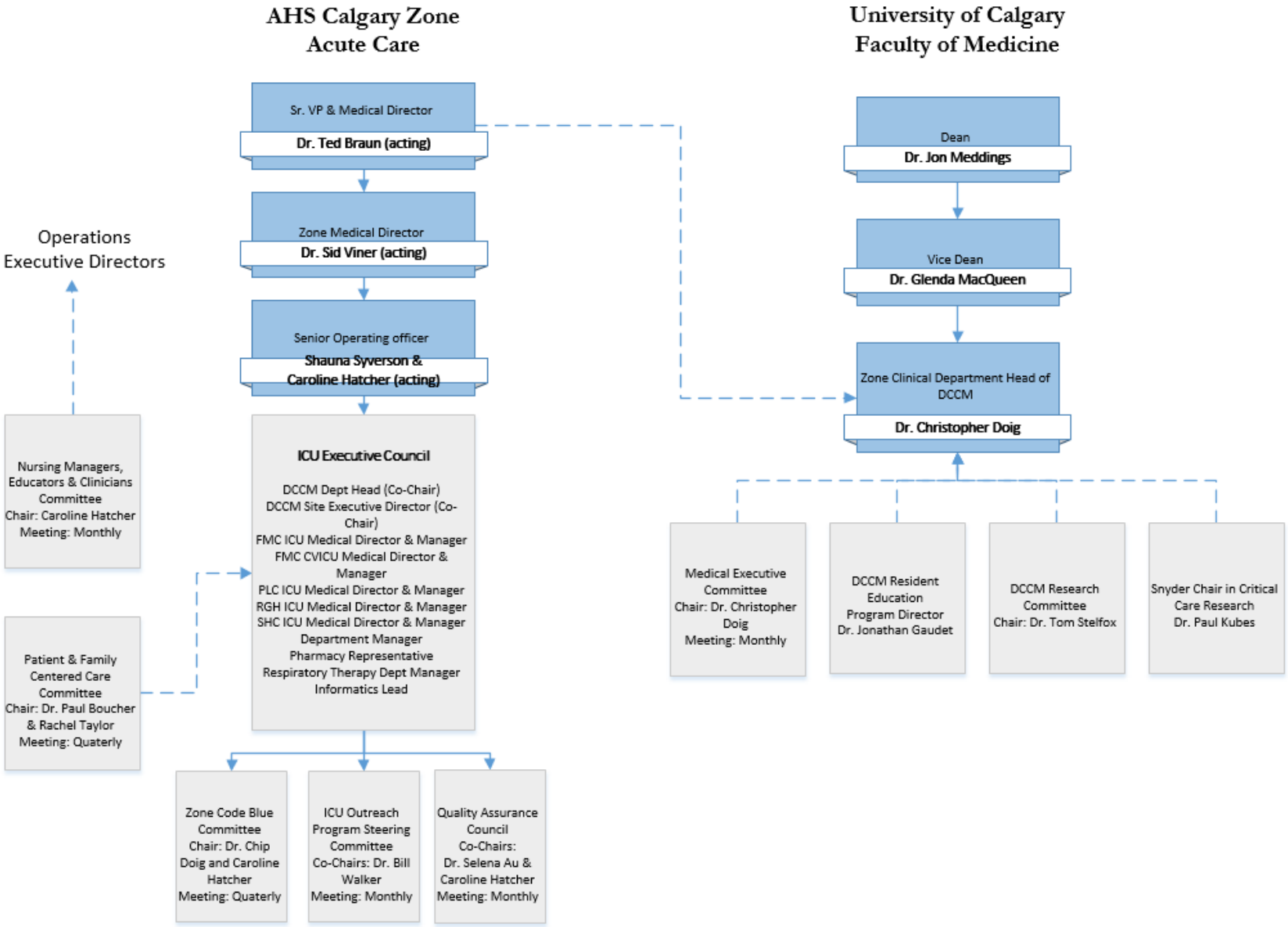
Zonal ICU Outreach Steering Committee

Zonal Code Blue Committee Meeting

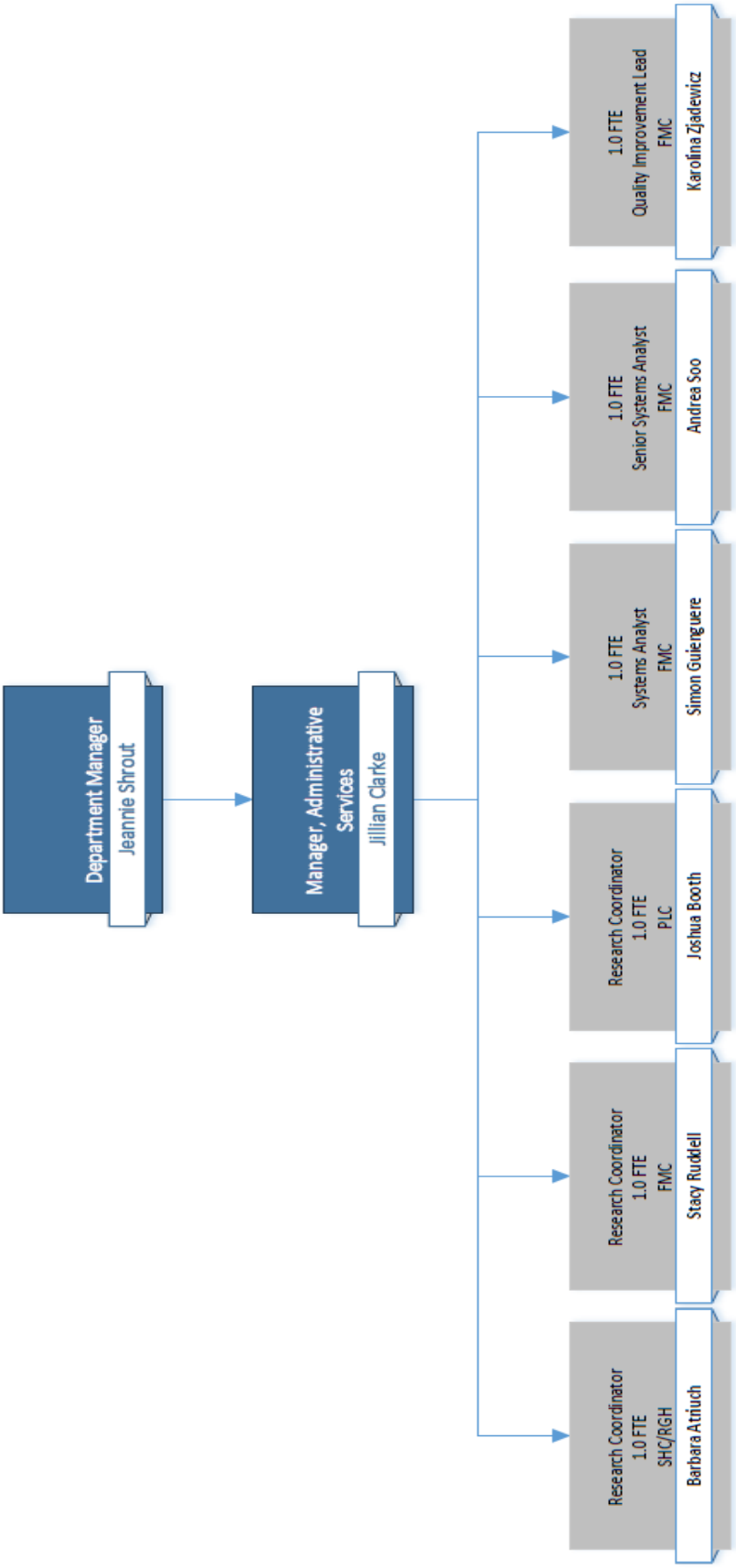
DCCM Physicians Business Meeting

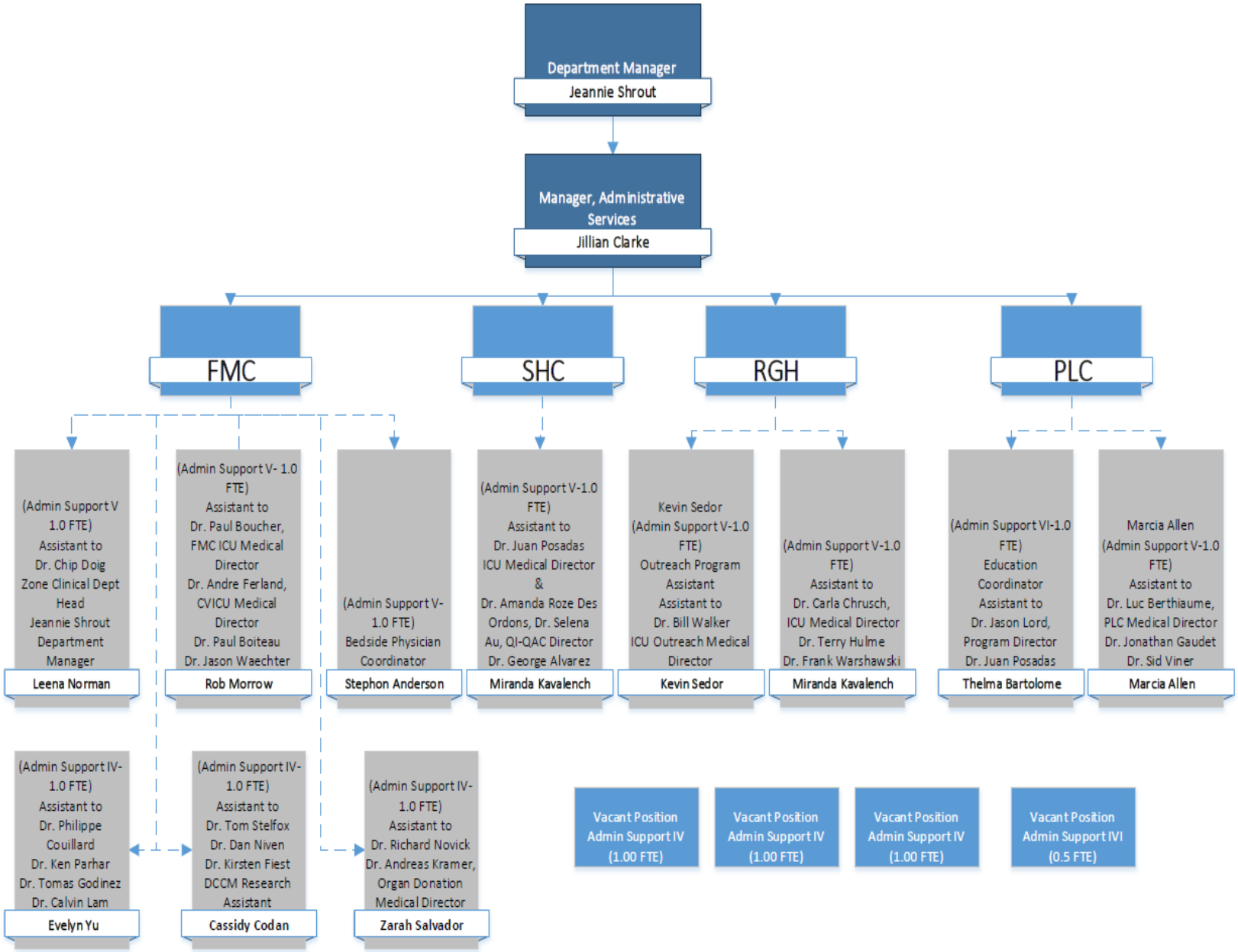
II. Medical Leadership & Administration




AHS Calgary Zone
Acute Care
University of Calgary
Faculty of Medicine
Sr. VP & Medical Director
Dr. Ted Braun (acting)
Zone Medical Director
Dr. Sid Viner (acting)
Senior Operating officer
Shauna Syverson &
Caroline Hatcher (acting)
Operations
Executive Directors
Nursing Managers, Educators & Clinicians Committee
Chair: Caroline Hatcher
Meeting: Monthly
Patient & Family Centered Care Committee
Chair: Dr. Paul Boucher & Rachel Taylor
Meeting: Quaterly
ICU Executive Council
DCCM Dept Head (Co-Chair)
DCCM Site Executive Director (Co-Chair)
FMC ICU Medical Director & Manager
FMC CVICU Medical Director & Manager
PLC ICU Medical Director & Manager
RGH ICU Medical Director & Manager
SHC ICU Medical Director & Manager
Department Manager
Pharmacy Representative
Respiratory Therapy Dept Manager
Informatics Lead
Zone Code Blue Committee
Chair: Dr. Chip Doig and Caroline Hatcher
Meeting: Quaterly
ICU Outreach Program Steering Committee
Co-Chairs: Dr. Bill Walker
Meeting: Monthly
Quality Assurance Council
Co-Chairs:
Dr. Selena Au & Caroline Hatcher
Meeting: Monthly
Dean
Dr. Jon Meddings
Vice Dean
Dr. Glenda MacQueen
Zone Clinical Department Head of DCCM
Dr. Christopher Doig
Medical Executive Committee
Chair: Dr. Christopher Doig
Meeting: Monthly
DCCM Resident Education Program Director
Dr. Jonathan Gaudet
DCCM Research Committee
Chair: Dr. Tom Stelfox
Snyder Chair in Critical Care Research
Dr. Paul Kubes

