



2020 Annual  
Report  
Calgary Zone



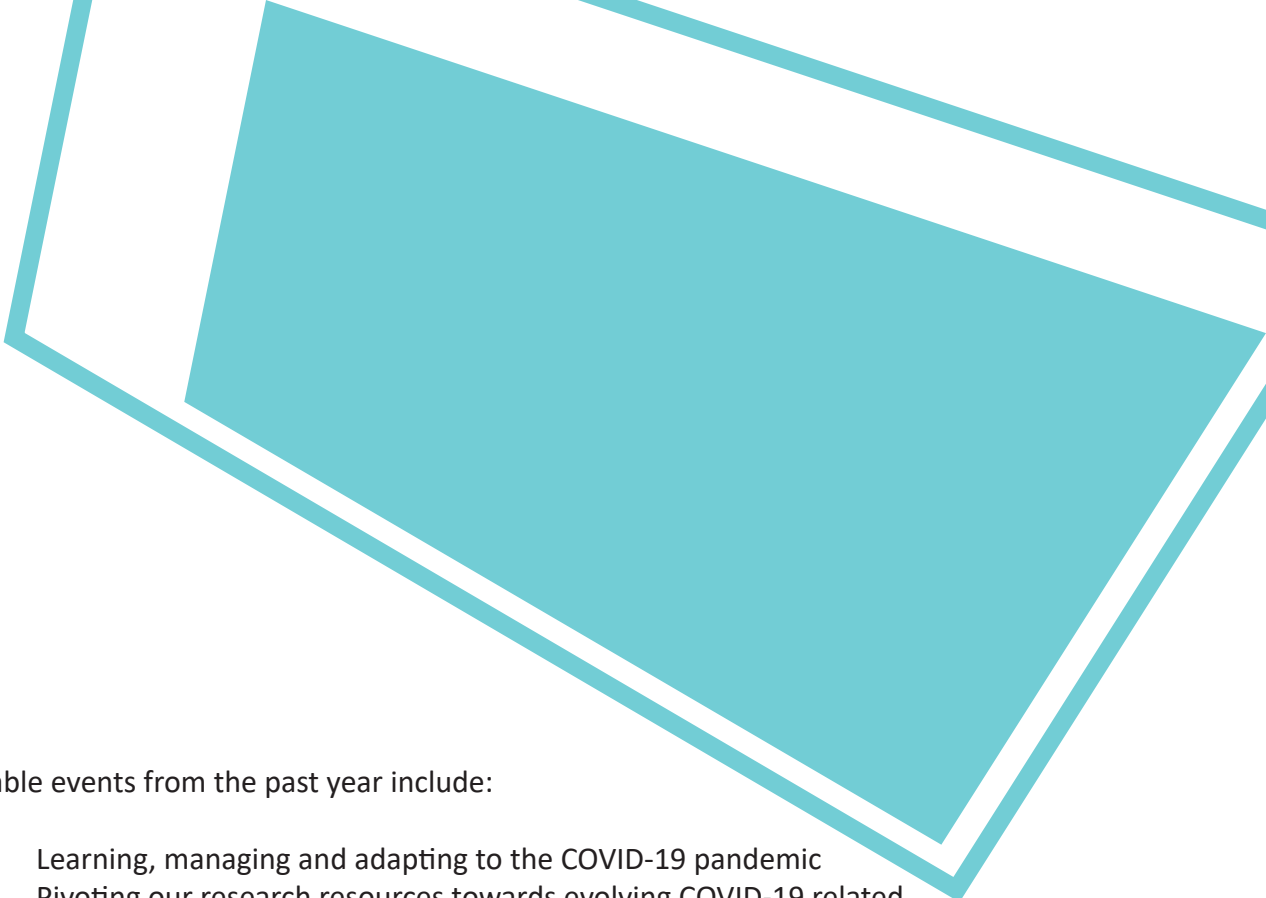
Department of  
Critical Care Medicine  
Calgary

## Message from the Department Head

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I'm pleased, on behalf of my recent predecessors, Drs. Tom Stelfox and Chip Doig, and the rest of my colleagues, to present our department's annual report for 2020. Herein we report on important work and accomplishments in addition to challenges we faced during this extraordinary pandemic year. As a clinical and academic department, we integrate clinical programs, education and research to deliver exceptional patient and family centred-care to critically ill patients in the Calgary Zone and associated referral area. Our greatest resources are always our people who are dedicated to the service of others.

A large teal graphic consisting of several overlapping, slightly offset rectangular shapes, creating a layered effect. It is positioned in the upper right quadrant of the page.

Notable events from the past year include:

- Learning, managing and adapting to the COVID-19 pandemic
- Pivoting our research resources towards evolving COVID-19 related clinical and basic science
- Adaptation of our educational program to support effective virtual delivery
- Evolution and initial funding for a neurocritical care fellowship program
- Establishment of an Equity, Diversity and Inclusion committee

Despite a continually evolving pandemic, our departmental members continue to lead critical care through their commitment to clinical care, education and research producing exceptional patient-and-family-centered care and continually advancing both the art and science of critical care.

Respectfully,

A handwritten signature in black ink, appearing to read 'Dan Zuege', with a long horizontal flourish extending to the right.

Dan Zuege MD, MSc, FRCPC

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# DCCM Strategic Plan

Focus Area:

## CLINICAL CARE



### Goal:

Exceptional patient care that uses best practices to optimize patient health outcomes.

### Objective:

Develop a framework for quality management.

### Activities:

1. Identify the needs of patients and the critical care team to optimize patient care and co-develop metrics to measure performance.

2. Develop a strategy to align clinical guidelines, pathways and performance metrics with current and future clinical information systems.

### Targets:

Develop clinical metrics by July 2020.

Develop and implement a clinical care review & feedback strategy by July 2021.



Focus Area:  
**EDUCATION**



**Goal #1:**

Successful transition of critical care medicine residency program to Competence By Design(CBD).

**Objective:**

Successful implementation of CBD transition plan.

**Activities:**

1. Train all physicians on the fundamentals of CBD and support them during the transition.

2. Evaluate effectiveness of the CBD program.

**Targets:**

Implement physician development sessions by July 2019.

2019      2020      2021      2022      2023      2024

Develop a local CBD evaluation plan by July 2021.

Develop & implement CBD metrics by July 2021.

**Goal #2:**

Professional development to support DCCM members pursuit of excellence.

**Objective:**

Continuous growth and development of members.

**Activities:**

1. Solicit feedback to inform professional development opportunities.

3. Foster a culture of growth.

2. Establish expectations for participation in professional development activities.

4. Incorporate educational activities into the accountabilities of all physicians and CSM faculty.

**Targets:**

Develop a plan to increase coaching and mentorship capacity by July 2021.

2019      2020      2021      2022      2023      2024

Professional growth plans are developed & reviewed regularly (yearly for physicians & CSM faculty).

Focus Area:  
**RESEARCH**



**Goal #1:**

Increase interdisciplinary research infrastructure.

**Objective:**

Maximize impact of departmental investments in research.

**Activities:**

1. Complete implementation of existing DCCM Clinical Research Strategic Plan.

3. Establish research fund development strategy.

2. Develop and implement a framework for prioritizing investments in research that leverage existing departmental strengths<sup>\*\*\*</sup>.

4. Support interprofessional research collaborations across departmental sites.

**Goal #2:**

Increase member capacity for research.

**Objective:**

Capacitate members to engage in research.

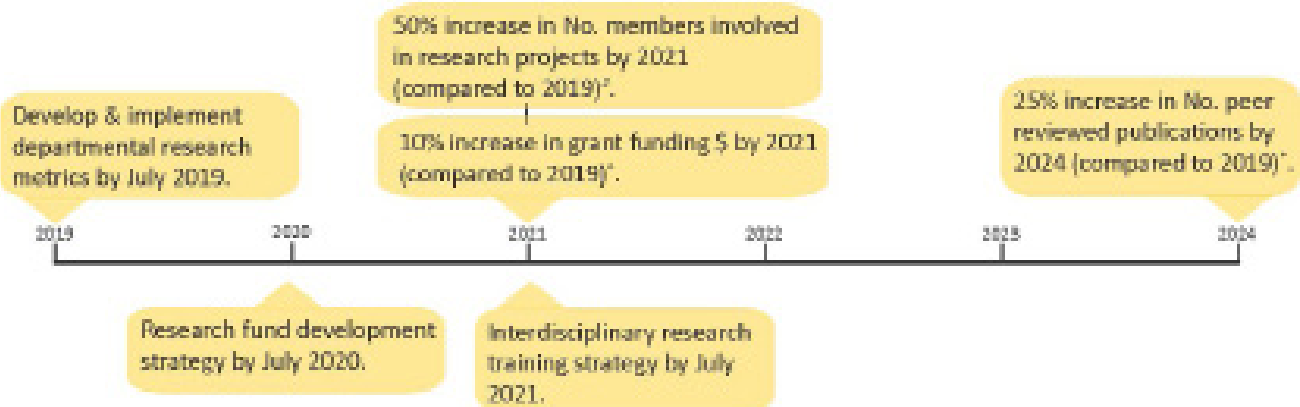
**Activities:**

1. Incorporate research activities into the accountabilities of all physicians and CSM faculty.

3. Develop an interdisciplinary research training strategy.

2. Encourage development of interdisciplinary research teams with synergistic interests and expertise.

**Targets:**



\* Number of publications with at least one DCCM member in the authorship list (no double counting for multiple DCCM authors)

\*\* Grant funding awarded to DCCM members as Nominated Principal Investigator or Principal Investigator (no double counting for multiple DCCM members)

\*\*\* Involvement in research spans a spectrum from identifying eligible patients, consenting eligible patients, being site Principal Investigator, to being a study Principal Investigator.

\*\*\*\* Immunology/inflammation, neurocritical care, medical education, health services research and recovery from critical illness.



Focus Area:  
**LEADERSHIP**



**Goal:**

Develop a Just Culture.

**Objective:**

Provide leadership and support for a Just Culture.

**Activities:**

1. Leadership communication to all members that patient and staff safety is a departmental priority.

2. Discuss quality of care at every ICU executive meeting and at unit meetings.

**Objective:**

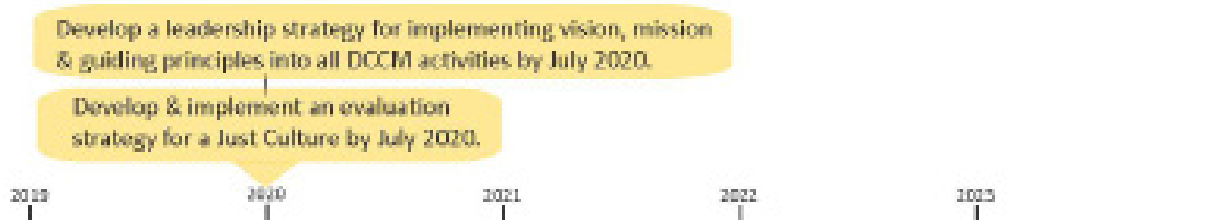
Align all quality assurance activities with Just Culture principles.

**Activities:**

1. Educate all members on the principles of Just Culture and their application to the department.

2. Task the Quality Assurance Committee to champion Just Culture principles that includes patient and team perspectives.

**Targets:**



2.AHS Just Culture philosophy supports an environment where everyone feels safe, encouraged, and enabled to discuss quality and safety issues where reporting and learning are key elements. This means that reporting is conducted within a psychologically safe environment where there is demonstrated respect and support for the individual, and the potential for human and systems fallibility is acknowledged. Everyone can trust that those within the organization will demonstrate, through their behaviours and decisions, a fair and consistent approach to responding to issues raised.



## AHS Vision

Healthy Albertans.  
Healthy Communities.  
**Together.**

## AHS Mission

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

## AHS 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.



## Cumming School of Medicine

### U of C Vision

Creating the future of social and health equity.

### U of C Mission

At the Cumming School of Medicine Office of Strategic Partnerships and Community Engagement, it is our mission to catalyze a social and health-equity oriented medical school by nurturing respectful relationship with diverse communities, collaboratively developing innovative models of engagement, informing curriculum and research, and co-designing initiatives for impact.

To engage with local, global and Indigenous communities to identify health inequities and foster a meaningful, co-creative response. To encourage active global citizenship, social accountability and a more inclusive view of health among students, staff and faculty by facilitating opportunities related to the social determinants of health. To innovate and create ethical partnerships with governments, academic institutions, providers, our internal community and communities worldwide in ways that advocate and promote greater health equity. To provide knowledge, operational guidance and evidence-based resources that enable and enhance social accountability initiatives within the CSM. To continually strengthen health equity across the communities we engage, by listening, learning and collaborating to ensure the future of health leads to improved health for all.

### U of C Mandate

- SUSTAIN and strengthen longitudinal community relationships
- DEVELOP document and showcase best practices for collaboration with external partners and communities
- FACILITATE equity-centred education, research and service
- INNOVATE policies, products, programmes and initiatives for social and health equity



Department of  
Critical Care Medicine  
Calgary

## DCCM Vision

Exceptional patient-and-family-centered critical care.

## DCCM Mission

We lead critical care medicine through our commitment to clinical care, education and research.

Our definition of critical care excellence is: best clinical outcomes, exceptional patient and family experience and zero preventable patient and staff harm.

## DCCM Values

**compassion** Multidisciplinary teamwork is evident in our clinical care, education and research

**accountability** Clear expectations and regular feedback.

**respect** DCCM is regarded by members to be a great place to work. We model professionalism.

**excellence** Nationally recognized for clinical care, education and research.

**safety** We report near misses and adverse events and focus on system improvement.

Over the next few years the annual report content will be migrated to the Department of Critical Care Medicine's external website. This website will continue to develop over time to ensure that it is a public resource with current information.

Accessing QR Code Content:

There are a few options for this;

1. Open/install a QR Code reader, scan the QR code
2. Use your phone camera as many have the ability to "scan" and link to the content from the camera



External Site

QR Codes  
=  
Additional content on the  
**external website**

# Our Year with COVID-19

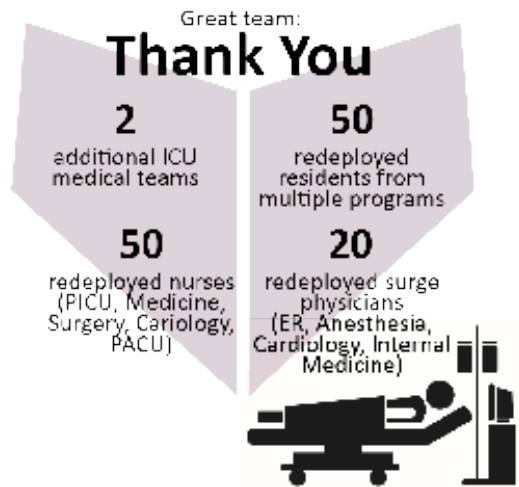
Our departments most significant challenge in 2020, indeed in the last decade, in common with many clinical areas and the world, was COVID-19.

The dedication, resilience and adaptability of our ICU staff and physicians has been truly remarkable, a key source of pride for our departmental leadership and members alike.

DCCM benefited substantially from the provincial approach to planning coordinated by the Critical Care SCN (development of surge plans and processes for inter-zonal load leveling; standardized care guideline; provincial coordination of ventilator and equipment resources; evolution of a critical care triage protocol...) – see CCSCN Section.

Though the COVID pandemic significantly interrupted a number of research programs, it also allowed many of our researchers to pivot their attention and successfully contribute to the rapid evolution of COVID-related science. For example:

- Understanding and managing the effects of COVID-19 restricted visitation policies on the families and healthcare providers of critically ill patients CIHR - \$298,769 PI: Drs. Kirsten Fiest, Jeanna Parsons Leigh, Tom Stelfox
- Awake Prone Position in Hypoxemic Patients with Coronavirus Disease 19 – CIHR \$1,089,20: PI Drs. Ken Parhar and Tom Stelfox
- Evaluation of patterns of inflammation and immune function in critically ill patients with COVID – multiple existing and new CIHR grants - Drs. Bryan Yipp, Braedon McDonald, Paul Kubes, Craig Jenne.



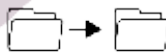
Adapted care efficiencies:

## Great ideas for the future

Equipment and space efficiency—moving IV pumps to room entry to allow access and conserve valuable PPE



Accelerated adaptation by physicians of electronic documentation tools

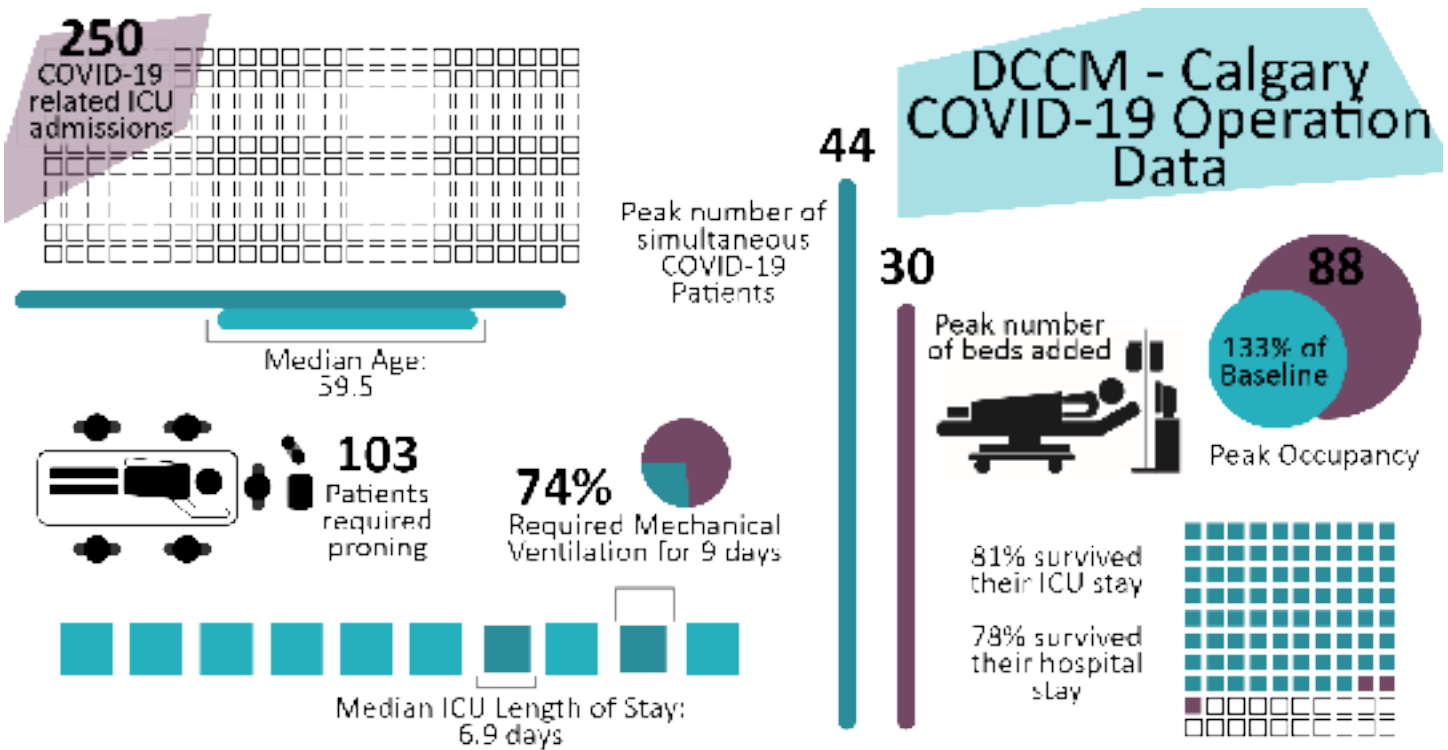


Streamlined documentation



Use of virtual tools to allow family contact with patients in the setting of restrictive visitation policies

At the end of 2020, the pandemic remained very active with further surges in critically ill patients with COVID infection. We continued to operate an additional 30 ICU beds over our usual baseline and continued to benefit from the help of redeployed staff and physicians to allow us to cope with the strain COVID has placed on our ICU system.



## Research

Despite many challenges faced by our research program, including a shift to working from home, two three-month intervals where all non-COVID-19 research was put on hold, and challenges with recruitment due to restricted visitation policies in the ICU, we were able to pivot and adapt to realize many successes. This includes over \$2M in COVID-19 research funding spread across the health services, biomedical, and clinical research programs in the form of CIHR funding and per-patient enrollment fees. The DCCM participated in or led six COVID-19 clinical trials across all four sites in Calgary. We continue to be a leader in providing the evidence that forms the basis for excellent clinical care.

## Communication

Zoom fatigue, isolation, stress, and blurring of work- life balance are only the tip of the iceberg on the communication and connection challenges we have all faced. Taking time is ok. Continue to communicate with your peers, family, and friends in anyway you feel you can.

The DCCM has done a fantastic job at transitioning staff to work from home, either part or full time, while finding ways to still connect with co-workers. Everyone should be proud of what they have done this past year.

Take time to reflect on the past year:

1. What are 5 things I am are proud of?
2. What are 5 things that challenged me?
3. In my day-to-day life what has changed? What is positive? What is challenging?
4. What did I do for the first time?
5. What is my greatest highlight?

# Accomplishments & Awards

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## Neurocritical Care Fellowship Training Program:

Congratulations to Julie Kromm, Andreas Kramer and Philippe Couillard for developing a proposal for a neurocritical care fellowship training program and securing initial funding to support the program. The goal is to launch the program July 1, 2021. This will make our Department the first centre in Canada to have a structured neurocritical care training fellowship program.

## GMS Journal for Medical Education for best article of 2020:

Dr. Jason Waechter received an award from GMS Journal for Medical Education for best article of 2020 for Quantifying the medical student learning curve for ECG rhythm strip interpretation using deliberate practice (GMS J Med Educ. 2019;36(4):Doc40).

## Grants Received:

- Ken Parhar received an Alberta Innovates Covid-19 operating grant for the PRONTO study.
- Paul McBeth and Steve Roy received an NSERC Alliance Covid-19 operating grant for their development of a multi-ventilation system during the Covid pandemic.
- Congratulations to Kirsten Fiest, Ken Parhar, Braedon McDonald, Craig Jenne and Paul Kubes for being awarded CIHR grants to advance our knowledge of Covid-19. Kirsten will lead a study of family visitation during pandemic restrictions. Ken will lead in partnership with colleagues at McMaster University a program to evaluate prone positioning in non-intubated hypoxemic patients. Braedon, Craig and Paul will lead a program of work to examine immune responses to infection with SARS-CoV-2.

## Provincial ICU Delirium Initiative

Dr. Kirsten Fiest, Dr. Tom Stelfox and Dr. Dan Zuege, among many others, were recognized by the Health Quality Council of Alberta' Patient Experience Award – Provincial ICU Delirium Initiative.

## CIHR Success:



Members of our Department currently hold 9 CIHR grants as principal investigators!



Congratulations to the 2020 Graduates:

Dr. Natalia Jaworska  
Dr. Kevin Solverson  
Dr. Jeffery Shaw  
Dr. Josh Ng Kamstra



Contribution Appreciation:

Ken Parhar's contribution to the AHS Strategic Advisory Group on how to provide awake prone positioning for non-intubated patients.

First Code Orange:

Congrats to Chip Doig and team for their effective management of our first Code Orange at Foothills Medical Centre.

2019 Best Article in the GMC Journal of Medical Education:

Jason Waechter and Chel Lee were awarded the 2019 Best Article in the GMC Journal of Medical Education for their description of medical student deliberative practice in interpreting ECG rhythm strips.

Career transitions working group:

George Alvarez has kindly agreed to lead a working group to provide recommendations for how the Department can help support intensivists during career transitions (e.g., start, end, mid-career interruptions).

Dr. Michael Chiu

- Arthur J Child's Scholarship for advanced fellowship training - University of Calgary/Libin Cardiovascular Institute
- Libin Cardiovascular Institute Publication Award - University of Calgary
- Canadian Critical Care Conference - Honorable mention - University of British Columbia

Dr. Natalia Jaworska

Behind-the-Scenes Award - In Recognition of Outstanding Enthusiasm, Significant Contributions, Dedication, and Support to the Pre-Clerkship's Intro to Clinical Practice Course

Dr. Paul McBeth

Department of Surgery – Ectopic Educator of the Year Award

Dr. John Kortbeek

Department of Surgery, South Health Campus, Distinguished Service Award

Dr. Benjamin Gershkovich

Internal Medicine CANMEDS Mentor Award, University of Ottawa

PGME Recognition:

Jason Lord's recognition by the PGME office for his contributions to assessment of CBD implementation.

Award of Excellence- U of C:

Congratulations Dr. Philippe Couillard; "In Recognition of Outstanding Enthusiasm, Significant Contributions, Dedication and Support of Students while in the Role of Course 5 Co-Chair for Undergraduate Medical Education" From 2017 to 2020.

Canadian Academy of Health Sciences Inductee

Dr. Tom Stelfox was inducted as a Fellow in the Canadian Academy of Health Sciences.

Dr. Philippe Couillard was recognized for his contributions to Education at the 2020 Neurology Awards. His nomination recognized that he "approaches undergraduate teaching in neurology with passion and excellence" and "contributes with compassion, wisdom, and great enthusiasm to education across the UME and PGME spectrum".

Dr. Philippe Couillard received the Award of Excellence in recognition of his contributions as the Course 5 Co-Chair for Undergraduate Medical Education.

The many members of our department have made important contributions to undergraduate medical education and have been recognized with the following:

Dr. George Alvarez

- Clerkship Teaching Award

Dr. Luc Berthiaume

- Associate Deans Letter of Excellence for Clinical Core
- Small Group Teaching Award
- Gold Award for Teaching
- Internal Medicine Clerkship Honorable Mention (awarded for teaching excellence) Undergraduate Medical Education, Cumming School of Medicine, University of Calgary

Dr. Philippe Couillard

- Associate Deans Letter of Excellence for Clinical Core
- Lecturing Award
- Platinum Award for Teaching

Dr. Michael Dunham

- UME Teaching Award

Dr. Kirsten Feist

- DCCM Research Mentor 2019
- Queen's Principals Development Fund Visiting Professorship. Faculty of Health Sciences, Queen's University
- Patient Experience Award as part of the Critical Care Strategic Clinical Network Core Committee. Health Quality Council of Alberta

Dr. Andre Ferland

- Associate Dean's Letter of Excellence for Clinical Core

Dr. Jonathan Gaudet

- Nominated for the Royal College of Physicians and Surgeons of Canada 2020
- Program Director of the Year Award
- Nominated for the RCPSC Program Director of the Year Award

Dr. Julie Kromm

- Associate Deans Letter of Excellence for Clinical Core
- Associate Deans Letter of Excellence for Small Group Teaching
- Cumming School of Medicine Gold Star Award - For outstanding undergraduate neurology teaching
- Sliver Award for Teaching
- Accepted into the CSM Master Teacher program
- 2019 Rotating Resident Teacher of the year

Dr. Braedon McDonald

- CIHR Early Career Investigator Award in Circulatory and Respiratory Health

Dr. Dan Niven

- O'Brien Institute for Public Health Emerging Research Leader Award, Cumming School of Medicine, University of Calgary

Dr. Ken Parhar

- Small Group Teaching Award
- Bronze Award for Teaching

Dr. Amanda Roze des Ordon

- Associate Deans Letter of Excellence for Clinical Core
- Silver Award for Teaching
- Dean Sandham 2019
- Clinical teaching

Dr. Thomas Stelfox

- Health Quality Council of Alberta' Patient Experience Award – Provincial ICU Delirium Initiative

Dr. Jason Waechter

- Lecturing Award
- Associate Deans Letter of Excellence for Small Group Teaching
- Associate Deans Letter of Excellence for Lecturing
- Platinum Award for Teaching

Dr. Bryan Yipp

- GSE- Great supervisor award recipient

Dr. Dan Zuege

- 2019 Outstanding Clinician of the Year
- Patient Experience Award – Delirium Initiative Health Quality Council of Alberta

Dr. Steven Roy

Red Dot Design Award for Ventilator Multiplexor Device. The Red Dot Design Award is one of the world's largest and most prestigious design competitions. Dr. Roy's invention will be showcased in the Essen, Germany during the Red Dot International Design week and will be kept on display in the Red Dot museum in Germany and Singapore.

### Recruitment:

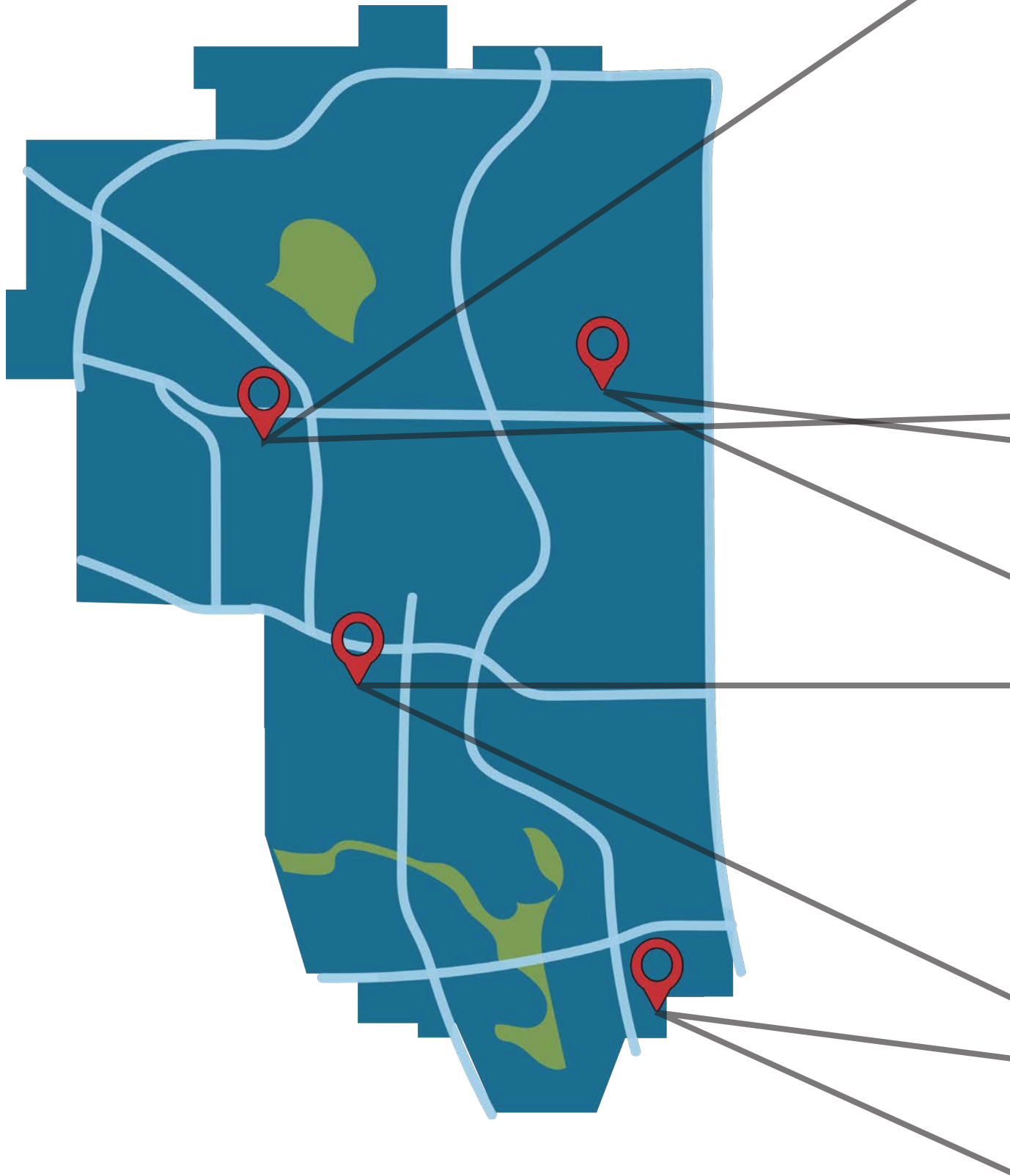
Dr. Ken Parhar will be taking over from Dr. Andre Ferland November 1st, 2020 as CVICU Medical Director. Thanks Dr. Andre Ferland for your leadership and outstanding contributions.

Congratulations Kevin Solverson and Natalia Jaworska who have been offered positions in the Department's Clinical Scholar Program beginning July 1st, 2020. Kevin Solverson will train in chronic ventilation with the Fox Lane Respiratory Services at Guy's and St. Thomas's NHS Foundation Trust. Natalia Jaworska will enroll in a MSc of Clinical Epidemiology in the Cumming School of Medicine, focusing on de-prescribing medications for patients recovering from critical illness.

Dr. Kevin Solverson is the successful candidate in our departmental search for an intensive care physician-respirologist with expertise in chronic ventilation. Kevin is completing a clinical scholar program year before joining the Department of Critical Care Medicine January 1, 2021.

# Locations

Highlights from each unit in 2020.



## Foothills Medical Centre

- COVID-19 Pandemic Response: All efforts were focused on the COVID-19 pandemic response in 2020. Large scale plans for increasing ICU beds to manage a surge in patient admissions along with education and training around frequently changing process as more and more information became available about this virus were priority for the year's work.
- Venting Wisely Pilot: FMC ICU was the pilot unit for the Venting Wisely Pathway; a comprehensive, evidence informed team-based care pathway for patients with hypoxic respiratory failure (HRF) or respiratory distress syndrome (ARDS). The pilot is supported by the Critical Care Strategic Clinical Network and will be spread for use in all ICU's in the province.

## Cardiovascular Intensive Care Unit

- Patient Flow Project – Optimizing patient flow from CVICU to cardiac surgery ward Unit 91.
- Early Recovery After Surgery (ERAS) Phase 1 protocol.
- The CVICU has its own PFCC committee which continues to build the foundation to include the patient and family members as integral partners in healthcare.

## Peter Lougheed Centre

- Family Engagement: We encourage family participation during rounds conducted by the team. Normal visitation is 24 hours, 7 days a week, with open doors until 2100 hrs.
- Quality Improvement: The team has developed a Quality Council. This has improved our unit organization and the intensive cares reordering of supplies

## Rockyview General Hospital

- RGH ICU supported our hospital and ICUs across the city, consistently operating at overcapacity over the winter months as part of a co-ordinated pandemic response to ensure all COVID and non-COVID critically ill patients received the care they required
- Leaders in Delirium management: emphasis on frequent and early mobilization despite space limitations.
- Active interprofessional projects: Examples include Enhancing interprofessional patient care rounds, AnaConDa pilot project, Arterial line insertions by RTs.
- Support for Departmental initiatives in Patient and Family Centered Care and Quality Improvement: Donation after Cardiac death and Neurological death, Fall risk identification and mitigation in the ICU/CCU with post Falls review and analysis.

## South Health Campus

- Planning and implementing care for COVID-19 pandemic patients as well as expected ICU patient populations. This involved planning to expand the current ICU bed map to up to 95 beds on site.
- Collaborating with OR and PACU teams in rolling out the OR to ICU handover process



More Information



## Clinical Programs

Critical Care Rehabilitation

Critical Care Network

Extracorporeal Life Support Program

HRF & ARDS

Neurocritical Care

Organ & Tissue Donation

Outreach Program



Work in the ICU Recovery Clinic has been interesting through the pandemic. As with most outpatient clinics, face-to-face contact has been minimized and the majority of visits are now conducted via secure videoconference or telephone. As our units were responding to the surge in patients, Joanna Everson largely pulled back into the ICU (while still contributing substantially from an administrative perspective) and the bulk of the clinical interactions were conducted by Chris Grant. In theory, the physical locations where we follow patients was reduced down to the SHC outpatient location exclusively, but in reality, the overwhelming bulk of the patient interactions are conducted via telehealth. Currently 2 half-day clinics per week are running. As we near the end of the year, approximately a third of the patients we see in the ICU Recovery Clinic are recovering from COVID-19.