Critical Care Support Staff




Department Manager
Jeannie Shrout
Manager, Administrative Services
Jillian Clarke
FMC
SHC
RGH
PLC
(Admin Support V 1.0 FTE)
Assistant to
Dr. Chip Doig
Zone Clinical Dept Head
Jeannie Shrout
Department Manager
Leena Norman
(Admin Support V- 1.0 FTE)
Assistant to
Dr. Paul Boucher, FMC ICU Medical Director
Dr. Andre Ferland, CVICU Medical Director
Dr. Paul Boiteau
Dr. Jason Waechter
Rob Morrow
(Admin Support V- 1.0 FTE)
Bedside Physician Coordinator
Stephon Anderson
(Admin Support V-1.0 FTE)
Assistant to
Dr. Juan Posadas
ICU Medical Director
&
Dr. Amanda Roze Des Ordons, Dr. Selena Au, QI-QAC Director
Dr. George Alvarez
Miranda Kavalench
Kevin Sedor
(Admin Support V-1.0 FTE)
Outreach Program Assistant
Assistant to
Dr. Bill Walker
ICU Outreach Medical Director
Kevin Sedor
(Admin Support V-1.0 FTE)
Assistant to
Dr. Carla Chrusch, ICU Medical Director
Dr. Terry Hulme
Dr. Frank Warshawski
Miranda Kavalench
(Admin Support VI-1.0 FTE)
Education Coordinator
Assistant to
Dr. Jason Lord, Program Director
Dr. Juan Posadas
Thelma Bartolome
Marcia Allen
(Admin Support V-1.0 FTE)
Assistant to
Dr. Luc Berthiaume, PLC Medical Director
Dr. Jonathan Gaudet
Dr. Sid Viner
Marcia Allen
(Admin Support IV-1.0 FTE)
Assistant to
Dr. Philippe Couillard
Dr. Ken Parhar
Dr. Tomas Godinez
Dr. Calvin Lam
Evelyn Yu
(Admin Support IV-1.0 FTE)
Assistant to
Dr. Tom Stelfox
Dr. Dan Niven
Dr. Kirsten Fiest
DCCM Research Assistant
Cassidy Codan
(Admin Support IV-1.0 FTE)
Assistant to
Dr. Richard Novick
Dr. Andreas Kramer, Organ Donation Medical Director
Zarah Salvador
Vacant Position
Admin Support IV
(1.00 FTE)
Vacant Position
Admin Support IV
(1.00 FTE)
Vacant Position
Admin Support IV
(1.00 FTE)
Vacant Position
Admin Support IVI
(0.5 FTE)

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.

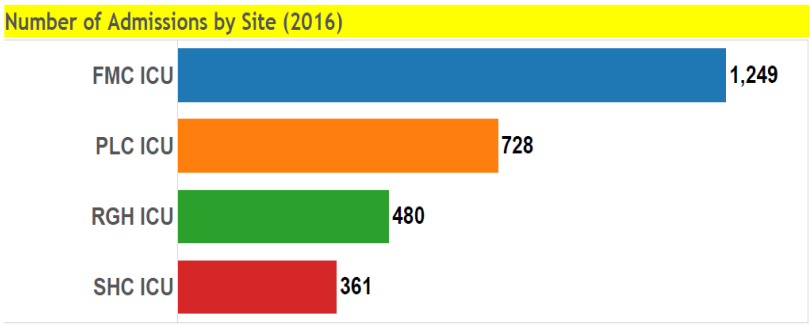
Adult critical care is provided in five ICU's; the multi-system ICU's (MSICU) are located at each of the Calgary hospitals and one cardiovascular ICU (CVICU) for the management of post-operative heart patients is located at the FMC, and is medically administered and staffed by our Department. The FMC 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.

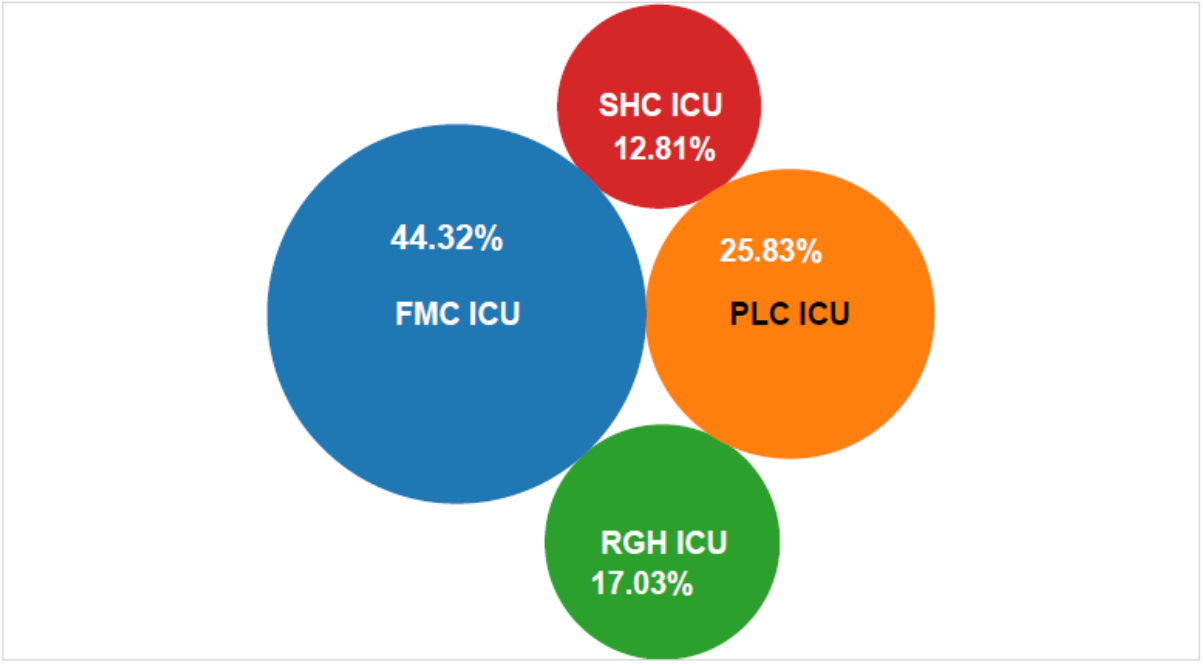
This process is facilitated by a flow map which is a joint initiative of the Department and RAAPID (see DCCM website). The key to the success of this process is for all participants and stakeholders to demonstrate the necessary flexibility as our Zonal and Provincial landscape changes.

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 2818 admissions in 2016 in the Departmental ICU's.