Research within the ICU from a rehab perspective has been considerably impacted by the pandemic. A project using bedside ultrasound assessment of muscle health launched, recruited 10 patients, and then was aborted as the pandemic surged. These data showed some interesting early patterns but were not published due to sample size. A study led by Joanna Everson (for which she received a grant) aimed at using actigraphy to objectively measure patient movement and activity within the ICU was aborted. Finally, a research project looking at patient and provider perspectives of Music Therapy in the ICU was aborted because of research restrictions related to the pandemic. Other larger ICU Rehab studies that we are contributing to contribute to, such as using CT imaging to assess muscle health in sepsis, as well as larger covid specific outcome studies are opportunities that we are pursuing. We continue to aim to contribute as much as possible to existing scientific work within our department (e.g. projects by Dr. Fiest, Dr. Stelfox, etc.)

Resources that are now available in the ICU related to critical care rehabilitation include Music Therapy within the ICU. This is possible through a grant from the National Music Centre and is led by Dr. Stephanie Plamondon (PM&R). There is a potential to expand music therapy to into other units in the city, if desired. On the physical front, the Foothills Medical Centre now has a supine FES ergometer for physical reconditioning. This was purchased through a large targeted donation. This project is being piloted by Brian Ellis's team and presents interesting potential for adding physical conditioning to patients that we might not otherwise be able to exercise. The ICU Music Therapy program is now robust and well established. The FES ergometry project is still in a piloting phase as we work through the practicalities of using this sort of equipment in the ICU.

Finally, on the provincial front, Chris Grant has been contributing to work through the Critical Care SCN on developing a provincial rehabilitation strategy for recovery following critical illness after coronavirus infection. Pre-pandemic, community rehabilitation resources were running at capacity, and now with Albertans coming out of our ICUs post-covid in large numbers, targeting them to appropriate rehabilitation resources in the community is a challenge for the province.

The Department of Critical Care Medicine is a vital part of the Critical Care SCN (CCSCN). Several members of our department provide leadership or vital participation within the CCSCN (Dan Zuege – Senior Medical Director; Dan Niven, Ken Parhar, Kirsten Fiest – provincial project leads; Kirsten Robertson, Karen Shariff – provincial practice leads; many of our research support staff and trainees). Provincial collaboration benefits our department in many ways, none more evident in 2020 than our response to the COVID-19 pandemic. Some of the key outputs and collaborations of the CCSCN related to COVID in 2020 are illustrated in this image:



Beyond the dominant SCN contributions to the COVID-19 pandemic, a number of other key provincial initiatives are underway, many led by individuals from DCCM:

- **RATIONALE** – a program aiming to optimize the use of Albumin in the critically ill. Project Lead - Dan Niven. Funding – CIHR; MSI Foundation. This program, despite the limitations of the pandemic, is well underway and showing significant trends to reduced and more appropriate use of Albumin in ICUs in Alberta.
- **Don't Misuse My Blood** – a program aiming to optimize use of blood products (other than albumin) in Alberta ICUs. Project Lead - Dan Niven. Funding – PRIHS (awarded in 2020); Choosing Wisely Alberta. This program, in its early phase, aims to influence practices of transfusion and the ordering of blood tests to reduce the exposure of patients to blood products, contribute to conservation of our scarce blood supply, and reduce healthcare costs.
- **Venting Wisely** – a program aiming to optimize the care of ventilated patients with hypoxemic respiratory failure in Alberta ICUs. Project Lead – Ken Parhar. Funding – HHS (awarded in 2020); CIHR. This program, now entering its implementation phase, will optimize the care patients with hypoxemic respiratory failure receive through rigorous measurement, audit and feedback, education supported by practice leads, and clinical decision support embedded in our information systems, ultimately saving lives, reducing ICU length of stay and healthcare costs.
- **Delirium** – a well established quality improvement program aiming to optimally prevent, detect and manage delirium in critically ill patients. This program is in its sustainability phase. Ongoing important investigations related to the roles families can play in the detection and prevention of delirium continue, led by Dr. Kirsten Fiest and her team.

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

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

In 2019, almost 30 runs of in ECLS were performed in total (including both VA and VV). In addition, several notable accomplishments were made. We transitioned to using our new CardioHelp system. These units have improved our monitoring and ease of transport while minimizing risks to the patients such as air emboli and clotting. In preparation for the COVID-19 pandemic, we conducted over 15 simulations of ECMO cannulation with PPE with the entire multidisciplinary team. The final notable achievement was combined care of COVID-19 ECMO patients in the Foothills Medical Center general systems ICU. Working with our colleagues in general ICU to provide safe care for all our COVID ECMO cases.

In 2021, we look to continue our momentum by continuing our training and simulation exercises for the cannulation and use of ECLS. We will continue to work together with the ECLS program at the Alberta Children's Hospital to work on areas of mutual interest such as education and simulation. Finally, we will continue to put the pieces in place to move towards being accredited by the international Extracorporeal Life Support Organization as a "Center of Excellence" further demonstrating our commitment to providing the highest quality of care for patients requiring ECLS.

Dr. Ken Parhar, QI ARDS Research Project Lead  
Gwen Knight, Research Assistant  
Dr. Andrea Soo, Senior Biostatistician DCCM  
Pete Dhillon, RRT Educator  
Alan Bader RRT supervisor  
Katie Kissel RN MN CNS  
Dan Cashen RN MN CNS  
Vanessa Doiron CNE  
Devika Kashyap, DCCM Quality Improvement Consultant  
Dr Tom Stelfox, Dr Chip Doig, Dr Dan Zuege, Dr Kirsten Fiest

Acute Respiratory Distress Syndrome (ARDS) is an inflammatory syndrome of the lungs that results in impaired oxygenation due to non-cardiogenic pulmonary edema. 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 Calgary Zone CMO/ Medical Affairs, MSI foundation, and 2017 Critical Care Strategic Clinical Network Seed Grant) demonstrated that ARDS is prevalent within the Calgary Zone and associated with significant morbidity and mortality. We estimate that approximately 10% of all Calgary Zone ICU patients meet full ARDS criteria by the Berlin Definition. This is important because patients with ARDS have a two-fold increase in ICU mortality, with patients in the severe ARDS category demonstrating a mortality rate of 56%. Application of evidence based care interventions is quite variable, particularly in the severe ARDS category. If we extrapolate our Calgary area incidence of ARDS to the province of Alberta we estimate approximately 951 cases of ARDS per year in Alberta, with an average hospital length of stay of 22 days.

We recently conducted an expert-panel modified-Delphi Consensus process to determine the optimal evidence-informed management of ARDS. We also externally validated the pathway through a survey that was conducted with enthusiastic response from over 700 clinicians from tertiary, community, and regional ICUs across the province. Finally, we pilot tested the pathway for one year at the Foothills Medical Center ICU (2020) and demonstrated its feasibility and acceptability. Based on this work we were funded by CIHR (through a project grant) and also Alberta Health Services (through a HIIS grant) to scale and spread this pathway across the province. This initiative will be called “Venting Wisely” and is a partnership with the Critical Care Strategic Clinical Network.

The Neurocritical Care Service consists of three board certified neurointensivists who work with a multidisciplinary team to advance the care of patients with life threatening neurologic injuries through clinical, research and education endeavors.

Our service offers consultations for departmental members of Critical Care Medicine, Clinical Neurosciences and Cardiac Sciences throughout Calgary and Central/Southern Alberta. We assist with preventing and managing secondary neurologic injury and systemic complications of neurologic disorders, providing neuro-prognostication and when appropriate supporting organ and tissue donation.

Our team conducts local research in association with Hotchkiss Brain Institute and co-investigate in several national research trials including Hemotion Trial (transfusion thresholds in traumatic brain injury), SaHaRA Trial (transfusion thresholds in subarachnoid hemorrhage), COPILOT (CPP Optimal to Individualize Care of Traumatic Brain Injury Patients) and PROTEST (PROphylaxis for Venous ThromboEmbolism in Severe Traumatic Brain Injury). We serve on editorial boards for 2 neurocritical care/critical care journals and participate in several national and international research and guidelines committees including the National Institute of Neurologic Disorders and Stroke Curing Coma Campaign. Collectively we have over 130 scientific publications.

We are thrilled to be launching our neurocritical care training program in July 2021. Collectively we have published 12 books/chapters and are involved in several local and international educational endeavors within the Cumming School of Medicine and Neurocritical Care Society. We have been honoured by over 20 awards including national recognition with the Frank Rutledge Award for Excellence in Clinical Care Teaching and the Kirsten Sivertz Resident Leadership Award.

In all our endeavors we are privileged to collaborate closely with several other programs including the Calgary Stroke Program, University of Calgary Spine and Neurosurgical programs as well as the Regional Trauma Service.

Whenever possible, providing the option of organ and tissue donation after death is an important aspect of end-of-life care in the intensive care unit (ICU).

The Department of Critical Care Medicine (DCCM) has a strong relationship with the Southern Alberta Organ and Tissue Donation Program (SAOTDP). Several current donation coordinators are former DCCM nurses. Numerous physicians are developing particular expertise in the area of donation. SAOTDP and DCCM have received funding from Alberta Health for “Specialist in End-of-Life Care, Neuro-prognostication and Donation” (SEND) positions. The responsibilities of SEND physicians will have similarities, but also a broader scope, than those of “donation specialist physicians” in other Canadian provinces. The program will commence in the spring of 2021 with a focus on promoting rigor and excellence in donation-related ICU practices.

The Alberta Organ and Tissue Donation Registry is the main method whereby Albertans can, in advance, express their intent to be organ and tissue donors. The Registry can be checked simply by contacting the on call coordinator. Having this information in advance is helpful and necessary during conversations with families regarding organ and tissue donation. SAOTDP donation coordinators and the Medical Director are always available for consultations regarding eligibility for donation.

In 2020, there were 39 deceased organ donors in Calgary. This number has gradually increased over the past decade. Specifically, there were 21 donors after neurological determination of death (NDD); 11 donors after circulatory determination of death (DCD); 7 donors that started out as potential DCD cases but then progressed to NDD during the donation work-up; and 2 donors after medical assistance in dying (MAID) (note these cases do not occur in ICU). Deaths in ICU remain, by far, the most common source of referrals for tissue donation in southern Alberta.

The Death Prediction and Physiology after Removal of Therapy (DePPaRT) study was completed in 2020 and the results published in the New England Journal of Medicine in early 2021. The main finding was that transient cessation followed by resumption of circulation is common following withdrawal of life-sustaining measures (WLSM). The longest pause followed by resumption was 4 minutes and 20 seconds. The implication of this finding is that it is safe to use 5 minutes without pulse pressure as the criterion for death in the context of DCD; this practice has now been adopted in Calgary. With Chip Doig's leadership, DCCM recruited 97 patients to this study, which was by far the highest number among Canadian centers.

# Outreach Program

Dr. Richard J. Novick, ICU Outreach Program Director  
 Devika Kashyap, Quality Improvement Lead  
 Kevin Sedor, ICU Outreach Program Assistant

The ICU Outreach Program provides essential tier one coverage at all four adult acute care sites. The response to medical activation calls was redesigned two years ago into a tiered response. This response is led by an experienced ICU Registered Nurse (RN) and Registered Respiratory Therapist (RRT) team, with direct access to critical care physician support when needed. Level 1 calls require the attendance of the Outreach physician whereas Level 2 and 3 calls are attended by the ICU RN and RRT. This response is designed to:

- Insure an effective response to meet patient and staff needs.
- Recognize ICU Outreach RN and RRT expertise and their ability to provide guidance and support, independent of ICU physicians.
- Highlight the importance of ensuring engagement of the most responsible health practitioner during these calls, and
- Insure efficient use of Outreach team resources.

2020	FMC			PLC			RGH			SHC			Total			
# calls	676			252			339			178			1445			
Level of Call	I 55%	II 38%	III 7%	I 38%	II 45%	III 16%	I 30%	II 61%	III 9%	I 31%	II 53%	III 16%	I 43%	II 46%	III 10%	
Time on a call	148 minutes			57 minutes			67 minutes			58 minutes			103 minutes			
% admitted to ICU	28%			21%			16%			13%			22%			
MRP responded	70%			62%			81%			56%			70%			
MRHP directed care	53%			51%			71%			46%			56%			
GOC	R 77%	M 22%	C 0%	U 1%	R 74%	M 25%	C 0%	U 2%	R 65%	M 33%	C 0%	U 2%	R 72%	M 25%	C 0%	U 2%
Change in GOC	R-M 3%	R-C 1%	Other 3%	R-M 2%	R-C 0%	Other 2%	R-M 1%	R-C 1%	Other 5%	R-M .5%	R-C 0.5%	Other 3%	R-M 2%	R-C 1%	Other 4%	
Code 66 72h dc from ICU	0%			0%			0%			0%			0%			

## Response to the Covid Pandemic

Medical outreach physicians, nurses and respiratory therapists have played a vital role in our department's delivery of high quality critical care to the large volume of patients hospitalized during the pandemic. In the second and third quarters of 2020 several new and experienced medical outreach physicians were recruited, increasing our total medical outreach FTE complement to 12.5 for the first time. We salute the efforts of all members of the outreach team in providing exemplary, team-based patient care, as well as mentorship of junior postgraduate trainees, during these challenging times.

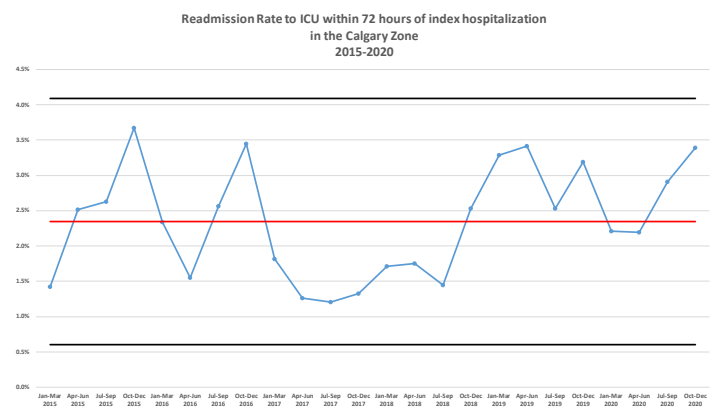
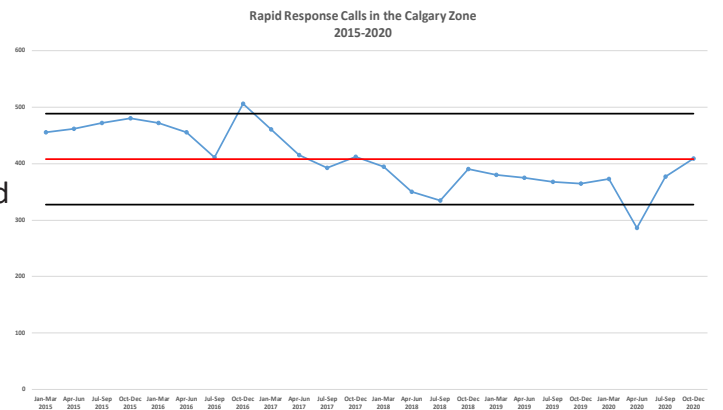
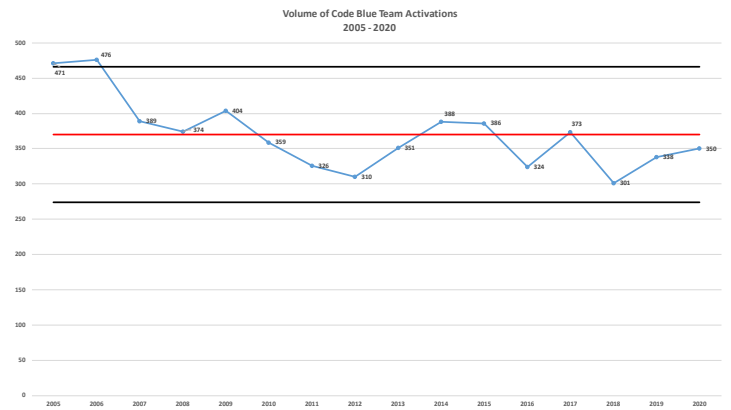


## Program Metrics

As shown in Figure 1, the overall number of outreach calls has remained stable since the initiation of the tiered response model, with a reduction in calls since 2016; however, calls increased in the second half of 2020, coincident with the second wave of the covid-19 pandemic. The individual metrics highlighted in Table 1 have been stable, with approximately an hour spent by Outreach teams on each call at PLC, RGH and SHC, versus 148 minutes at FMC.

Importantly, as shown in Figure 2, there has been a 26% relative decrease in the absolute number of code blue (as opposed to overall medical activation team) calls in the Calgary Zone since the medical outreach team concept was actualized in 2005. This has occurred despite the opening of the South Health Campus in 2013 and the progressive increase in the number of patients hospitalized in the Calgary Zone.

Figure 3 shows that the rate of readmission to the ICU within 72 hours of discharge has remained below 3.5%, despite the steadily increasing comorbidity profile and acuity of patients admitted to the ICUs in the Calgary Zone. Members of the ICU Outreach team routinely follow patients who have transferred out of ICU and who are deemed to be at high risk for new complications by the ICU physician.