Percentage of Admissions by Site (2016)



Percentage of Class Admissions by Site(2016)

Class	FMC ICU	PLC ICU	RGH ICU	SHC ICU
MEDICAL	40.27%	74.73%	78.96%	82.27%
NEURO	18.98%	1.65%	2.08%	2.77%
SURGICAL	23.46%	22.25%	17.50%	13.85%
TRA_WITH_HINJURY	8.49%	0.14%	0.21%	0.00%
TRA_WO_HINJURY	7.93%	0.14%	0.42%	0.28%
UNKNOWN	0.88%	1.10%	0.83%	0.83%

% of Total Admissions for each Class broken down by Site. Color shows details about Site. Percents are based on each column of the table.

Site
- FMC ICU
- PLC ICU
- RGH ICU
- SHC ICU

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.

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 > 5L/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.

During the reporting period of January 01, 2016 to December 31st, 2016, our ICU Outreach Teams have responded to 1793 Code 66 calls which translate to approximately 149 calls per month. The vast majority of patients remain on their respective nursing units with about 18% requiring transfer to one of our ICUs. The most common reason for the team activation is a decrease in patient level of consciousness (54.13%) followed by respiratory distress (36%). They also completed 4,420 follow-up visits with patients after being discharged from ICU, experiencing a code 66 or a code blue. Planned changes to a model of rapid response team are presented elsewhere in this report.

The vision of the *e*Critical Alberta Project (formerly the Critical Care Clinical Information System (CCCIS) 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 – *e*Critical 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, *e*Critical Alberta requires two key components – a bedside clinical information system (MetaVision) and a data warehouse (TRACER). *e*Critical 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.

IV. 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 V. Workforce Planning

Ongoing Matters and Plan of Action

ICU Outreach

Three main developments were emphasized in the ICU Outreach Program in 2016. Firstly, quarterly teleconferenced meetings were held with the Outreach physicians to facilitate appreciation of concerns, disseminate information, and attempt to support familiarity between physician members and enhance collegiality.

Secondly, following adoption by the ICU Executive Committee to proceed with transitioning the ICU Outreach Program from a Medical Emergency Team (MET) – a physician-led format – to that of a ramp-up Rapid Response Team (RRT) – an RN/RT dyad as first-responders – the Executive Committee was dissolved and two more focused committees established. The ICU Outreach Operations Committee concerned itself with routine policy and procedure, governmental concerns and the multi-disciplinary ICU Outreach Working Group was established to develop the infrastructure to support the concepts, introduction, and functioning of the proposed RRT.

Thirdly, an Outreach Educator was appointed to consolidate and direct the education and enhance the clinical skills of Outreach RNs and RTs; some 70% of Outreach RNs and 65% of Outreach RTs have attended at least one full-day multi-faceted skills day in 2016. This is the first phase in developing the enhanced skills necessary to support the transition of Outreach from a MET to an RRT.

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.

V. Workforce Planning

Summary of Recruitment

New Academic Department Members in Critical Care Medicine in 2016:

Dr. Kirsten Fiest, PhD, Assistant Professor
Dr. Jeanna Parsons Leigh, PhD, Research Assistant Professor
Dr. Dean Yergens, PhD, Adjunct Assistant Professor
Dr. Andrea Soo, PhD, Adjunct Assistant Professor

The following physicians were promoted in 2016:

Dr. Carla Chrusch- Clinical Associate Professor

The following vacant positions were filled in 2016:

- Intensivist/Clinical Implementation Scientist- Dr. Daniel Niven
- Intensivist/Academic Chronic Disease Epidemiologist- Dr. Kirsten Fiest

The following recruitment positions were approved during this year

- 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.

VI. 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. Changes to the rapid response team approach to outreach services.
4. 4. Delirium collaboration in association with the Critical Care Strategic Clinical Network.

VII. Grants and Publications

Department of Critical Care Medicine Research Grants

Granting Agency	Title of Project	Period of Support	Funds Received
Alberta Science and Research Authority (ASRA), Canadian Foundation for Innovation (CFI), University of Calgary Dr. Dan Zuege Role: Co-Investigator	Critical care epidemiologic and biologic tissue bank resource (CCEPTR) for infection and inflammation in the ICU	2009 - present	$0
Alberta Innovates - Health Solutions (AIHS), Edmonton, Alberta Dr. Tom Stelfox Role: Principal Investigator	Developing quality indicators to measure the quality and safety of trauma care	2010 - 2017	$1,175,000
SAGE Products Inc Dr. Dan Zuege Role: Principal Investigator	Implementation and evaluation of revised protocols for oral hygiene for mechanically ventilated patients in Alberta Health Services Calgary	2010 - Present	$49,836
Canadian Institutes of Health Research (CIHR) Dr. Paul Kubes Role: Principal Investigator	Role of endothelial, platelet, parenchymal and leukocyte TLRs in vascular dysfunction	2012 - 2017	$154,132 per year
NVIDA Academic Partnership Program – Equipment Donation Dr. Chip Doig Role: Principal Investigator	Automated Epidemiological Analysis Utilizing Nvidia Telsa Technology	2012 - present	$5,000.00
Spectral Diagnostics (US), Inc. Dr. Brent Winston Role: Principal Investigator Dr. Paul Boucher Role: Co-Investigator	Evaluating the Use of Polymyxin B Hemoperfusion in a Randomized Controlled Trial of Adults Treated for Endotoxemia and Septic Shock (Euphrates Trial)	2012 - present	$18,512 per patient
EMS Foundation Dr. Chip Doig Role: Principal Investigator	EMS Systems and Paramedic Care: Because you never know…	2013 - 2016	$100,000
Alberta Innovates - Health Solutions (AIHS) Dr. Paul Kubes Role: Principal Investigator	Invariant NKT cells as the link between brain injury and susceptibility to infections	2013 - 2016	$250,000 per year
Alberta Innovates - Health Solutions (AIHS) Dr. Brent Winston Role: Co-Principal Investigator	Treatment of cholesterol-dependent pulmonary surfactant dysfunction	2013 - 2016	$699,000 over 3 years
Public Health Agency of Canada (PHAC) Dr. Tom Stelfox Role: Co-Investigator	A Pilot Study to Ascertain the Use of Intensive Care Units as an Option for the Surveillance of Severe Respiratory Illness (SRI) in Canada	2013 - 2017	$12,000