Informatics plays a vital role in the delivery of and planning for excellent critical care in Calgary. We are fortunate to have in Alberta in general, and in Calgary in particular, robust clinical information systems, data repositories and clinical analytics resources and teams to support us in our daily work. These include:

- The eCritical Alberta Program – supports the MetaVision bedside Critical Care Information System in all ICUs in Alberta since 2012 (now being replaced by Connect Care) and the TRACER data repository and clinical analytics system. As our core CIS in our ICUs, MetaVision provides detailed electronic clinical, device and laboratory data to support daily care of critically ill patients. This data, supplemented with other data sources, allows the TRACER analytics system and team to provide near real-time summary operational, quality and performance data to support optimal care delivery and planning. Connect Care will replace the MetaVision system, planned to commence in November 2021 at PLC. A number of adaptations to MetaVision and several new analytics tools were quickly made available in order for us to understand the evolution of COVID in ICUs from a utilization and outcome perspective. The vital importance of a critical care focused informatics team, with knowledge and skill with both the clinical and informatics aspects of critical care in Alberta, independent of the information systems in use, cannot be overstated.

- Sunrise Clinical Manager – supporting order entry, medication management and some clinical documentation functions (also being replaced by Connect Care). Though SCM is in a transition phase, continually updating content remains vital to optimally support our bedside providers, the importance no more evident than during our pandemic.
- Connect Care – planned implementation to Calgary critical care in November 2021 at PLC. Numerous planning activities are underway with active unit engagement. We are grateful for the device and wifi upgrades and the potential for tap and go computer access ahead of implementation. As a department, we are instituting a number of care process changes to adapt well ahead of Connect Care implementation in order to ease the transition. Area trainers have been identified as are superusers for the first wave of Calgary implementation. The Connect Care Critical Care Area Council and its adult subgroup have significant Calgary leadership (Emma Folz, Dan Zuege) and representation.

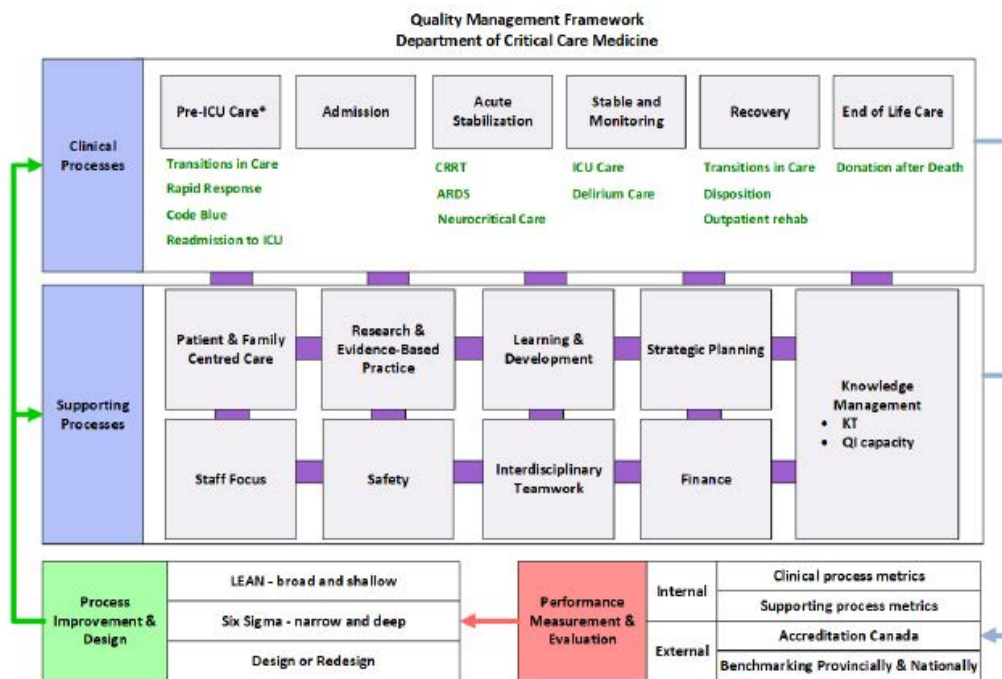
Looking forward, the importance of excellent informatics resources will only be growing to support the drive for quality, appropriate, cost effective care. Our department looks forward to the continued evolution of our informatics assets to enhance our measurement of quality of care at department, unit and provider levels.

# Quality Improvement

## Culture of Quality

The culture of Quality Improvement (QI) is integral to the strategic direction, planning and operations for the Department of Critical Care Medicine (DCCM). In the last year, there were two main areas of focus for the QI Portfolio; preparing for the Accreditation Canada survey and putting the final pieces on the Quality Management Framework and Performance Metrics.

Due to the global pandemic, the Accreditation Canada survey visit for the DCCM was deferred. However, this preparatory process provided an opportunity for the DCCM operational and medical leads to highlight our care pathways, policies, procedures and practices against nationally established benchmarks and best practice recommendations. This local benchmarking process will inform our future quality program and help us with refining our quality management framework and performance metrics.



## The DCCM Quality Management Framework and Performance Metrics

The DCCM has a long history of using data as a platform to discuss and drive improvement work for our ICU teams. E-critical provides us with an extensive dashboard of metrics which has detailed and timely access to numerous data points.

The DCCM leveraged this robust infrastructure and built a quality management framework to reflect the clinical and supporting processes of our critical care teams. In order to evaluate our quality management framework and identify possible areas for improvement a curated list of performance metrics were developed.

The finalized quality management framework and supporting metrics are outlined below. This framework will be the foundation upon which our ICU teams can focus QI priorities that matter to the frontline staff and our patients.

### DCCM List of Performance Metrics

Quality Dimension	Performance Measure
<b>SAFETY</b>	% Mortality in critical care % Mortality in hospital
<b>EFFECTIVENESS</b>	% Re-admission to ICU within 72 hours
<b>ACCEPTABILITY</b>	% Goals of Care documented daily
	% 1 <sup>st</sup> Family Contact w/in 30-minutes of patient arrival
<b>ACCESSIBILITY</b>	% Avoidable Days
	Length of Stay in the ICU
<b>APPROPRIATENESS</b>	Delirium - ever delirium
<b>END OF LIFE CARE</b>	Organ Donation - % Family Approached
	Tissue Donation - % Family Approached

# Patient Safety in the ICU

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Patient safety culture starts with awareness and readiness to review safety events in just manner. The DCCM Patient Safety Roadmap summarizes our approach when clinically serious adverse events occur.

## What have we done in 2020?

In 2020, the DCCM conducted 1 QAR and partnered with other QACs for 2 other reviews. Quality Assurance Reviews use systems analysis methodology to look for contributing factors beyond individual performance.

- **Case 1:** A patient was incorrectly administered medication intended for another ICU patient. This was due to team rounding dynamics and order entry on Sunrise Clinical Manager. The event was used to inform an ICU Rounds QI project to minimize interruptions.
- **Case 2:** A patient on low molecular weight heparin underwent OR and experienced severe post-operative bleeding. In addition to PACU recommendations, ICU provided feedback with regards to peri-operative anticoagulation care that spurred an internal medicine quality improvement initiative.
- **Case 3:** A patient with previous history of difficult airway experienced hypoxia during endoscopy. The difficult airway was not known medical history to the endoscopist and prolonged time to intubation resulted in anoxic injury and death. DCCM participated in the medical QAR with recommendations including airway screening and dissemination of a difficult airway document for communication.

Safety events were used to trigger quality improvement projects.

- **Case 1:** An unconscious patient had delay in detection of contact lens, resulting in visual loss. A quality improvement working group created a standardize contact lens screening procedure which is currently under an implementation phase.
- **Case 2:** Missed fever using temporal thermometer was a noted theme in RLS, including one case with patient death. This changed the temperature monitoring policy and temperature monitoring equipment and method for increased accuracy.

Selena Au  
Tracey Cressman  
Devika Kashyap

In 2020, we reviewed 895 reports (Reporting and Learning System) related to patients in the ICUs were submitted by staff and physicians. The DCCM “Notifiable Events List” is used to guide staff to reporting of events that have high risk for severe harm and/or link strongly with optimal safe ICU care. These events are all reviewed at the QAC. 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 4 adult ICUs.

DCCM physicians reviewed 582 ICU mortality cases in our Mortality Working Group to look for opportunities of improved care. Of these cases, 53 were noted to have adverse event or opportunity for improved care. 62 of these cases were brought forward to the QAC for review. Departmental Patient Safety Rounds (zonal mortality working group) are presented from a multiprofessional group every two months to have facilitated discussion on active reviews and/or disseminate safety learnings from completed QARs. Themes discussed in 2020 include risk with multitasking and rounds interruptions, and off-site transfers to CCU.

We celebrated Canadian Patient Safety Week October 26-30. It is an annual opportunity to educate our staff on our DCCM patient safety processes such as what is Quality Assurance and Just Culture, why it is important for reporting of adverse events, and what happens as part of safety review.

Thank you to our committed QAC members for their ongoing dedication to improve patient safety!

Selena Au – Medical Director for Quality Improvement and Quality Assurance, Co-Chair  
Emma Folz– Executive Director for DCCM, Co-Chair  
Tracey Cressman – Patient Safety Lead  
Tom Stelfox  
Chip Doig  
Kelly Coutts                      Frank Warshawski  
Patty Infusino                      Lyle Geldolf  
Rachel Taylor                      Allen Sutton  
Melissa Redlich                      Katie Kissel  
Luc Berthiaume                      Dan Cashen  
Paul Boiteau                      Miranda Kavalench

# Patient Safety in the ICU Continued

## DCCM Patient Safety Roadmap



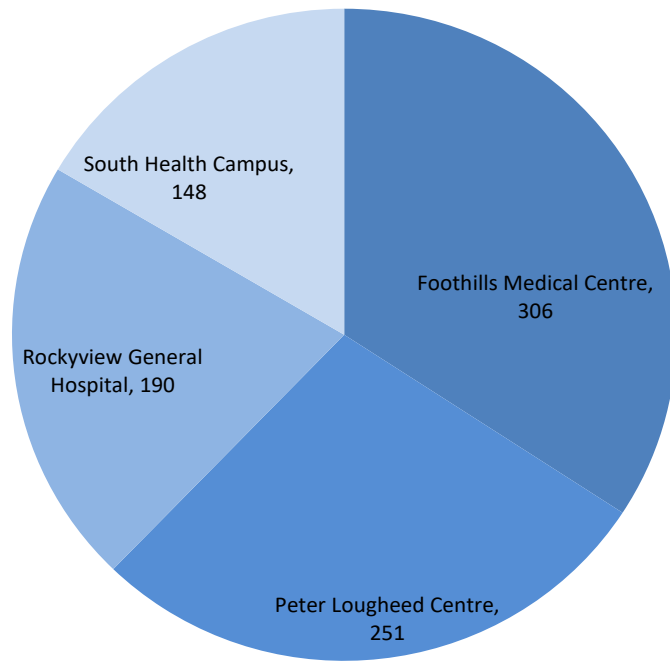
### Clinical Adverse Event What is it?

An event arising from healthcare that could or does result in unintended injury or complication.

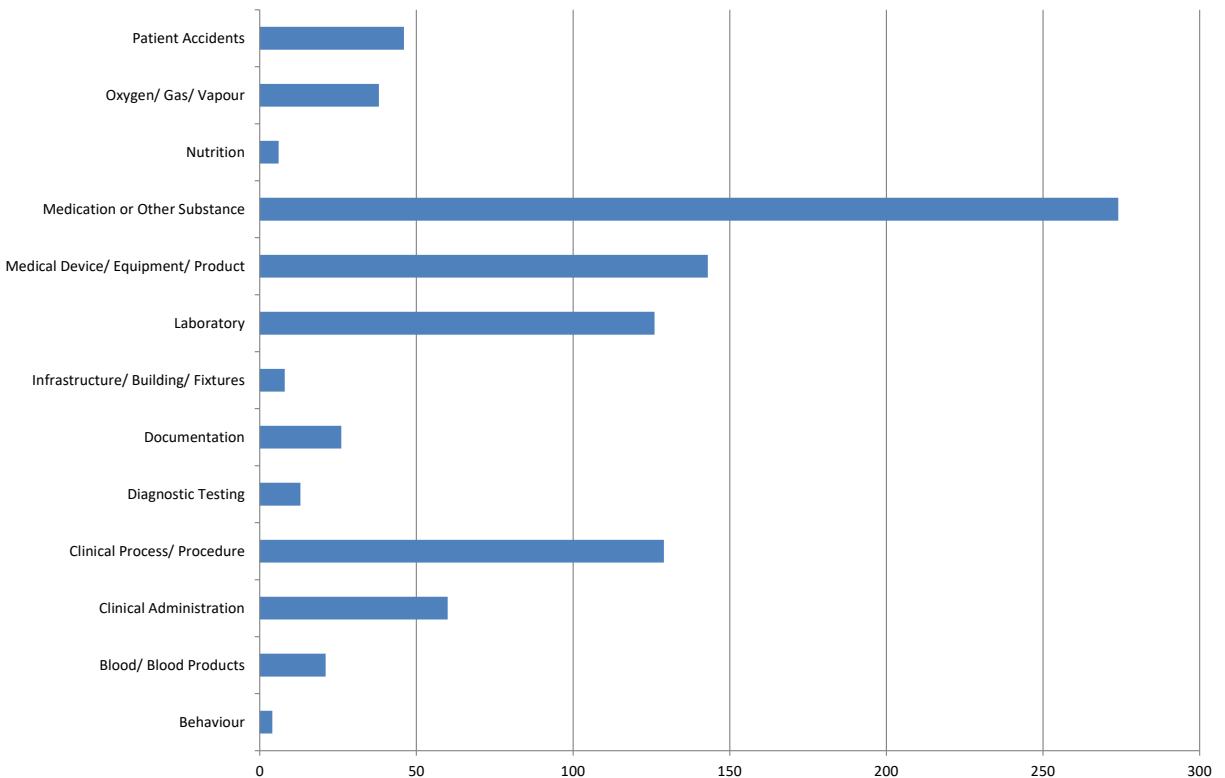
<h3>1 DETECTION</h3> <p><b>Reporting</b> Direct communication to Supervisor/ Manager/Medical Site Director</p> <p><b>Reporting &amp; Learning System (RLS)</b> RLS are reviewed by managers/safety lead and site director as relevant</p> <p>Clinically Serious Adverse Events and Events from Notifiable Events list* should be submitted to RLS and will be reviewed at QAC</p> <p><b>Retrospective Detection</b> <b>Mortality Working Group (MWG)</b> Section 9<sup>c</sup> protected multidisciplinary subgroup of QAC</p> <ul style="list-style-type: none"> <li>• Monthly site-based mortality triggered chart review for events<sup>^</sup></li> <li>• Bi-monthly zonal MWG meetings are a forum to allow for analysis and sharing of teaching safety cases</li> </ul> <p><b>Electronic Detection</b> Safety key performance indicators from administrative databases</p> <p><i>Examples:</i> Tableau with monthly central line bloodstream infection reports, TRACER with monthly readmission rates and reintubation rates</p> <p><b>Patient and Family Concerns</b> FS24 Satisfaction Survey Review</p>	<h3>2 REVIEW</h3> <p><b>Who</b> Accountable Leader (Executive Director/ Department Head who may delegate Manager/Medical Site Director) requests timeline* to help decide on appropriate type of review: 1) Need for individual assessment -&gt; Administrative Review* and/or 2) Need for systems assessment -&gt; QAC</p> <p><b>Quality Assurance Committee (QAC)</b> Meets monthly to review adverse events, initiate safety reviews, and facilitate recommendation formation</p> <p><b>Membership:</b> QAC Medical Director (co-chair), Zone Lead Executive Director of Critical Care (co-chair), DCCM Department Head, Operational Manager from each ICU, Physician Site Representative, Respiratory Therapy Zone Representative, Clinical Nurse Specialist, Clinical Nurse Educator, Clinical Safety Lead, Patient and Family representative (pending)</p> <p><b>How</b> Adverse events with systems issues undergo: 1) Patient safety or Educational review (non-Section 9 protected) or 2) Quality Assurance Review (Section 9 protected) with options for concise, comprehensive or aggregate review QAC chairs/Department Head appoints a clinical lead for QAR</p> <ul style="list-style-type: none"> <li>• QAC reviews and refines recommendations from analysis team</li> <li>• ICU Executive Committee gives final approval for recommendations</li> </ul>	<h3>3 STEPS TO IMPROVE PATIENT CARE</h3> <p><b>Communication</b> Direct follow up with involved staff/ patient/family</p> <p>QAR findings are summarized as Patient Safety Learning Summaries, disseminated and posted on DCCM website</p> <p><b>Education</b></p> <ul style="list-style-type: none"> <li>• Simulation</li> <li>• Grand Rounds</li> <li>• Crash Course</li> <li>• Orientation</li> </ul> <p><b>Implementation</b></p> <ul style="list-style-type: none"> <li>• Quality Improvement initiatives, Policy/guidelines/order sets updates, Patient concerns resolution process, Human factors referral</li> <li>• Accountable leaders follow-up with recommendation implementation on quarterly basis</li> </ul> <p><small>* Notifiable Events List - DCCM Guideline of reportable events created in 2016; undergoing updates led by Devika Kashyap &lt; Section 9 – Part of Alberta Evidence Act that makes the work and records of health services quality assurance committees privileged for evidentiary purposes ^ Strategic chart reviews – Project to expand from mortality as trigger for chart review; undergoing updates led by Selena Au + Timeline - Factual chart review &gt; Administrative Review – An evaluation of whether actions and behaviours of staff members in a specific event were appropriate or inappropriate</small></p>
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## 895 RLS Submissions Between Four Sites



### Incidents by RLS: Event type



## Critical Care Medicine Residency Program

The Department of Critical Care Medicine (DCCM) at the University of Calgary has been fortunate to have trained adult Critical Care Medicine (CCM) physicians since 1988. The Royal College of Physicians and Surgeons survey fully accredited our CCM Training Program for seven years in February 2015. In 2019 we also underwent a successful mid-point internal accreditation process through Postgraduate Medical Education (PGME) at the University of Calgary. 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 and have helped to shape the modern practice of CCM, not just as clinical leaders but as administrators, researchers and educators in their respective centers.

Presently, there are eight trainees in our CCM Training Program from a variety of base specialty backgrounds (e.g., Internal Medicine, Respiriology, Cardiology and Emergency Medicine). We continue to provide entry positions for four trainees each year with a guarantee of two years of funding. Recruitment was once again highly successful this year 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 increasing numbers of external applicants and that we consistently match into all our offered training positions. The quality of our program is underscored by the results of our graduating trainees on their national licensing exams—all 4 graduating trainees were once again successful in attaining their FRCPC designation in CCM this past fall.

## Multi-professional Simulation

The year witnessed continued engagement and support for multi-professional simulation as an educational tool within our Department. Our bi-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. These sessions continue to prove fruitful in augmenting team-based competence and multi-professional trust in our Department.

Dr. Jonathan Gaudet  
Critical Care Medicine Residency Program Director

## Education Curriculum

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

Our core content curriculum covers the foundational expertise required of a CCM specialist across all CanMEDS domains. Educational sessions as part of the core content curriculum are provided by a combination of Departmental attending physicians and local experts and are designed in a small-group, interactive format to maximize participation. Our residents also continue to participate in a variety of PGME-sponsored workshops, including sessions on Teaching Techniques and Provision of Feedback as well as Biomedical Ethics and Medico-Legal aspects of practice. Our trainees 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 ninth year and targets approximately 30-40 participants per workshop from several disciplines including CCM, Anesthesia, Emergency Medicine, Otolaryngology and Respiriology. It also includes involvement from the regional Respiratory Therapists as well as our Critical Care Outreach physicians. We were pleased to continue our expanded enrolment this year to also include residents from Cardiology and General Internal Medicine in our participant pool.

## MDSC Program

Several years ago, a Critical Care MSc/PhD graduate training program was developed within the University of Calgary Department of Medical Sciences to better support departmental academic activities. It offers MSc/PhD graduate students and CCM residents a structured education environment to further their academic pursuits. The program offers a tremendous amount of flexibility to allow training in diverse areas related to Critical care. The program currently offers 3 graduate courses: The Fundamental Basis of Critical Illness (MDSC 623.02) and Basic Pulmonary and ventilator Physiology (MDSC 623.03) and Advanced Pulmonary Physiology (MDSC 623.04). Many graduate students have successfully trained in this MDSC subspecialty training program pursuing advanced graduate MSc and PhD degrees. Students enrolled in the program are expected to present their basic science and clinical research at local, national and international conferences and many students have published their research in well-respected, peer-reviewed scientific journals. The program requires students to have a supervisor who is a member of the Department of Critical Care as well as a supervisory committee that may be made up of diverse members within the University.

For further information about the Critical Care Graduate Program please contact Aggie Chan, MDSC Graduate Program Administrator, Graduate Sciences Education in the Cumming School of Medicine at [medgrad@ucalgary.ca](mailto:medgrad@ucalgary.ca) or Dr. Brent Winston, Graduate Coordinator, Critical Care Graduate Program at [bwinston@ucalgary.ca](mailto:bwinston@ucalgary.ca).

# Education Continued

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## Curriculum Innovations

Several curriculum innovations have been implemented in recent years as well. Our didactic and hands-on curriculum on application of ultrasound and echocardiography in the ICU continues to mature. State of the art on-line educational modules to augment the didactic and practical experiences as part of the curriculum have been implemented since 2016. Since then, a novel IT solution enabling image archiving of ultrasounds acquired at each of the various sites in the city is being implemented to facilitate expert feedback on image acquisition and image quality. Four hand-held ultrasound platforms continue to be accessible to our trainees to allow them to more easily be able to develop their echocardiography skills at the point of care. More recently, clinicopathological case rounds (CPC) rounds have been developed as a new curriculum innovation to have a forum to improve clinical reasoning skills. These monthly rounds are a joint educational activity between the DCCM and the Division of Anatomic Pathology / Department of Pathology & Laboratory Medicine to provide multidisciplinary teaching around interesting presentations of common diseases, common presentations of uncommon diseases, or otherwise diagnostically and therapeutically challenging disease presentations in critically ill patients. These rounds have been extremely well received by participants and will continue for the foreseeable future due to the high-quality teaching and learning opportunity they afford us.

Two additional important curricula continue to grow, serving to nicely round out our educational offerings. A novel communication skills curriculum that explores fundamental aspects of effective communication including goals of care discussions, addressing conflict and disclosure of unanticipated medical events has been implemented relying on simulated patients to allow CCM residents to grow their skills. Recognizing the increasing importance for physicians to develop comfort and fluency with Quality Improvement and patient safety (QIPS), we have also developed a QIPS curriculum to familiarize our trainees with foundational concepts and to help them develop skills necessary to lead QIPS projects in their future careers.

## Continuing Professional Development

High caliber citywide CCM Grand rounds continue to be a weekly staple as part of our continuing professional development. A variety of local and national experts continue to offer state of the art topic reviews and cutting edge talks on the science of CCM as part of our CME offerings. These are recorded and archived along with the presentation slides. Both are available for review on our website.

## Community ICU

To further enhance our clinical and academic collaboration with our referring rural centers, the Training Program continues to integrate a one-month community-based rotation at the Red Deer Regional Hospital intensive care unit. This year several of our fellows participated in this rotation supported by the Distributed Learning and Rural Initiative (DLRI) Program offered by the U of C. The educational experience and professional development afforded by this rotation has been universally highly regarded and immensely valued by our trainees. We're appreciative of our Red Deer colleagues for fostering such a great experience for our trainees as well as the supports put in place by DLRI to make these learning experiences possible.

Undergraduate and Post-Graduate Medical Education

In addition to the CCM Training Program, the DCCM continues to support undergraduate and post-graduate medical education at the University of Calgary. The DCCM supervised approximately 150 months of CCM training for rotating residents this past academic year. Rotating residents came from the following core programs: Internal Medicine, Respiriology, Cardiology, Neurology, Emergency Medicine, Anesthesia, General Surgery, Orthopedic Surgery, Plastic Surgery, Otolaryngology, Cardiac Surgery and Urban and Rural Family Medicine. There is no national requirement for CCM rotations in Family Medicine but given that many trainees subsequently practice in rural Alberta, a one-month rotation is offered for all trainees in order to develop skills in caring for the critically ill.

We are pleased to report that our clinical rotation continues to be highly desired by undergraduate medical students at the University of Calgary. The number of medical students who have chosen CCM remains very high in 2020. In addition to local students, we continue to attract national trainees wishing to pursue CCM as a medical elective. Based on requests for the upcoming academic year, we anticipate the number of medical students interested in rotating with will continue to be high.

### Opportunities and Challenges Ahead

In July 2019 we implemented a once-in-a-generation change in our educational paradigm by transitioning to a competency-based medical education (CBME) model. This Royal College initiative called “Competence by Design” (CBD) is the biggest change in postgraduate medical education in Canada in more than three decades! CBD is an outcomes focused physician education model to better support continuous learning and assessment in professional development.

Over the past years several of our faculty members have been engaged in meetings at the Royal College in Ottawa and served in a leadership capacity in this regard within the University. The product of these workshops was delineation of required training experiences, development of new training requirements organized around a framework of enabling competencies, as well as the incorporation of new workplace-based assessment methods that have informed the education and professional development for our current cohort of CCM trainees. Early experience with the new paradigm has been positive and has afforded our trainees and clinical faculty greater hands-on experience with workplace-based observation and feedback and coaching in the moment. We remain excited about this transformational educational change and are actively furthering education scholarship as we explore our experience with the transition to, and lived-experience of, this new educational paradigm. While CBD remains a work in progress, we continue to forge ahead learning and adjusting as we go.

Finally, the COVID-19 pandemic has made 2020 an indelible year and far reaching impacts have been experienced across the Education Office. Many of our trainees have experienced the disappointment of having to cancel their outbound electives due to necessary PGME restrictions on travel outside our institution. Conversely, we've not been able to welcome as many visiting trainees as we might like to Calgary. Many of our ICU fellows have also been recalled to home service in the ICU in order to meet surging patient care needs as a result of the pandemic. Simultaneously, the DCCM has also benefitted from the can-do attitude of other Departments whose trainees have volunteered to redeploy to help out the pandemic surge in the ICU. For this assistance we are extremely grateful.

Given the requirement to socially distance our educational offerings have necessarily also had to adapt and have been reimaged in new ways. This past year we successfully hosted our first virtual CaRMS interviews! We've also moved most of our education activities to an on-line format and leveraged Zoom to its' full capabilities in order to do so. We're buoyed to see the pandemic starting to subside and we hope to resume our usual standard of in-person learning opportunities in the months ahead.

In closing, we would like to celebrate our trainees who have risen to the occasion time and time again in providing high quality care amidst a very busy, once-in-a generation, public health crisis. It is an absolute privilege to work shoulder to shoulder with them. Their resolve and commitment have not gone unnoticed and are hugely appreciated during a time of immense challenge. We're optimistic for the brighter days that lay ahead!

# Research

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In 2020 more than 2,994 patients were admitted to the four general system intensive care units (ICU) across the Calgary Zone with an average stay of 7 days.

The goal of our Department is to lead and partner in research initiatives to develop and implement new knowledge to provide the best care for critically ill patients. Our Department has much to celebrate and notable research highlights are summarized below.

## Health Services Research

In 2020, the Health Services Research program continued focusing on patient and family centered research. Specific programs within the Health Services Research domain include improving transitions in care from the ICU, de-adopting low value practices in care, promoting gender equity in critical care medicine, and promoting patient and family centered practices in the care of “late life” critically ill patients. 2020 also saw a shift to COVID19 focused research including the impact of restricted visitation policies on patients, families, and providers, ethical and triage guidelines for resource allocation during infectious disease outbreaks, pandemic impacts on provider wellbeing, and societal impacts of the COVID19 pandemic. Research funding highlights include two successful applications to the CIHR Operating Grant: COVID-19 Rapid Research Funding Opportunity. Dr. Fiest received 1-year of funding and Dr. Parsons Leigh received 2-years of funding. The Health Services Research program continued using administrative data sources to conduct retrospective cohort studies and began exploring the use of natural language processing and machine learning techniques in these data sources. This work has been done in collaboration with a multi- disciplinary team including the Critical Care Strategic Clinical Network, patient and family partners and researchers across several departments within and outside of the University of Calgary.





Dr. Kirsten Fiest



## DCCM Clinical Research

In 2020, 919 patients were enrolled in 21 different clinical studies in ICUs across the Calgary Zone. The team continues to prioritize maintaining a transparent approach to financial tracking and emphasized addressing backlogs in both finance and research administration. The most recent Department Research Report can be found in Appendix VIII.

March 2020 saw a shift to primarily focusing on COVID19 research with the first study launched on March 12, 2020. Throughout 2020 and into 2021 there were 2–3-month intervals where the department was exclusively enrolling in COVID19 research. The first period was from mid-March 2020 to mid-June 2020 and the second was from December 2020 until mid-February 2021. In 2020, 86 patients were enrolled in non Covid studies and 833 patients were enrolled in Covid studies. Dr. Ken Parhar received funding through grant money totaling \$471,000 between CIHR (\$271,000), CSM (\$100,000), and matching funds from collaborators (\$90,000) and the Libin Institute (\$10,000) Dr. Parhar is also site PI for COVI-PRONE study, this study has received \$44,885 in 2020 as patient enrollment fees from McMaster university.



## Paul Kubes Lab

Over the last year we are building the level 3 facility so that we could start doing COVID research. Received funds from CIHR and CFI grant for COVID. Publication related to Cell imaging the alveoli of the lung showing that alveolar macrophage constantly vacuums up bacteria we breath in but when you get influenza, they become impaired was published. The other new highlight has been that a research fellow surgeon has come to my lab and published a paper in Science on adhesion formation post abdominal surgery and how to therapeutically target that.”

## Research Continued

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### Notable Highlights for the Winston Lab

Dr. Winston continues to be active in research administration in the DCCM as the Coordinator of the Critical Care Graduate Program (a subspecialty within the Medical Sciences Graduate Program) and sits on the Graduate Educational Committee of MDSC. Dr. Winston also coordinates 2 of the three graduate courses in the Critical Care Graduate Program and is on the GEC of the DCCM.

The Winston lab has been actively involved in examining how metabolomics can be used for diagnosis, prognosis and determining mechanisms of disease in acute respiratory disease syndrome (ARDS) and in traumatic brain injury (TBI), with the goal of applying precision medicine in these disease processes. As part of Dr. Winston's research team, Dr. Sayed Metwaly and Dr. Mohammad Banoei both successfully completed and defended their PhD over the last year.

The Winston team has published 6 publications over the year and has received 6 grants – two as PI (ALA and URGC) and four CIHR grants as co-I or collaborator. His team has been involved in Clinical trials involving sepsis, Covid-19 and ARDS.

Two noteworthy publications are;

1) Mohammad M. Banoei\*, Hans J. Vogel, Aalim M. Weljie, Sachin Yende, Derek C. Angus and Brent W. Winston. Plasma lipid profiling for the prognosis of 90-day mortality, in-hospital mortality, ICU admission and severity in bacterial community acquired pneumonia (CAP). *Crit Care* 24, 461 (2020). <https://doi.org/10.1186/s13054-020-03147-3>.

2) Sayed M. Metwaly\* and Brent W. Winston. Systems Biology ARDS Research with a Focus on Metabolomics. *Metabolites* 2020, 10, 207; doi:10.3390/metabo10050207.

In addition, there is an important ARDS metabolomics paper under revision at *AJP-lung* entitled "Sayed Metwaly\*, Sarah J. Donnelly\*, Mohammad M. Banoei\*, Ahmed I. Mourad\*, Hans J. Vogel, Oliver Fiehn, Brent W. Winston on behalf of the Canadian Critical Care Translational Biology Group (CCCTBG). Unravelling Novel Insights into ARDS Pathophysiology Using Metabolomics Technologies. Submitted to *Am J Physiol Lung Cell Mol Physiol.*, 2021. Under revision.

\*designates trainee

## McDonald Lab Highlights

2020 was the first full year for the newly established McDonald lab. Despite the major barriers caused by COVID-19, we are very proud to have achieved a number of important milestones throughout the year:

**Publication Highlights** - We published the first major study from our new lab in June 2020, in which we found the gut microbiota is a critical regulator of the immune system's ability to combat bacterial infections in the bloodstream. We discovered that a specific metabolite produced by gut bacteria (D-lactate) stimulates macrophage function to capture and clear bacteria from the blood, thereby limiting the spread and severity of infection. McDonald, et al. *Cell Host and Microbe* 2020.

**Recognition Highlights** - Dr. McDonald was the fortunate recipient of the 2020 CIHR Early Career Investigator Award in Infections and Immunity.

**Research Funding Highlights** - The McDonald lab received a number of major operating and infrastructure grants in 2020:

- CIHR Project Grant in Spring 2020 - "The gut-liver axis in sepsis and host defense" (5 years).
- CIHR ECI Award operating grant - "Precision editing of the gut microbiota to protect against bacterial infections in critical illness" (3 years).
- CFI JELF infrastructure grant - "Microbiota-immune interactions and host defense against infections and sepsis" (5 years).
- (Co-PI) CIHR operating grant: COVID-19 Rapid Research Funding Opportunity - "Imaging COVID-19 Lungs to Uncover Therapies" (1 year).
- Co-PI on 2 additional CIHR grants, and co-I on 3 additional CIHR grants.

**Translational Research Highlights** - in addition to our lab's basic science focus, we also launched a number of clinical/translational research projects in 2020 that (despite COVID-19) are off to an excellent start. These including MICRO-ICU, COVID Immunology (in collaboration with Dr. Bryan Yipp), and COVID-TEG (in collaboration with Dr. Prism Schneider from Department of Surgery).

**Team Highlights** - The newly established McDonald lab welcomed a number of new staff members and trainees to the DCCM and immunology Graduate Program, including Amanda Zucoloto, MSc (MDIM PhD student, recipient of CIHR Canada Graduate Scholarship), Diana Changirwa (MDIM MSc student), Jared Schlechte (BioSci Honour thesis student), Katrina Yu, MSc (lab technician), and Zdenka Slavikova (clinical research coordinator).