GlaxoSimthKline Dr. Chip Doig, Dr. Tom Stelfox & Dr. Juan Posadas Role: Site Principal Investigators Dr. Dan Zuege & Dr. Brent Winston Role: Co-Investigator	Nutritional adequacy therapeutic enhancement in the critically ill: A randomized double blind, placebo-controlled trial of the motilin receptor agonist GSK962040. The NUTRIATE Study	2013 - 2017	$154,270
Sunnybrook Health Sciences Centre Dr. Tom Stelfox Role: Co-Investigator	Optimizing Duration of Antibiotic Therapy For Bloodstream Infections in Critically Ill Patients	2013 - 2017	$8,000
Asahi Kasei Pharma America Corp. Dr. Chip Doig & Dr. Luc Berthiaume Role: Site Principal Investigators Dr. Dan Zuege, Dr. Brent Winston & Dr. Paul Boucher Role: Co-Investigator	A randomized, double-blind. Placebo-controlled, phase 3 study to assess the safety and efficacy of ART-123 in subjects with severe sepsis and coagulopathy	2013 - 2018	$12,000 per patient
Canadian Institutes of Health Research (CIHR) Café Scientifique Program Dr. Tom Stelfox Role: Principal Investigator	Engaging the Public to Establish Priorities for Research and Innovation in Critical Care Medicine	2013 - 2018	$5,583
Alberta Innovates – Health Solutions Dr. Tom Stelfox Role: Co-lead	W21C: Interdisciplinary Research and Innovation for Health System Quality and Safety	2013 - 2018	$4,679,601
Calgary Health Trust Dr. Craig Jenne Role: Principal Investigator	Start-up Funding	2013 - 2020	$300,000
Cubist Pharmaceuticals Inc. Dr. Paul Boucher & Dr. Dan Zuege Role: Principle Investigator Dr. Brent Winston Role: Co-Investigator	A phase 3 randomized double-blind study comparing TR -701 FA and Lenezolid in ventilated Gram-positive nonsocomial pneumonia	2013 - present	$12,000 per patient
Canadian Institutes of Health Research (CIHR) Dr. Andreas Kramer Role: Site Investigator	Early Determination of Neurological Prognosis in ICU patients with Severe Traumatic Brain Injury: TBI-Prognosis Multicenter Prospective Study	2013 - present	$2,100 per patient
Alberta Innovates - Health Solutions Partnership for Research and Innovation in the Health System (PRIHS) Dr. Tom Stelfox Role: Co-Principal Investigator Dr. Chip Doig, Dr. Luc Berthiaume, Dr. Paul Boucher & Dr. Dan Zuege Role: Co-Investigator	Identifying and Evaluating Intensive Care Unit Capacity Strain in Alberta	2014 - 2017	$743,818

Alberta Innovates - Health Solutions Partnership for Research and Innovation in the Health System (PRIHS) Dr. Tom Stelfox Role: Principal Investigator Dr. Chip Doig, Dr. Dan Zuege, Dr. Dan Niven & Dr. Paul Boucher Role: Co-Investigator	Reassessing Practices in the Daily Care of Critically Ill Patients: Building Capacity and Methodology to Identify and Close Evidence Care Gaps	2014 - 2018	$748,790
Technology Evaluation in the Elderly (TVN) 2013 Core Grant Program Dr. Tom Stelfox Role: Principal Investigator Dr. Dan Zuege & Dr. Daniel Niven Role: Co-Investigator	Reengineering the Discharge of Elderly Patients from Intensive Care	2014 - 2016	$589,573
Canadian Intensive Care Foundation Dr. Daniel Niven Role: Principal Investigator Dr. Tom Stelfox Role: Co-Investigator	The Adoption and De-adoption of Intensive Insulin Therapy Among Critically Ill Adults	2014 - 2016	$14,675
Brain Canada Technology and platform grant Dr. Brent Winston Role: Co-Investigator	A National biobank and database for patients with traumatic brain injury	2014 - 2017	~1.5 million $980,000 + matched funds
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox, Dr. Dan Niven Site Investigator Dr. Chip Doig, Dr. Jonathon Gaudet, Dr. Juan Posadas Role: Co-Investigator	STandard versus Accelerated initiation of Renal Replacement Therapy in Acute Kidney Injury (STARRT-AKI)	2014 - 2018	$220,996
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Paul Kubes Role: Principal Investigator	Intravascular immunity in chronic inflammatory lung disease	2014 - 2019	$500,000 per year
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Paul Kubes Role: Principal Investigator	Neutrophil and monocyte roles in sterile inflammation and repair of vessels and tissue	2014 - 2019	$199,805 per year
NVIDA Academic Partnership Program – Equipment Donation Dr. Chip Doig Role: Principal Investigator	Automated Epidemiological Analysis Utilizing Nvidia Telsa Technology	2015 - 2016	$3,500 USD
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co- Investigator	Bacteremia Antibiotic Length Actually Needed for Clinical Effectiveness (BALANCE): A Randomized Controlled Trial.	2015 - 2016	$100,000

2015 CCSCN New Investigator Seed Grant Dr. Selena Au Role: Principal Investigator Dr. Amanda Roze des Ordons & Dr. Tom Stelfox Role: Co-Investigator	Determining best practices for family participation in Intensive Care Unit rounds	2015 - 2017	$22,400
2015 MSI Foundation Grant Dr. Selena Au Role: Principal Investigator Dr. Amanda Roze des Ordons & Dr. Tom Stelfox Role: Co-Investigator	Determining best practices for patient and family participation in Intensive Care Unit rounds	2015 - 2016	$98,000
Canadian Institutes of Health Research (CIHR) Industry-partnered Collaborative Research Grant Dr. Craig Jenne Role: Co-Applicant	Pathogenesis of Hepatitis B Virus Infection in Non-Alcoholic Fatty Liver Disease	2015 - 2016	$228,747 + $240,00 (from GSK)
Technology Evaluation in the Elderly (TVN) Dr. Dan Zuege Role: Principal Investigator Dr. Tom Stelfox Role: Co-Investigator	Province-Wide Implementation of the Clinical Frailty Scale in a Electronic Medical Record System (eCritical) in Alberta	2015 - 2016	$99,999.79
Critical Care Strategic Clinical Network New Investigator Seed Funding Competition (with matching funds from Department of Critical Care Medicine, University of Calgary) Dr. Daniel Niven Role: Principal Investigator Dr. Tom Stelfox Role: Co-Investigator	The Reversal of Clinical Practice in Critical Care Medicine: A Systematic Review.	2015 - 2016	$19,205.60
Canadian Institutes of Health Research (CIHR) Dr. Chip Doig Role: Principal Investigator Dr. Andreas Kramer, Dr. Paul Boucher, Dr. Phillipe Couillard Role: Co-Investigator	1. Death Prediction and Physiology after removal of therapy (DePPaRT)	2015 - 2017	$307.50 per patient
Heart and Stroke Foundation of Canada Dr. Paul Kubes Role: Principal Investigator	Neutrophil Extravascular Traps (NETs) in Blood Vessel	2015 - 2017	$199,950
Canadian Cancer Society Research Institute (CCSRI) Innovate Grant Dr. Craig Jenne Role: Co-Principal Investigator	Understanding oncolytic virus delivery using intravital imaging	2015 - 2017	$200,000

Alberta Innovates – Health Solutions, Partnership for Research and Innovation in the Health System (PRIHS) Dr. Tom Stelfox Role: Co-Investigator	Family Integrated Care (FICare) in Level II NICUs: An Innovative Program for Alberta	2015 - 2018	$750,000
Leading Biosciences Inc. Dr. Dan Zuege and Dr. Chip Doig Role: Site Principal Investigator	Treatment of Septic Shock by Inhibiting Auto-digestion and Preserving Gut Integrity with Enteric LB1148 (SSAIL Study)	2015 - 2018	$10,000 per patient
NHMRC Partnership Grant APP1092499 Dr. Tom Stelfox Role: Co-Investigator	Evidence to change policy and improve outcomes in children suffering major injury	2015 - 2019	$501,694 AUS
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co-Investigator	STandard versus Accelerated Renal Replacement Therapy for Acute Kidney Injury	2015 - 2019	$1,608,568
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co-Investigator	STandard versus Accelerated initiation of Renal Replacement Therapy in Acute Kidney Injury (STARRT-AKI)	2015 - 2019	$1,104,971
Canadian Institutes of Health Research (CIHR) Foundation Scheme Dr. Tom Stelfox Role: Co-Investigator	Better Prediction and Decision Support Tools to Improve Care and Outcomes for Patients with Acute Kidney Injury (AKI)	2015 - 2020	$855,842
NSERC Discovery Grant Dr. Craig Jenne Role: Principal Investigator	Development of Imaging Approaches to Study Coagulation In Vivo	2015 - 2020	$160,000
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co-Investigator Dr. Chip Doig Role: Site Co-Investigator	A RandomizEd trial of ENtERal Glutamine to minimize thermal injury: (The RE-ENERGIZE Study)	2015 - 2020	$2,500/patient
Canadian Institutes of Health Research (CIHR) Dr. Paul Kubes Role: Principal Investigator	The interplay between subtypes of neutrophils, monocytes, (July) macrophage, iNKT cells and platelets in infection, sterile injury and metastasis in the liver and other organs	2015 - 2022	$4,397,112
Technology Value Network (Centres of Excellence of Canada) Dr. Dan Zuege Role: Principal Investigator	Measuring Clinical Frailty in an Electronic Medical Record System: a Tool to Guide Clinical Care, Quality Improvement and Research	2015 - present	$100,000.00

Genetech Dr. Luc Berthiaume Dr. Chip Doig Role: Site Principal Investigator Dr. Paul Boucher, Dr. Andreas Kramer, Dr. Phillipe Couillard, Dr. Ken Parhar, Dr. Jason Lord, Dr. Jonathon Gaudet, Dr. Dan Niven Role: Co-investigator	Phase 2 randomized, double-blind placebo-controlled trial of MHAA4549A, a monoclonal antibody in combination with oseltamivir versus oseltamivir for treatment of severe influenza infection	2015 - present	$122,732
La Jolla Pharmaceutical Company Dr. Chip Doig, Dr. Selena Au, Dr. Carla Chrusch Role: Site Investigator Dr. John Kortbeek, Dr. Paul McBeth, Dr. Juan Posadas, Dr. Amanda Roze des Ordons, Bryan Yipp	Phase 3, Placebo-Controlled, Randomized, Double-Blind, Multi-Center Study of LJPC-501 in Patients with Catecholamine-Resistant Hypotension (CRH) (Angiotensin Study)	2016-2017	$7,500.00/ patient
Critical Care Strategic Clinical Network 2016 New Investigator Seed Funding Dr. Thomas Stelfox Role: Co-Investigator	A Modified Delphi Process to Identify, Rank and Prioritize Quality Indicators in Continuous Renal Replacement Therapy (CRRT) Care in Critically Ill Patients	2016-2017	$9,850
Critical Care Strategic Clinical Network 2016 New Investigator Seed Funding Dr. Kirsten Fiest Role: Principal Investigator Dr. Thomas Stelfox Role: Co-Investigator	The Epidemiology of Hypoactive Delirium in the Critically Ill.	2016-2017	$10,000
Critical Care Strategic Clinical Network 2016 New Investigator Seed Funding Dr. Jeanna Parsons-Leigh Role: Principal Investigator Dr. Thomas Stelfox Role: Co-Investigator	Developing a Framework for the De-Adoption of Low-Value Clinical Practices in Acute Care Facilities	2016-2017	$10,250
Alberta Innovates- Health Solutions Community Engagement and Conference Grant Dr. Jeanna Parsons-Leigh Role: Principal Investigator Dr. Thomas Stelfox Role: Co-Investigator	Engaging the Public in the Development of a Family-Partnered Care Pathway for Critically Ill Older Adults,	2016-2017	$5,000
Technology Evaluation in the Elderly 2015 Catalyst Grant Program Dr. Thomas Stelfox Role: Principal Investigator	Reengineering the Discharge of Elderly Patients from Intensive Care: Pre-Clinical Evaluation of a Tool Kit	2016-2017	$99,938
Clinical Research Fund Grant, University of Calgary Dr. Thomas Stelfox Role: Principal Investigator	A Retrospective Cohort Study to Describe the Characteristics and Outcomes of Patients Discharged from Hospital in Alberta Directly from the Intensive Care Unit	2016-2017	$10,000

Planning and Dissemination Grant- Institute Community Support, Canadian Institutes of Health Research Dr. Jeanna Parsons-Leigh Role: Principal Investigator Dr. Thomas Stelfox Role: Co-Investigator	Establishing Stakeholder Research Priorities for the Development and Evaluation of Caregiver-Mediated Interventions in the Care of Critically Ill Older Patients	2016-2017	$19,992
M.S.I Foundation Dr. Amanda Roze des Ordons Role: Principal Investigator Dr. Thomas Stelfox Role: Co-Investigator	Identifying Spiritual Distress in Families of ICU Patients: The INSPIRE Study.	2016-2018	$96,000
Department of Critical Care Medicine, University of Calgary Dr. Kirsten Fiest Role: Principal Investigator	New Investigator Start-up Funds	2016-2018	$65,000
O'Brien Institute for Public Health, University of Calgary Dr. Kirsten Fiest Role: Principal Investigator=	New Investigator Start-up Funds	2016-2018	$15,000
M.S.I Foundation Dr. Jeanna Parsons- Leigh Role: Principal Investigator Dr. Thomas Stelfox Role: Co-Investigator	Developing a Framework for the De-Adoption of Low-Value Clinical Practices in Acute Care Facilities	2016-2018	$99,196
Canadian Institutes of Health Research Dr. Thomas Stelfox Role: Co-Investigator	Relaxation for critically ill Patient Outcomes and Stress-coping Enhancement (REPOSE): Clinical Trial of an Integrative Intervention to improve critically ill patients' delirium and related outcomes	2016-2018	$187,302
Clinical Research Fund 2016, University of Calgary Dr. Kirsten Fiest Role: Principal Investigator Dr. Thomas Stelfox Role: Co-Investigator	Validating screening tools for delirium subtypes in the critically ill	2016-2018	$20,000
Canadian Institutes of Health Research Dr. Thomas Stelfox Role: Co-Investigator	Evaluation of the association between hospital resource use intensity and quality of care in a trauma system.	2016-2019	$390,000