Appendix

Organization Charts

Governance

Medical Leadership & Administration

Administration & Support Staff

Research

Councils & Committees

Member List

Summary of Recruitment

Clinical Activity & Organization

Cumming School of Medicine Annual Report

Department Research Report

Grants

Peer Reviewed Manuscripts

Abstracts

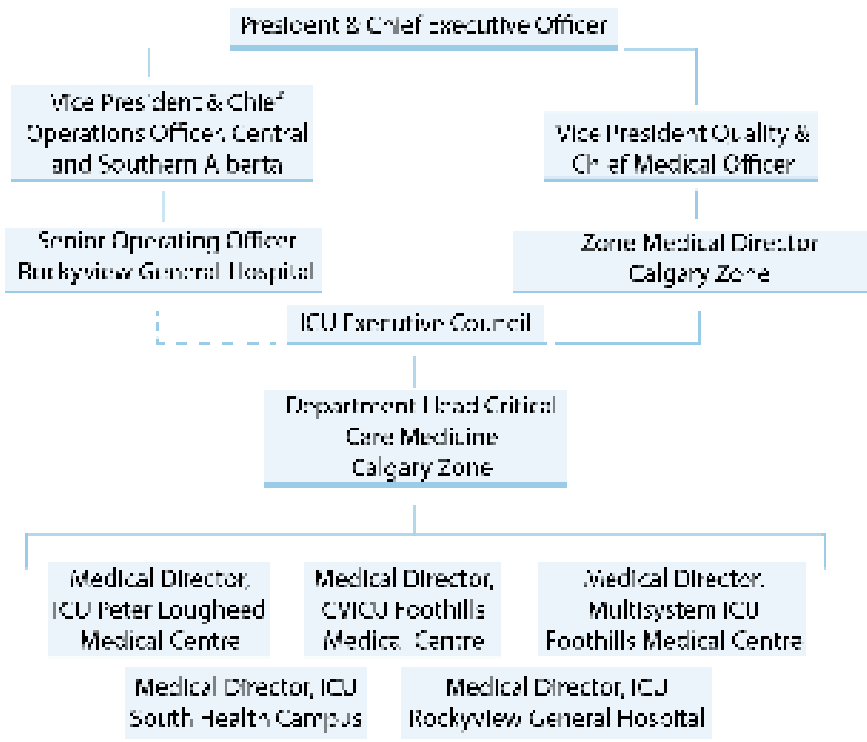
Book Chapters

Patents

Trainees

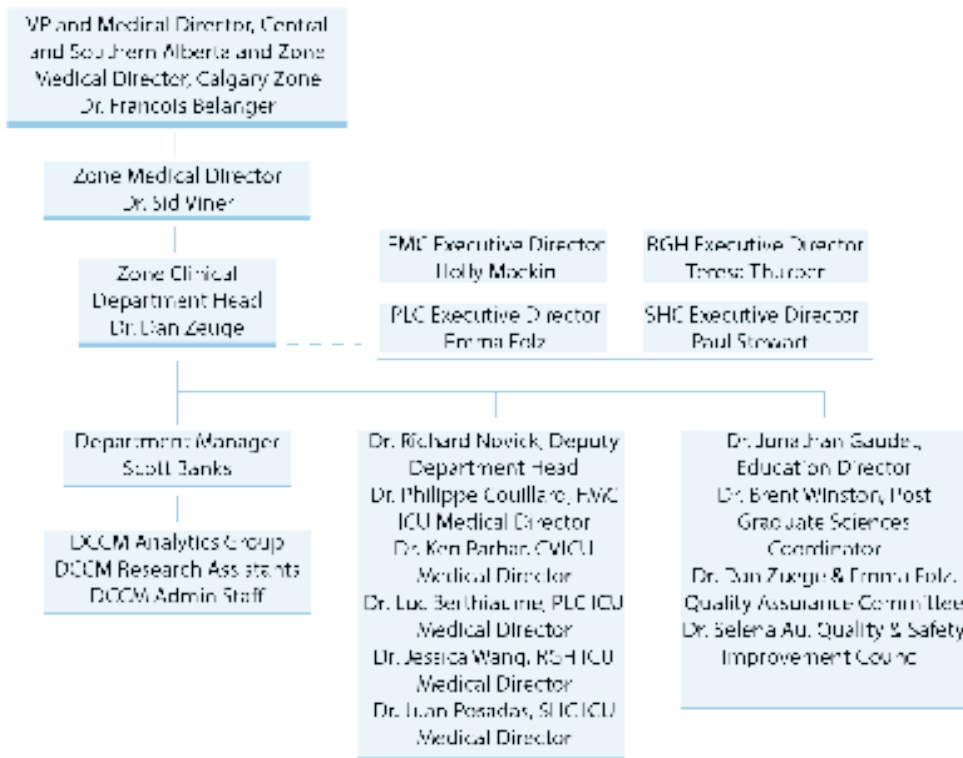
## Governance

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.

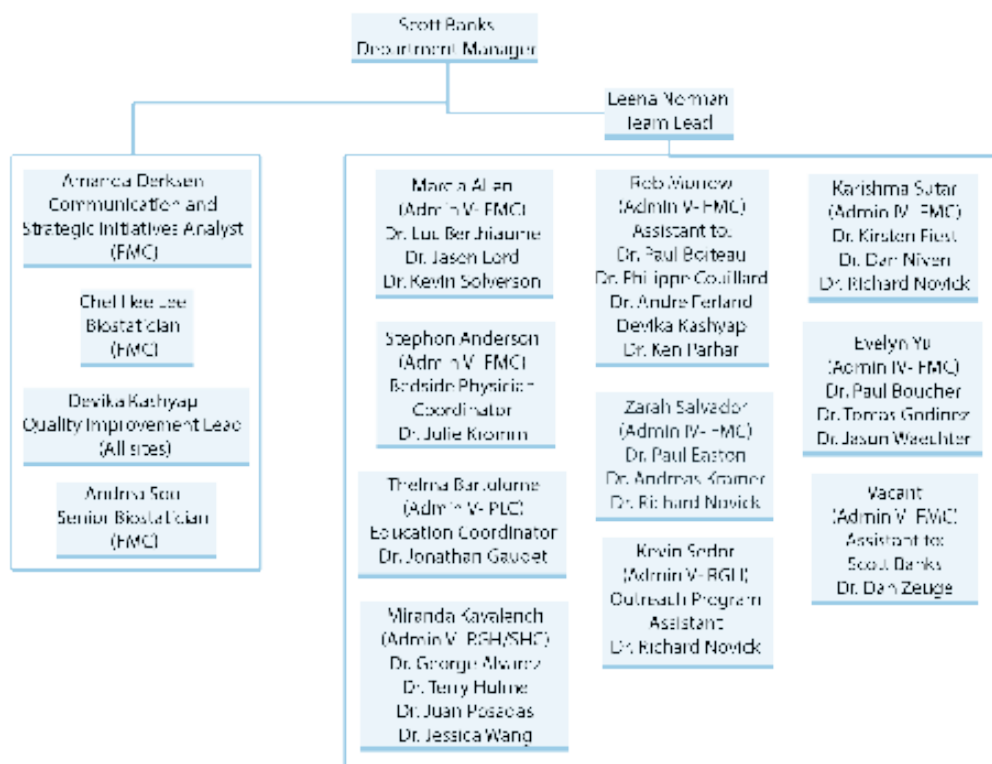


The Calgary Zone reporting relationships and governance of DCCM are provided in the schema outlined above. The DCCM Head is a member of the Zonal Medical Advisory Committee. All DCCM members share responsibility for the vision, goals and advancement of all facets of the Department: exceptional patient-and-family centered critical care. We lead critical care through our commitment to clinical care, education and research. The Department head meets with the members of the Department, Medical Executive Committee and also with the Zonal ICU Executive Council for operational issues on a regular basis. Participation by medical and non-medical ICU practitioners in our weekly Grand Rounds, our annual Research Day, 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.

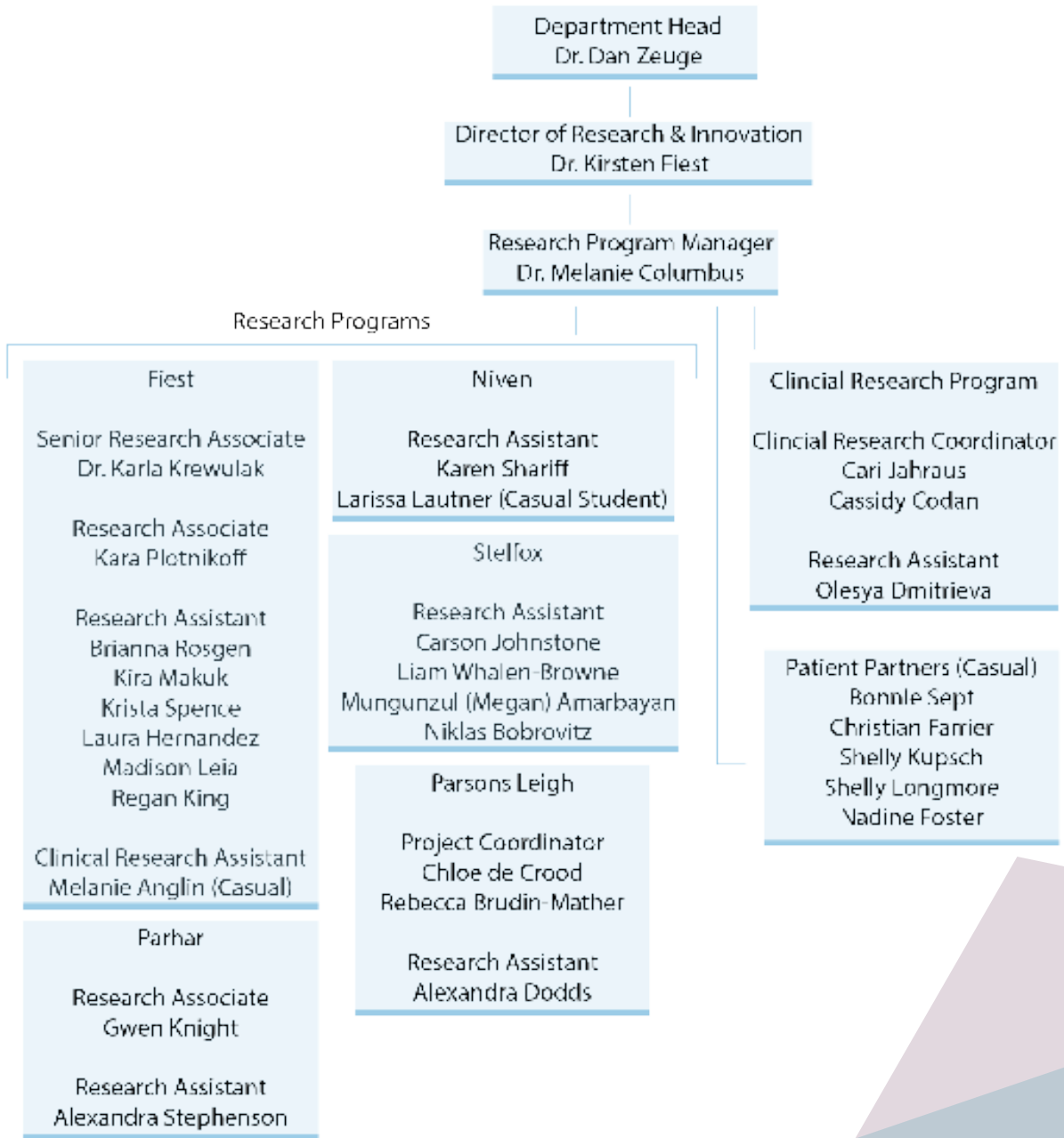
# Medical Leadership & Administration



# Administration & Support Staff



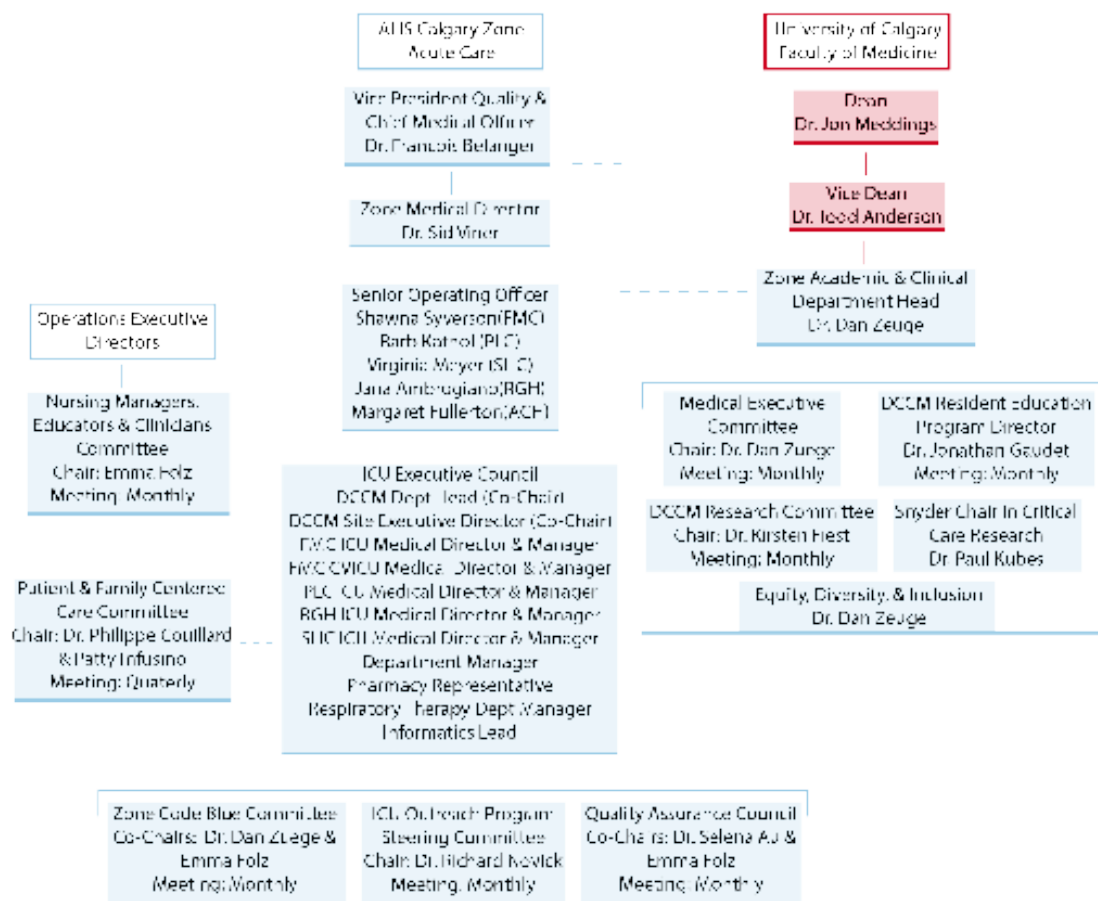
# Research



## Councils & 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.

- Equity, Diversity, & Inclusion Committee
- DCCM Business Meeting
- DCCM Clinical Research Meeting
- ICU Executive Council
- ICU Medical Executive Committee
- Mortality Working Group
- Quality Assurance Committee
- Zonal ICU Outreach Steering Committee
- Zonal Code Blue Committee Meeting





## Members of the Department

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Member profiles have been moved to the website.  
This allows us to provide the most up-to-date list of department members.

There are six categories that members are categorized into:

- Leadership
- Medical Professionals
- Education
- Research
- Student / Trainee
- Support Staff



[View profiles here](#)

## Workforce Planning

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### Summary of Recruitment

Administrative Roles in Critical Care Medicine in 2020:

- **Dr. Ken Parhar** assumed the role of Medical Director, CIVCU

Vacant Positions filled:

- **Dr. Dan Zeuge** – Department Head
- **Dr. Kevin Solverson** – Intensive Care Physician-Respirologist with expertise in chronic ventilation

Physician Promotions:

- **Dr. Selena Au** – Promotion to Clinical Associate Professor
- **Dr. George Alvarez** – Promotion to Clinical Associate Professor
- **Dr. Jonathan Gaudet** – Promotion to Clinical Associate Professor
- **Dr. Paul McBeth** – Promotion to Clinical Associate Professor
- **Dr. Juan Posadas** – Promotion to Clinical Associate Professor
- **Dr. Amanda Roze des Ordons** – Promotion to Clinical Associate Professor
- **Dr. Bryan Yipp** – Promotion to Associate Professor

Ongoing recruitment for the following positions:

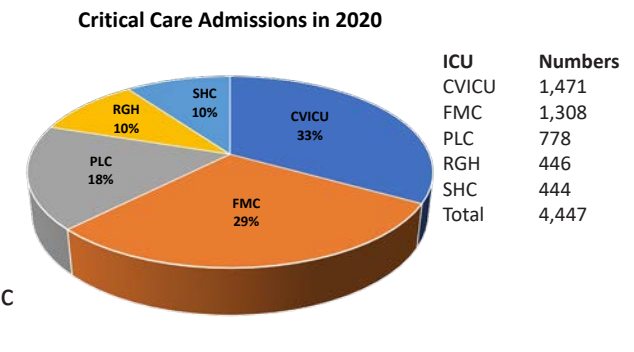
- Clinician-Scientist (GFT)

# Clinical Activity & Organization

The Calgary Zone serves a population in Calgary of approximately 1,286,000 and a regional referral of an additional 300,000 patients from south and central Alberta, southeastern British Columbia and occasionally southwestern Saskatchewan.

There were 4,447 admissions in 2020 in the Departmental ICUs.

Adult critical care is provided in five ICUs; four multi-system ICUs (MSICU) located at each of the Calgary hospitals and one Cardiovascular ICU (CVICU) for the management of post-operative heart patients, located at the Foothills Medical Centre (FMC). 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 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



The Peter Lougheed Centre (PLC) provides regional vascular surgery services and has an 18 bed MSICU while the Rockyview General Hospital (RGH) provides regional urology services and has a 10 bed MSICU. The RGH ICU has a slightly older and classic medical-surgical distribution of patients. The South Health Campus (SHC) serving the southern portion of the city has a 10 bed MSCICU.

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. 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.

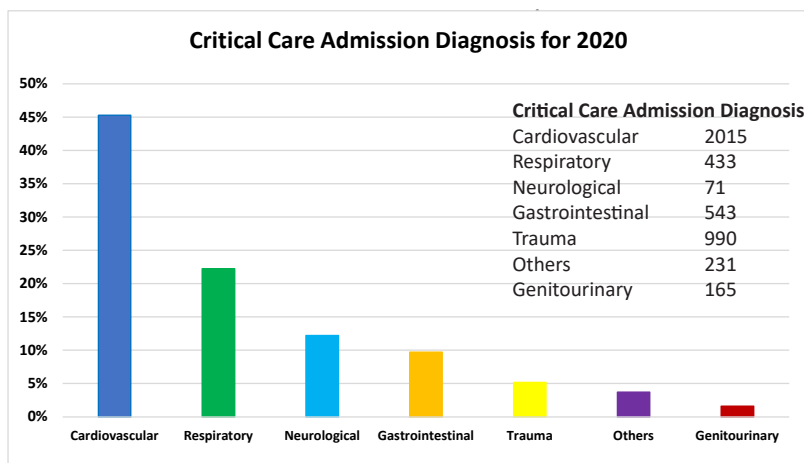
A conference call with the ICU attending, the referring physician, the STARS 'flight' doctor, and any other specialist can be immediately arranged by this service. Within the city, the adult ICUs have adopted a policy of '1 ICU across 4 hospitals' and frequently the Department coordinates inter-institutional transfers of critically-ill patients. These patients may be transferred directly between ICUs or from an Emergency Department to an ICU. These two mechanisms of referral and transfer have helped ensure that all ICUs 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 ICUs 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.

All ICUs perform standard critical care monitoring and physiologic support. All units are equipped with similar equipment. All adult ICUs 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 cerebral microdialysis in association with placement of intra-parenchymal Codman microsensor ICP transducers and brain tissue probes as part of a program in neurocritical by our 3 neurocritical care intensivists. The to concentrate the provision of neurologic 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.



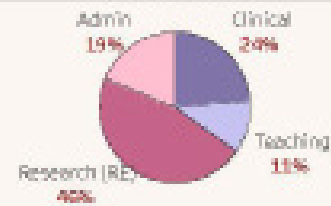
# Cumming School of Medicine - Annual Report

## Annual Report 2019-20 Critical Care Medicine

### ANNUAL FTEs <sup>3</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 <sup>1,2</sup>
CSM	588	593	516	517	528	526
Basic Sciences	126	129	126	141	143	142
Clinical w/out AARP	153	157	157	163	165	162
Clinical w. AARP	223	222	225	215	238	220
<b>Critical Care Medicine</b>	<b>6</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>8</b>

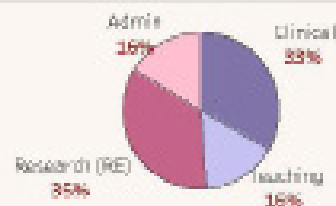
### Critical Care Medicine <sup>1,2</sup>



### ANNUAL REs <sup>3</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
CSM	196.4	201.4	209.0	223.1	230.6	225.0
Basic Sciences	66.4	67.9	72.9	79.6	81.4	80.6
Clinical with AARP	81.5	81.0	82.9	86.4	89.9	87.2
Clinical w/out AARP	54.2	52.5	52.3	57.1	58.2	56.5
<b>Critical Care Medicine</b>	<b>2.4</b>	<b>3.5</b>	<b>3.5</b>	<b>4.4</b>	<b>4.1</b>	<b>3.7</b>

### Clinical without AARP <sup>1,2</sup>



### TOTAL RESEARCH REVENUE <sup>4</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	\$157.3M	\$164.0M	\$200.2M	\$212.4M	\$212.0M
Basic Sciences	\$43.7M	\$41.6M	\$52.3M	\$58.2M	\$57.3M
Clinical w AARP	\$65.6M	\$62.6M	\$70.1M	\$75.0M	\$86.0M
Clinical w/out AARP	\$24.2M	\$27.6M	\$20.1M	\$24.5M	\$26.4M
<b>Critical Care Medicine</b>	<b>\$1.5M</b>	<b>\$1.9M</b>	<b>\$1.9M</b>	<b>\$2.8M</b>	<b>\$2.0M</b>

### RESEARCH REVENUE PER RE <sup>1,2</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	\$0.87M	\$0.86M	\$0.73M	\$0.77M	\$0.73M
Basic Sciences	\$0.62M	\$0.61M	\$0.77M	\$0.75M	\$0.76M
Clinical with AARP	\$0.82M	\$0.70M	\$0.24M	\$0.69M	\$0.72M
Clinical without AARP	\$0.47M	\$0.52M	\$0.58M	\$0.60M	\$0.62M
<b>Critical Care Medicine</b>	<b>\$0.64M</b>	<b>\$0.54M</b>	<b>\$0.48M</b>	<b>\$0.46M</b>	<b>\$0.65M</b>

### TOTAL CIHR REVENUE <sup>5</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	\$81.4M	\$82.0M	\$89.7M	\$89.2M	\$86.7M
Basic Sciences	\$14.6M	\$14.6M	\$16.6M	\$19.1M	\$19.6M
Clinical w AARP	\$12.5M	\$13.1M	\$14.9M	\$19.0M	\$16.3M
Clinical w/out AARP	\$8.3M	\$8.2M	\$7.2M	\$8.3M	\$11.6M
<b>Critical Care Medicine</b>	<b>\$6.4M</b>	<b>\$6.3M</b>	<b>\$6.8M</b>	<b>\$1.2M</b>	<b>\$7.0M</b>

### CIHR REVENUE PER RE <sup>1,2</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	\$0.15M	\$0.19M	\$0.15M	\$0.20M	\$0.20M
Basic Sciences	\$0.22M	\$0.22M	\$0.22M	\$0.23M	\$0.24M
Clinical with AARP	\$0.17M	\$0.16M	\$0.18M	\$0.20M	\$0.18M
Clinical without AARP	\$0.06M	\$0.10M	\$0.14M	\$0.15M	\$0.19M
<b>Critical Care Medicine</b>	<b>\$0.18M</b>	<b>\$0.22M</b>	<b>\$0.22M</b>	<b>\$0.21M</b>	<b>\$0.48M</b>

### TOTAL CLINICAL RESEARCH REVENUE <sup>6</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	\$24.2M	\$28.9M	\$68.0M	\$67.2M	\$47.9M
Basic Sciences	\$1.9M	\$6.7M	\$9.8M	\$6.7M	\$1.6M
Clinical w AARP	\$18.1M	\$14.9M	\$44.2M	\$46.2M	\$50.6M
Clinical w/out AARP	\$5.9M	\$16.0M	\$13.7M	\$14.2M	\$11.7M
<b>Critical Care Medicine</b>	<b>\$0.4M</b>	<b>\$1.4M</b>	<b>\$1.0M</b>	<b>\$1.2M</b>	<b>\$0.9M</b>

### CLINICAL RESEARCH REVENUE PER RE <sup>1,2</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	\$0.11M	\$0.29M	\$0.52M	\$0.30M	\$0.20M
Basic Sciences	\$0.09M	\$0.40M	\$0.12M	\$0.09M	\$0.06M
Clinical with AARP	\$0.20M	\$0.41M	\$0.62M	\$0.52M	\$0.34M
Clinical without AARP	\$0.08M	\$0.32M	\$0.28M	\$0.25M	\$0.20M
<b>Critical Care Medicine</b>	<b>\$0.17M</b>	<b>\$0.41M</b>	<b>\$0.30M</b>	<b>\$0.28M</b>	<b>\$0.22M</b>

### RESEARCH SUPPORT FUND <sup>14</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	\$4.82M	\$5.56M	\$1.85M	\$6.04M	\$5.84M
Basic Sciences	\$2.02M	\$3.23M	\$1.04M	\$2.03M	\$2.97M
Clinical with AARP	\$1.19M	\$1.89M	\$1.82M	\$3.06M	\$2.10M
Clinical w/out AARP	\$0.62M	\$0.79M	\$1.87M	\$1.92M	\$1.15M
<b>Critical Care Medicine</b>	<b>\$0.94M</b>	<b>\$0.69M</b>	<b>\$1.08M</b>	<b>\$0.10M</b>	<b>\$0.15M</b>

### RESEARCH SUPPORT FUND per RE <sup>14,2</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	\$24.8K	\$27.7K	\$28.3K	\$27.2K	\$27.4K
Basic Sciences	\$40.2K	\$45.7K	\$43.6K	\$36.6K	\$35.4K
Clinical with AARP	\$17.3K	\$20.9K	\$22.9K	\$23.9K	\$14.2K
Clinical w/out AARP	\$12.4K	\$14.6K	\$17.2K	\$18.5K	\$19.9K
<b>Critical Care Medicine</b>	<b>\$15.7K</b>	<b>\$23.4K</b>	<b>\$22.4K</b>	<b>\$23.4K</b>	<b>\$32.9K</b>

## 2015-19 FTE BIBLIOMETRICS

## Critical Care Medicine

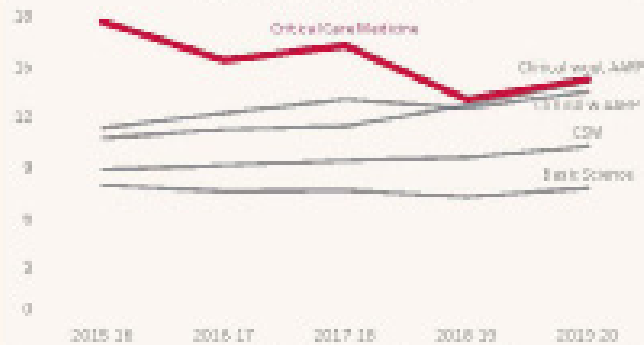
### PUBLICATIONS <sup>7</sup>



### PUBLICATIONS PER FTE <sup>8</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	3.5	3.6	3.8	4.1	4.5
Basic Sciences	4.2	4.0	4.1	4.1	4.4
Clinical with AARP	4.2	4.5	4.9	5.0	5.6
Clinical without AARP	3.6	3.8	3.8	4.5	5.1
<b>Critical Care Medicine</b>	<b>7.0</b>	<b>6.0</b>	<b>8.0</b>	<b>8.1</b>	<b>8.3</b>

### PUBLICATIONS PER RE <sup>9</sup>



### PUBLICATIONS PER RE <sup>9</sup>

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	8.8	9.1	9.4	9.6	10.3
Basic Science	7.9	7.6	7.7	7.3	7.8
Clinical w AARP	11.8	12.2	13.0	12.5	13.9
Clinical wout AARP	10.7	11.3	11.4	12.7	14.1
<b>Critical Care Medicine</b>	<b>17.6</b>	<b>15.4</b>	<b>16.2</b>	<b>13.0</b>	<b>14.2</b>

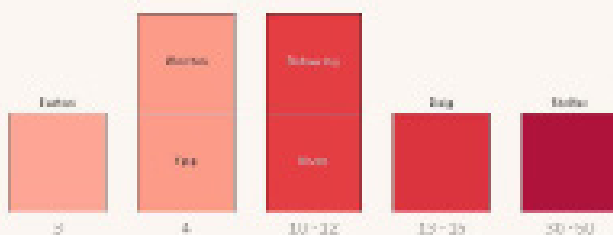
### ANNUAL CITATIONS <sup>10</sup>



### HIGH IMPACT PAPERS (IF > 10) <sup>11</sup>



### # PUBLICATIONS BY 2019/20 FTE FACULTY IN 2019 <sup>12</sup>



### HOT PAPERS <sup>13</sup>

	2015	2016	2017	2018	2019
CSM	305	406	661	671	761
Basic Sciences	100	115	164	167	202
Clinical without AARP	88	111	155	181	210
Clinical with AARP	217	238	362	368	427
<b>Critical Care Medicine</b>	<b>5</b>	<b>12</b>	<b>13</b>	<b>19</b>	<b>18</b>

## NOTES and Definitions

1.1

**Year 2020-21**

Snapshot of Faculty Counts, as of June 30 2020. This is the definition used by HR Systems and Reporting and the OIA Fact Books.

2

**FTEs**

Full-time Academic Staff with Ranks of Professor, Associate Professor or Assistant Professor, Instructor, Senior Instructor, as of June 30 of the previous year (e.g. 2020-21 FTEs are as of June 30 2019)

Department Groups Defined as Follows:

a) Basic Sciences (Biochemistry & Molecular Biology, Cell Biology & Anatomy, Community Health Sciences, Microbiology Immunology & Infectious Diseases, Physiology & Pharmacology)

b) Clinical with AARP (Cardiac Sciences, Clinical Neurosciences, Family Medicine, Medicine, Pediatrics)

c) Clinical without AARP (Anesthesiology, Critical Care Medicine, Emergency Medicine, Medical Genetics, Obstetrics & Gynaecology, Oncology, Pathology & Laboratory Medicine, Psychiatry, Radiology, Surgery)

**Source:**

Annual Factbook by the UCalgary Office of Institutional Analysis

3

**REs**

Average Research Time Allocations, divided by 100 and multiplied by the number of FTE faculty (see Note 2).

Note: To account for CSM Academic Staff members with no time allocation reported in the ARD, the previous year's time allocation is used. If the previous year's time allocation is also blank, then the department average is assigned.

**Source:**

Academic Report Online

3.1

**Time Allocation**

Average Time Allocation (as reported in ARD) for FTE faculty (see Note 2).

Note: To account for CSM Academic Staff members with no time allocations reported in the ARD, the previous year's time allocation is used. If the previous year's time allocation is also blank, then the department average is assigned.

**Source:**

Academic Report Online

4

**Total Research Revenue**

Annual Research Revenue for Projects assigned to CSM

- Revenue is assigned to a Department/Component Group based on the Project Department

- CSM total includes Project Departments not part of the 20 CSM Departments (e.g. Dean's Department - Operations)

\* Of the ~\$34 million dollar increase in CSM Research Revenue from 2016-17 to 2017-18, ~\$21.5 million is grant revenue and ~\$10.5 million is donation related.

**Source:**

Enterprise Reporting/Research & Trust Accounting database

4.1

**Research Revenue per RE**

Annual Research Revenue (See note 4) divided by the number of Research Equivalents in the same year (See note 3)

\* For the CSM Total, Revenue assigned to Project Departments not part of the 20 CSM Departments is excluded (e.g. Dean's Department - Operations revenue is excluded)

5

**CIHR Revenue**

Research revenue report (see Note 4), where:

IF Account Description = ("CIHR Grants" OR "CIHR Authorized Transfers")

OR

Tri-Council Source = "CIHR" AND Account Description ("CIHR Grants" OR "CIHR Authorized Transfers")

5.1

**CIHR Revenue per RE**

Annual CIHR Research Revenue (See note 5) divided by the number of Research Equivalents in the same year (See note 3)

\* For the CSM Total, CIHR Revenue assigned to Project Departments not part of the 20 CSM Departments is excluded (e.g. Dean's Department - Operations revenue is excluded)

6

**Clinical Research Revenue**

Research revenue report (see Note 4), where: Purpose of Funds = "Clinical Trials" OR "Clinical Research"

- In 2016-17, all revenue assigned to projects involving 'Grant Sponsored Clinical Trials' was classified as 'Clinical Research'. In 2018-19, only 47% of revenue assigned to projects involving 'Grant Sponsored Clinical Trials' was classified as 'Clinical Research'. This led to a large increase in 'Clinical Research' revenue in 2018-17 from 2016-16

## NOTES and Definitions Cont'd

6.1	<p><b>Clinical Revenue per RE</b>            Annual Clinical Research Revenue (See note 6) divided by the number of Research Equivalents in the same year (See note 3)            * For the CSM Total, Revenue assigned to Project Departments is not part of the 20 CSM Departments is excluded (e.g. Dean's Department - Operations revenue is excluded)</p>
7	<p><b>Publications</b>            The number of unique papers published by FTE Faculty (see note 2) in the same publication year. (e.g. 2019-20 refers to the number of unique papers published by 2019/20 FTE faculty in the 2019 publication year)</p> <p>- Only publications of Document Types "Article", "Review", "Editorial", "Case Report", "Clinical Trial" and "Book" are included.            - Papers co-authored by more than 3 FTE faculty member will be counted once within the same Group.</p> <p><b>Source:</b>            Web of Science - CV from Authors sent to Office of Faculty Analysis (OFA) in 2019-20</p>
8	<p><b>Publications per FTE</b>            Annual number of Unique Publications (see note 7) divided by the number of FTEs in the same year (see note 2)</p>
9	<p><b>Annual Publications per RE</b>            Annual number of unique Publications (see note 7) divided by the number of Research Equivalents in the same year (see note 3)</p>
10	<p><b>Citations</b>            The number of times that unique publications by FTE Faculty of a given year have been cited in the same year (e.g. 2018-19 refers to the number of times unique papers published by 2018/19 FTE Faculty were cited in 2018)</p> <p>- Only publications of Document Types "Article", "Review", "Editorial", "Case Report", "Clinical Trial" and "Book" are included.            - Papers co-authored by more than 3 FTE faculty member will be counted once within the same Group.</p> <p><b>Source:</b>            Web of Science - CVs from Authors sent to Office of Faculty Analysis (OFA) in 2019-20</p>
11	<p><b>High Impact Publications</b>            Annual publications (see note 7) in journals with an Impact Factor &gt;= 10 in a given publication year</p> <p><b>Source:</b>  <a href="http://webofknowledge.com/jcr">http://webofknowledge.com/jcr</a></p>
12	<p><b># of Publications by 2019-20 Faculty in 2019</b>            Histogram of the number of papers published by 2019-20 FTE Faculty in 2019</p>
13	<p><b>Immediate Impact Papers</b>            Unique publications cited &gt; 49 times in a 5 year publication data window (e.g. For 2018-19, sum of unique publications published between 2014-18 by 2018/19 FTE Faculty that were cited in 2014-18 greater than 49 times)</p> <p><b>Research Support Fund</b></p> <p>2018-20 UCalgary Research Support Fund Contribution            (Portion of Credits) / ( Total UCalgary Credits ) * (Annual UCalgary RSI )</p> <p>- RSI is credited to a faculty/department based on the the Primary Appointment of June 2020 UCalgary Faculty, or the oldest start date of UCalgary faculty who only have multiple Secondary Appointments.</p>
14	<p><b>Background:</b>            In 2019-20 the University of Calgary was awarded a total of \$12,501,264 in Research Support Funds (Research Support Funds (RSF) are awarded annually by the Tri-council Agencies to cover a portion of the indirect costs of research incurred by the University of Calgary (UC). The RSI amount awarded is based on the amount of CRIR/NELUC/RSI/IC funding received by UC researchers. This dashboard shows the total RSF dollars given to the University for grants awarded to the named researchers in comparison to the RSF generated by other department/institute researchers. The table shows the awarding Tri-Council Agency and what role the researcher has on the grant. The information provided demonstrates that RSF earnings are generated for both the role of Principal Investigator and the role of Co-Investigator and highlights the benefit of being included as Co-Investigators on grant applications where the PI is external to the UC (because of the RSF dollars that will flow to UC) as well as being selective about who to include as Co-Investigators. If Co-Investigators are from the UC, the associated RSF dollars will remain at the UC; if Co-Investigators are from other institutions, a portion of the RSF dollars associated with the grant will be shared with those institutions).</p>
14.1	<p><b>Research Support Fund per RE</b>            2018-20 Research Support Fund (see note 14) divided by the annual sum of Research Equivalents (see note 3)</p>