Canadian Institutes of Health Research Dr. Thomas Stelfox Role: Co-Investigator	InCURS: Intensive Care Unit Residents Scheduling Study	2016-2019	$100,000
Team Grant – Late Life Issues, Canadian Institutes of Health Research Dr. Thomas Stelfox Role: Principal Investigator Dr. Jeanna-Parsons Leigh, Dr. Kirsten Fiest, Selena Au, . Roze des Ordons Role: Co-Investigator	Development and Evaluation of a Family-Partnered Care Pathway for Critically Ill Older Patients	2016-2020	$1,388,754
Canadian Institutes of Health Research Embedded Clinician Researcher Salary Award Dr. Thomas Stelfox Role: Principal Investigator	Reengineering Discharge from the Intensive Care Unit	2016-2020	$300,000
Canadian Association of General Surgeons - Canadian Surgical Research Fund Dr. Paul McBeth Role: Principal Investigator	Characterization of Early Coagulopathy in Trauma Patients with Massive Hemorrhage Using Rotational Thrombelastography.	2016 - present	$100,000
Department of Surgery Research and Education Development Fund Dr. Paul McBeth Role: Co-Principal Investigator	Evaluation of Coagulation Abnormalities in the Trauma Patient: Point-of- Care Thrombelastography.	2016-present	$100,000
SAHaRA Study Dr. Andreas Kramer Role: Site Principal Investigator Dr. Phillipe Couillard Role: Co-Investigator	Aneurysmal SubArachnoid Hemorrhage - Red Blood Cell Transfusion And Outcome (SAHaRA Study)	2016-2100	
Technology Value Network (Centres of Excellence of Canada) Dr. Dan Zuege Role: Co-Investigator	Reengineering the Discharge of Elderly Patients from Intensive Care: Pre-Clinical Evaluation of a Tool Kit	2016-present	$99,938
Lyric Pharmaceutics Inc Dr. Dan Zuege Role: Site Investigator	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	2016-present	
Sunnybrook Health Sciences Centre Dr. Thomas Stelfox Role: Site Investigator Dr. Chip Doig Role: Co-Investigator	Bacteremia Antibiotic Length Actually Needed for Clinical Effectiveness (BALANCE): A Pilot Randomized Controlled Clinical Trial	2016-2021	$1500.00 per patient
Canadian Institutes of Health Research Dr. Thomas Stelfox Role: Co-Investigator 2.	3. The Canadian Trauma Systems Improvement Program (CTSIP): Improving injury care across the continuum	2016-2022	$832,646

The Medical Council of Canada Research in Clinical Assessment Grant Competition 2016. Ko J, Fyles G, Lim H, Shenkier T, McKenzie M, Ballard M, Chen C, Simon J, Henning W, Roze des Ordons A.	The advance care planning clinical evaluation exercise (ACP-CEX): Development and pilot study of an assessment tool to evaluate advance care planning discussions between oncology patients and resident trainees.	2016	$17,300.
Heart and Stroke Foundation of Canada PI: Craig Jenne	The Role of Platelet Activation in Pathogen-Induced Coagulopathy	2016-2019	$284,735

Department of Critical Care Medicine Research Publications/Presentations

Peer Reviewed Manuscript

January 2016

1. Kramer AH, Deis N, Ruddell S, Couillard P, Zygun DA, Doig CJ, Gallagher C. Decompressive Craniectomy in Patients with Traumatic Brain Injury: Are the Usual Indications Congruent with Those Evaluated in Clinical Trials? Neurocrit Care 2016 Jan 5. 10.1007/s12028-015-0232-8. Impact Factor 2.44.
2. Mirsaeidi M, Banoei MM, Winston BW, Schraufnagel DE. Reply: Metabolomics and Mycobacterial Disease: Don't Forget the Bioinformatics. Ann Am Thorac Soc. 2016 Jan;13(1):142-3. doi: 10.1513/AnnalsATS.201510-711LE.
3. Bobrovitz N, Santana MJ, Kline T, Kortbeek J, Widder S, Martin K, Stelfox HT. Multicenter Validation of the Quality of Trauma Care Patient-Reported Experience Measure (QTAC-PREM). J Trauma Acute Care Surg. 2016 Jan;80(1):111-8. doi: 10.1097/TA.0000000000000879.
4. Moore L, Evans D, Hameed M, Yanchar N, Stelfox HT, Simons R, Kortbeek J, Bourgeois G, Clément J, Turgeon AF, Nathens A. Mortality in Canadian trauma systems: a multicenter cohort study. Annals of Surg. 2016 Jan 7. [Epub ahead of print]
5. Patten SB, Williams JVA, Lavorato DH, Bulloch AGM, Fiest KM, Wang JL, Sajobi T. Seasonal Variation in MDE Prevalence in Canada. Epidemiol Psychiatr Sci. 2016 Jan 11:1-8. [Epub ahead of print].
6. Atta CA, Fiest KM, Frolkis AD, Jette N, Pringsheim T, St Germaine-Smith C, Rajapakse T, Kaplan GG, Metcalfe A. Global Birth Prevalence of Spina Bifida by Folic Acid Fortification Status: A Systematic Review and Meta-Analysis.Am J Public Health. 2016 Jan;106(1):e24-34. doi: 10.2105/AJPH.2015.302902.
7. Mah JK, Korngut L, Fiest KM, Dykeman J, Day LJ, Pringsheim T, Jette N. A Systematic Review and Meta-analysis on the Epidemiology of the Muscular Dystrophies. Can J Neurol Sci. 2016 Jan;43(1):163-77. doi: 10.1017/cjn.2015.311.
8. Fiest KM, Walker JR, Bernstein CN, Graff LA, Zarychanski R, Abou-Setta AM, Patten SB, Sareen J, Bolton JM, Marriott JJ, Fisk JD, Singer A, Marrie RA; CIHR Team Defining the Burden and Managing the Effects of Psychiatric Comorbidity in Chronic Immunoinflammatory Disease. Systematic review and meta-analysis of interventions for depression and anxiety in persons with multiple sclerosis. Mult Scler Relat Disord. 2016 Jan;5:12-26. doi: 10.1016/j.msard.2015.10.004.