# Departmental Research Report

## Departmental Research Report – Quarter 3

### Current DCCM Clinical Studies

Clinical Studies			
Industry Trial	Non-Industry Trial	Local Initiated Trial	Not Funded
3	13	3	2

Department Member Participation (n=)	
PI	Co-I
11	25

### On-going Enrolment – Calgary Zone

Study Name	# Active Enrolment Sites	Patient Enrolment		Start Date
		Most Recent Quarter	Total	
ARBS Corona	2	166	257	Jul-20
Balance	2	5	39	Jan-16
COVI-PRONE	4	85	86	Oct-20
CATCO	1	0	9	Jun-20
Corona I	4	8	8	Nov-20
CCEPTR	2	5	5	Jan-20
Co-Pilot	1	10	40	Nov-19
ECMOCARD	1	171	264	Jan-20
HALO	1	1	4	Nov-18
HEMOTION	1	0	22	Nov-18
INDEX	1	0	47	Feb-18
MICRO ICU	1	10	43	Aug-19
Protest	1	2	4	Nov-19
RE-ENERGIZE	1	0	11	May-16
REVISE	2	2	8	Jan-20
Roche INFLUENZA	3	0	1	Jan-19
SAHARA RCT	1	0	16	May-18
Sprint-Sari	1	171	264	Jan-20
STARRT-AKI FMC	1	0	24	Dec-16
STARRT-AKI PLC	1	0	22	Dec-16

### Patient Enrolment (YTD)

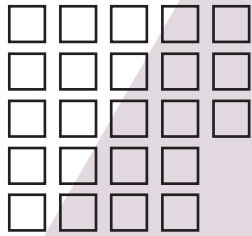
2020	Foothills Medical Centre (n=610)		Rockyview General Hospital (n=235)		Peter Lougheed Centre (n=341)		South Health Campus (n=182)		Calgary Region (n=1,368)	
	Total	N <sup>o</sup> per 100	Total	N <sup>o</sup> per 100	Total	N <sup>o</sup> per 100	Total	N <sup>o</sup> per 100	Total	N <sup>o</sup> per 100
Screened	520	40	18	4	216	28	21	5	775	26
Missed*	0	0	0	0	0	0	0	0	0	0
Enrolled	80	6	9	2	47	6	9	2	145	5
Admitted	1,312		449		785		450		2,996	



At a Glance:

23

Abstracts



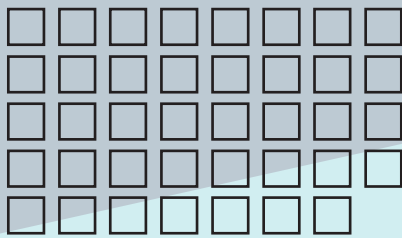
3

Book Chapters



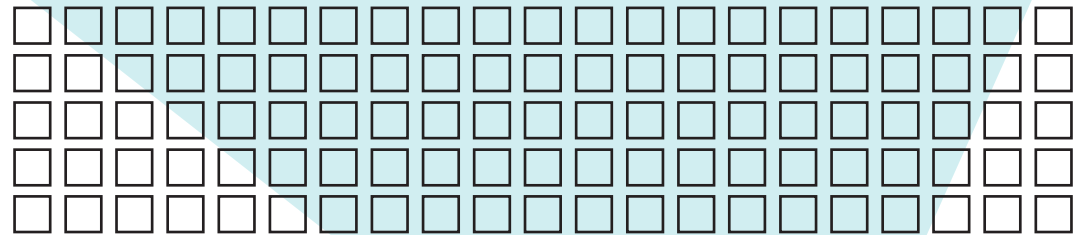
39

Grants



105

Manuscripts



4

Patents



# Grants

<u>Year</u>	<u>Sponsor</u>	<u>P/CO Investigator</u>	<u>Title</u>	<u>Amount</u>
2020	Baxter Corporation Canada	PI: Dr. Alvarez COI: Dr. Au COI: Dr. Posadas	Therapeutic Plasma Exchange in Adult Patients with Severe Sepsis	\$65,234
2020-2021	CIHR - COVID-19 Rapid Funding Opportunity	PI: Dr. Fiest CO-PI: Dr. Stellfox, Dr. Niven COI: Dr. Parhar	Understanding and managing the effects of COVID-19 restricted visitation policies on the families and healthcare providers of critically ill patients	\$298,769
2020-2025	CIHR	PI: Kristen Fiest	Canadian Sepsis Research Network: Improving Care Before, During and After Sepsis. Team Grant: Sepsis Research Network	\$5,700,000
2020-2022	CIHR – Operating Grant: COVID-19 - Public health response and its impact	CO-PI: Dr. Fiest, Dr. Stellfox COI: Dr. Parhar, Dr. Niven	Socio-Cultural Implications of COVID-19: Educating, Engaging & Empowering the Public	\$401,161
2020-2022	Research NS	CO-PI: Dr. Fiest, Dr. Stellfox	COVID-19 - Public health response and its impact	\$155,760
2020-2023	Alberta Children's Hospital Research Institute	PI: Dr. Fiest	FAM-CAPD – Family Assessment of Pediatric Delirium	\$207,000
2020-2021	CIHR	PI: Dr. Fiest	Sex differences in preclinical models of sepsis: a systematic review	\$147,059
2020-2021	CIHR	PI: Dr. Fiest	The Canadian Network of COVID-19 Clinical Trials Networks	\$6,000,000
2020-2025	CIHR Project Grant	PI: Dr. McDonald	The gut-liver axis in host defense against bacterial infections and sepsis	\$742,050
2020-2023	CIHR	PI: Dr. McDonald	Precision-guided editing of the gut microbiota to protect against bacterial infections during critical illness	\$375,000
2020-2021	CIHR (Operating Grant:)	PI: Dr. McDonald	Imaging COVID-19 Lungs to Uncover Therapies	\$1,271,404
2020	CIHR	Site PI: Dr. Niven COI: Dr. Posadas	Re-Evaluating the Inhibition of Stress Erosions and prophylaxis against gastrointestinal bleeding in the critically ill (REVISE) trial	\$1,935,832
2020-2023	Alberta Innovates	PI: Dr. Niven CO-PI: Dr. Stellfox COI: Dr. Fiest, Dr. Zunge	Don't Misuse My Blood: Reducing Avoidable Blood Tests and Avoidable Blood Transfusions in Patients admitted to Critical Care and High-risk Surgical Units in Alberta	\$751,654

2020	CIHR - COVID-19 Rapid Funding Opportunity	PI: Dr. Parhar Nominated Principal Applicant COI: Dr. Posadas, Dr. Niven, Dr. Zuege	Awake Prone Position in Hypoxemic Patients with Coronavirus Disease 19	\$1,089,205
2020-2021	Alberta Innovates - COVID-19 Rapid Research Funding Opportunity	PI: Dr. Parhar Nominated Principal Applicant. CO PI: Dr. Stelfox, Dr. Fiest, Dr. Zuege	The Evaluation of a PRONE Positioning Knowledge Translation Toolkit in COVID-19 ARDS (PRONTO) study.	\$362,285
2020-2024	CIHR – Project Scheme Grant	PI: Dr. Parhar Nominated Principal Applicant, PI: Dr. Niven, Dr. Fiest, Dr. Zuege	Minimizing Variation In Care Among Critically Ill Patients With Respiratory Failure Through Implementation Of An Evidence-Informed Care Pathway	\$600,524
2020-2021	University of Calgary Clinical Research Fund	PI: Dr. Parhar, COI: Dr. Fiest	COvid pRONE hypoxemiA (CORONA)-1 Trial	\$100,000
2020	Cumming School of Medicine – COVID-19 Rapid Funding Opportunity	PI: Dr. Parhar COI: Dr. Posadas, Dr. Stelfox, Dr. Fiest	Awake Prone Position in Hypoxemic Patients with Coronavirus Disease 19.	\$100,000
2020-2022	CIHR	CO-PI: Dr. Stelfox	COVID-19 - Public health response and its impact	\$200,581
2020-2021	CIHR	CO-PI: Dr. Stelfox	Canadian COVID-19 Prospective Cohort Study (CanCOV)	\$2,112,000
2020-2021	The Lung Association of Alberta	PI: Dr. Winston	Analyzing and Validating ARDS Metabolomics using Robust Statistical Methods	\$30,000
2020-2021	URGC Grant	PI: Dr. Winston	Using a metabolomics approach for severe TBI prognosis	\$15,000
2020	NA	PI: Dr. Au	Toolkit to Facilitate Family Participation in ICU Rounds	NA
2020	NSERC Alliance	PI: Dr. Roy	COVID-19 Grant	\$50,000
2020	CIHR	PI: Dr. Kubes	The interplay between subtypes of neutrophils, monocytes, macrophage, iNKT cells and platelets in infection, sterile injury and metastasis in the liver and other organs” Foundation Scheme Per Year: \$549,639.00	\$549,639.00

2020	CIHR	PI: Dr. Kubes	IL-18 and MRP neutralization for the treatment of anti-IL-1- refractory auto inflammatory diseases CIHR: "E-Rare Joint Transnational Call for Proposals 2017" Transnational Research Projects for Innovative Therapeutic Approaches for Rare Diseases" Per Year: \$130,000	\$130,000
2020	Heart and Stroke Foundation of Canada	PI: Dr. Kubes	Pericardial macrophage in cardiac injury and repair" Per Year: \$99,178	\$99,178
2020	Canadian Cancer Society	PI: Dr. Kubes	The Cavity Macrophage, a friend or foe in cancer metastasis progression Per Year \$66,000	\$66,000
2020	Cystic Fibrosis of Canada	PI: Dr. Kubes	Understanding the interplay between alveolar macrophages and P. aeruginosa in the Cystic Fibrosis lung" Per Year: \$100,000	\$100,000
2020	Canada Foundation for Innovation	PI: Dr. Kubes	Imaging in Level 3 facility CFI	\$1,000,000
2020	Canada Foundation for Innovation	PI: Dr. Kubes	Wild Microbiome Facility CFI	\$12,000,000
2020-2025	CIHR	COI: Dr. Fiest	Cerebral Oxygenation and Neurological outcomes Following critical illness (CONFOCAL)-2 study: A prospective observational study assessing the relationship between cerebral oxygenation, delirium, and long-term cognitive outcomes in critically ill patients.	\$562,275
2020-2021	CIHR	COI: Dr. Fiest	Partnering with patients at the earliest stages of the research continuum: building a framework to involve patients in preclinical laboratory work	\$100,000
2020-2024	CIHR	COI: Dr. Fiest	Oncofertility among adolescent and young adult cancer survivors in Alberta: a mixed	\$612,000

2020-2025	CIHR (Team Grant - Sepsis Research Network)	COI: Dr. McDonald	Canadian Sepsis Research Network: Improving Care Before, During and After Sepsis	\$5,700,00
2020-2021	CIHR (Project Grant)	COI: Dr. McDonald	Sex differences in preclinical models of sepsis: systematic review	\$147,059
2020-2024	CIHR (Project Grant)	COI: Dr. McDonald	Quantification of the Duration of Increased Risk for Venous Thromboembolism in Patients with Femur Fractures Using Thrombelastography	\$834,616
2020-2021	CIHR (Catalyst Grant)	COI: Dr. McDonald	Thrombelastography-Defined Duration of Hypercoagulability Following Pelvis and Acetabular Fractures	\$100,000
2020-2021	Cumming School of Medicine	COI: Dr. Niven	A prospective open-label randomized trial of prone positioning versus usual care for non-intubated patients with hypoxemic respiratory failure during the coronavirus SARS-CoV-2 (COVID-19) pandemic	\$200,000 (\$100,000 awarded; \$100,000 matched funds)
2020	CIHR	COI: Dr. Posadas	Guided Occupational Therapy Cognitive Interventions in Critically Ill patients: The GOTCI Study	\$10,000
2020-2021	CIHR	COI: Dr. Stelfox	COVID-19 Evidence Network to support Decision-making (COVID-END)	\$1,000,000
2020	CIHR	COI: Dr. Yipp	The Thistle-down Foundation. Defining the immune-cell genomic landscape in severe ICU COVID-19 patients using single cell sequencing	\$317,500
2020-2023	CIHR	COI: Dr. Winston	ARBs-Corona II: Host response mediators in COVID-19 infection - is there a protective effect of arbs on outcomes of coronavirus infection?	\$3,500,000
2020-2022	Health Innovation Implementation and Spread (HIIS) Competition	COI: Dr. Zuege	Venting Wisely - Transforming the provision of respiratory life support for Albertans	\$700,000

## Peer Reviewed Manuscripts

1. Thompson M, Mei S, Wolfe D, Champagne J, Fergusson D, Stewart D, Sullivan K, Doxtator E, Lalu M, English SW, Granton J, Hutton B, Marshall J, Maybee A, Walley K, Winston BW, McIntyre L. Cell therapy with intravascular administration of mesenchymal stromal cells continues to appear safe: An updated systematic review and meta-analysis. *EClinicalMedicine* 19 (2020), 100249. <https://doi.org/10.1016/j.eclinm.2019.100249>
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4. Smith T, Couillard P, McBeth P, Hruska P, Kortbeek J. Esophageal Colloingh for Hypoxic Encephalopathy: A Feasibility Study, Therapeutic Hypothermia and Temperatiue Management. Dec 2020 <https://doi.org/10.1089/ther.2020.0015>
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8. Ball CG, Murphy P, Verhoeff K, Albusaidi O, Pattersen M, Widder S, Hameed M, Parry N, Vogt K, Kortbeek JB. A 30-day prospective audit of all inpatient complications following acute care surgery: How well do we really perform? *Can J Surg.* 2020;63(2):E150-E154. Published 2020 Mar 27. doi:10.1503/cjs.019118
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10. Goyal M, Kromm J, Ganesh A, et. al. Integrating New Staff into Stoke Teams During the COVID-19. Pandemic. *AJNR.* 2020. DOI: 10.3174/ajnr. A6854
11. Alkhachroum A, Der-Nigoghossian CA, Mathews E, Massad N, Letchinger R, Doyle K, Chie WT, Kromm J, Rubinos C, Valazquez A, Roh D, Agarwal S, Park S, Connolly ES, Claassen J. Ketamine to treat super-refractory status epilepticus. *Neurology.* 2020;95(16):e2286-e2294. DOI: <https://doi.org/10.1212/WNL.0000000000010611>

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# Abstracts

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9. Maratta C, Stelfox HT. Overnight In-House Physician Staffing: A Cross-Sectional Survey of Canadian ICUs. *2020 Critical Care Congress. Orlando, FL. February 2020.*



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11. Roy S, McPhalen D, Koppang M. Avalanche Medicine, and the Canadian Context. Canadian Association for Wilderness Medicine. 2020
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15. Roy S. Cardiopulmonary Resuscitation in Special Circumstances. 1st Latin American Mountain Medicine and Technical Rescue Symposium (Argentina).2020
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17. Banoei M, Hutchison J, Pananka W, Wishart DA, Winston BW on behalf of the Canadian Critical Care Translational Biology Group (CCCTBG) and the Canadian Traumatic Brain Injury Research and Clinical Network (CTRC). Characterization of metabolic profiles in adult severe traumatic brain injury (sTBI) for prognosis of outcome. Presented at the CCCTBG meeting. Lake Louise, 2020.
18. Banoei M, Hutchison J, Pananka W, Wishart DA, Winston BW on behalf of the Canadian Critical Care Translational Biology Group (CCCTBG) and the Canadian Traumatic Brain Injury Research and Clinical Network (CTRC). Characterization of metabolic profiles to prognosis outcome in adult severe traumatic brain injury (sTBI). Presented at the CTRC Winter Meeting, Lake Louise, 2020.
19. Banoei M, Hutchison J, Pananka W, Wishart DA, Winston BW on behalf of the Canadian Critical Care Translational Biology Group (CCCTBG) and the Canadian Traumatic Brain Injury Research and Clinical Network (CTRC). Characterization of metabolic profiles to help prognosticate outcome in adult severe traumatic brain injury (sTBI). Presented at the CCCSCN-ASICP Meeting in Lake Louise, 2020.

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## Book Chapters 2020

1. Kirkpatrick AW, Coccolini F, McDonald B, Roberts DJ. In: *Hot Topics in Acute Care Surgery and Trauma. Definition, pathophysiology, and pathobiology of intra-abdominal hypertension and the abdominal compartment syndrome*. Ch. 6. Springer Nature. (2020)
2. Paterson R, Roy S. Chapter 32 – High Altitude Illnesses. *Mountain Emergency Medicine*. (2020) Elsevier. Milan, Italy.
3. Brodmann M, Roy S, Williams J, Greene M. Chapter 6 - Mountain Medicine Education & Training. *Mountain Emergency Medicine*. (2020) Elsevier. Milan, Italy.

## Patents

1. Preliminary US Patent - Device for Extending a Ventilator Circuit
2. Preliminary US Patent - Process for Extending a Ventilator Circuit
3. Designed a medical device (Valence InVent Xtend) currently in review by Health Canada for Interim Order approval
4. Designed and programmed software program for advanced IV medication compatibility analysis (currently in use in multiple countries)

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**Acknowledgement:**  
The Department of Critical Care Medicine gratefully acknowledges and thanks everyone for their support and contributions.