February 2016

9. Guichon J, Alakija P, Doig C, Mitchell I, Thibeault P. Scrupulous monitoring of physician-assisted dying: The case for mandatory reporting to coroners and medical examiners of all physician-assisted deaths in Canada. Health Law in Canada. Feb 2016. 36(3) 99-120.
10. Cleary S, Doucette K, Doig CJ, Coffin CS, Grant D, Dixon E. Canadian Association of General Surgeons Position Statement: Recommendations for Surgeons with Blood Borne communicable diseases. Can J Surg, 2016 Feb 1. 59(1):7615. doi: 10.1503/cjs.007615. Impact Factor 1.62.
11. Daneman N, Rishu AH, Xiong W, Bagshaw SM, Dodek P, Hall R, Kumar A, Lamontagne F, Lauzier F, Marshall J, Martin CM, McIntyre L, Muscedere J, Reynolds S, Stelfox HT, Cook DJ, Fowler RA; Canadian Critical Care Trials Group Committee Members. Duration of Antimicrobial Treatment for Bacteremia in Canadian Critically Ill Patients. Crit Care Med. 2016 Feb;44(2):256-64. doi: 10.1097/CCM.0000000000001393.
12. Maharaj R, Stelfox HT. Rapid response teams improve outcomes: no. Intensive Care Med. 2016 Apr;42(4):596-8. doi: 10.1007/s00134-016-4246-2. Epub 2016 Feb 5.

13. Tricco A, Lillie E, Zarin W, O'Brien K, Colquhoun H, Kastner M, Levac D, Ng C, Sharpe J, Wilson K, Kenny M, Warren R, Wilson C, Stelfox HT, Straus S. A scoping review on the conduct and reporting of scoping reviews. BMC Med Res Methodol. 2016 Feb 9;16(1):15. doi: 10.1186/s12874-016-0116-4.
14. Fiest, KM*, Marrie, RA, Jette, N & Bennett, DK. The Standards of Reporting of Neurologic Disorders (STROND) checklist: Application to Multiple Sclerosis. Mult Scler. 2016 Feb 26. pii: 1352458516634873. [Epub ahead of print]

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15. Delaney JW, Pinto R, Long J, Lamontagne F, Adhikari NK, Kumar A, Marshall JC, Cook DJ, Jouvet P, Ferguson ND, Griesdale D, Burry LD, Burns KE, Hutchison J, Mehta S, Menon K, Fowler RA; Canadian Critical Care Trials Group H1N1 Collaborative. The influence of corticosteroid treatment on the outcome of influenza A(H1N1pdm09)-related critical illness. Crit Care. 2016 Mar 30;20:75. doi: 10.1186/s13054-016-1230-8.
16. Shahan CP, Magnotti LJ, McBeth PB, Weinberg JA, Croce MA, Fabian TC. Early antithrombotic therapy is safe and effective in patients with blunt cerebrovascular injury and solid organ injury or traumatic brain injury. J Trauma Acute Care Surg. 2016 Mar 28.
17. Berrigan, LI, Fisk, JD, Patten, SB, Tremlett, H, Wolfson, C, Warren, S, Fiest, KM, McKay, K & Marrie, RA for the CIHR Team in the Epidemiology and Impact of Comorbidity on Multiple Sclerosis (ECOMS). Health-Related Quality of Life in Multiple Sclerosis: Direct and Indirect Effects of Comorbidity. Neurology. 2016 Mar 9. pii: 10.1212/WNL.0000000000002564. [Epub ahead of print]
18. Kirkpatrick AW, McKee I, McKee JL, Ma I, McBeth PB, Roberts DJ, Wurster CL, Parfitt RJ, Ball CG, Oberg S, Sevcik W, Hamilton DR. Remote just-in-time telementored trauma ultrasound: a double factorial randomized controlled trail examining fluid detection and remote knobology control through an ultrasound graphic user interface. The American Journal of Surgery. Am J Surg. 2016 Mar 10.
19. Ball CG, Campbell A, Grondin SC, Dixon E, DuBose J, McBeth PB, Lall R. Use of a novel saline/bipolar radiofrequency energy instrument as an adjunct for arresting ongoing solid organ surface and laceration bleeding in critically injured patients. Injury. 2016 Mar 18.
20. Fiest, KM, Patten, SB, Fisk, JD, Tremlett, H, Wolfson, C, McKay, K, Berrigan, L, Warren, S & Marrie, RA for the CIHR Team in the Epidemiology and Impact of Comorbidities on Multiple Sclerosis (ECOMS). Fatigue and comorbidities in multiple sclerosis. Int J MS Care. 2016 Mar-Apr;18(2):96-104. doi: 10.7224/1537-2073.2015-070.
21. Lost: Young Canadian physician-scientists need a map. Lewinson RT, Keough MB, Beck PL, Hollenberg MD, Yipp BG. Sci Transl Med. 2016 Mar 9;8(329):329fs6. Corresponding Author.

April 2016

22. Roze des Ordons A, Doig C. From communication skills to skillful communication - a longitudinal integrated curriculum for critical care fellows. Academic Medicine, In Press, April 2016.
23. Wang, J, Kubes, P. Body Cavity Macrophage: A Reservoir of Mature Macrophage that can Rapidly Invade Visceral Organs to Affect Repair. Cell. April 21, 2016 (165) 1-11. Doi: 10.1016/j.cell.2016.03.009.
24. Prisnie J, Fiest KM, Coutts SB, Patten SB, Atta C, Blaikie L, Bulloch AGM, Demchuk A, Hill MD, Smith EE, Jette N. Validating Screening Tools for Depression in Stoke and TIA Patients. Int J Psychiatry Med. 2016 Apr; 51(3):262-77. doi: 10.1177/0091217416652616.

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May 2016

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36. Ball IM, Bagshaw SM, Burns KE, Cook DJ, Day AG, Dodek PM, Kutsogiannis DJ, Mehta S, Muscedere JG, Stelfox HT, Turgeon AF, Wells GA, Stiell IG. A clinical prediction tool for hospital mortality in critically ill elderly patients. J Crit Care. 2016 Jun 7;35:206-212. doi: 10.1016/j.jcrc.2016.05.026.
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41. B. Surewaard, J. Deniset, F. Zemp, M. Amrein, M. Otto, J. Conly, A. Omri, R.M. Yates, and P. Kubes. Identification and treatment of the Staphylococcus aureus reservoir in vivo. The Journal of Experimental Medicine. 2016 Jun 27;213(7):1141-51. doi: 10.1084/jem.20160334. Epub 2016 Jun 20. PMID: 27325887
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