

2022

ANNUAL REPORT

DEPARTMENT OF CRITICAL CARE MEDICINE



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Message from Department Head



I'm very proud to present, on behalf of my departmental colleagues, the 2022 Annual Report for the Department of Critical Care Medicine.

Herein we report on important work and accomplishments in addition to challenges during the 2022 calendar 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.

Some notable events from 2022 include:

- Continuing to learn, manage and adapt to the changing COVID-19 pandemic, including permanent bed additions to Calgary Zone ICUs
- Expansion of the Critical Care Nurse Practitioner program to all four general ICUs in Calgary
- Being awarded a \$2.5 million grant from the Calgary Health Foundation to expand the reach and positive impact of neurocritical care throughout Southern Alberta
- Achieving significant success in biomedical and clinical critical care research with impactful publications in Nature Medicine, JAMA and BMJ. Leading and contributing to important local, national and international scholarship related to both COVID-19 related and other critical care clinical and basic science
- Leading several province-wide clinical quality improvement programs positively impacting patient care and achieving significant health system cost avoidance
- Full re-accreditation of our RCPSC Critical Care Residency program
- A flourishing Clinical Scholar program including the graduation of our first neurocritical care fellow and the new addition of a CVICU-focused training program
- Successfully transitioning our clinical informatics systems to Connect Care. Driving continuous improvement in system design and content to optimize use for critical care in Calgary and throughout the province

Despite the challenges of a pandemic, and now its after-effects on our health system, our departmental members continue to lead critical care through their commitment to clinical care, education and research delivering exceptional patient-and-family-centred care and continually advancing both the art and science of critical care.

Respectfully,

Dan Zuege MD, MSc, FRCPC
Professor and Head – Department of Critical Care Medicine
Alberta Health Services – Calgary Zone
Cumming School of Medicine, University of Calgary

Mission and Vision



Alberta Health Services

Vision:

Healthy Albertans. Healthy Communities. Together.

Mission:

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

Values:

Alberta Health Services' core values – compassion, accountability, respect, excellence and safety – guide our actions and behaviours to achieve excellent patient-and-family-centred healthcare for all Albertans.

CORE 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.





UNIVERSITY OF CALGARY CUMMING SCHOOL OF MEDICINE

Cumming School of Medicine University of Calgary

OUR VISION:

Creating the future of health.

OUR MISSION:

The Cumming School of Medicine (CSM) is driven to create the future of health. We are a proud leader with seven world-class research institutes and more than 2,700 students, as well as faculty and staff, working to advance education and research in precision medicine and precision public health (PM/PPH), improving lives in our community and around the world.

The CSM's strategic plan focuses on three key areas — people, platforms and partnerships. By continuing to strategically focus on and invest our resources in these three priority areas, we're creating the ability to focus on PM/PPH; an individualized approach to patient diagnosis, treatment and disease prevention and the use of emerging technologies to better enhance precision in healthcare. The school is named in honour of UCalgary alumnus Geoffrey Cumming, who provided the largest single philanthropic gift in the university's history in 2014. The CSM marked its golden anniversary in 2017, celebrating 50 years since our doors opened.

THE FUTURE:

The Cumming School of Medicine and the broader University of Calgary are currently undertaking a strategic planning process to update their vision, mission and values going forward.



Department of Critical Care Medicine

VISION

Exceptional patient-and-family-centred critical care.

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.

GUIDING PRINCIPLES

Collaboration — 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.



“

Our definition
of critical care
excellence is:
best clinical
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and family
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patient and staff
harm.

Department Organization, Teams & Strategic Planning



Governance

Medical Leadership and Administration

Administration and Support Staff

Clinical Research Alberta Health Services

Councils and Committees

Focus Area: Clinical Care

Focus Area: Leadership

Focus Area: Education

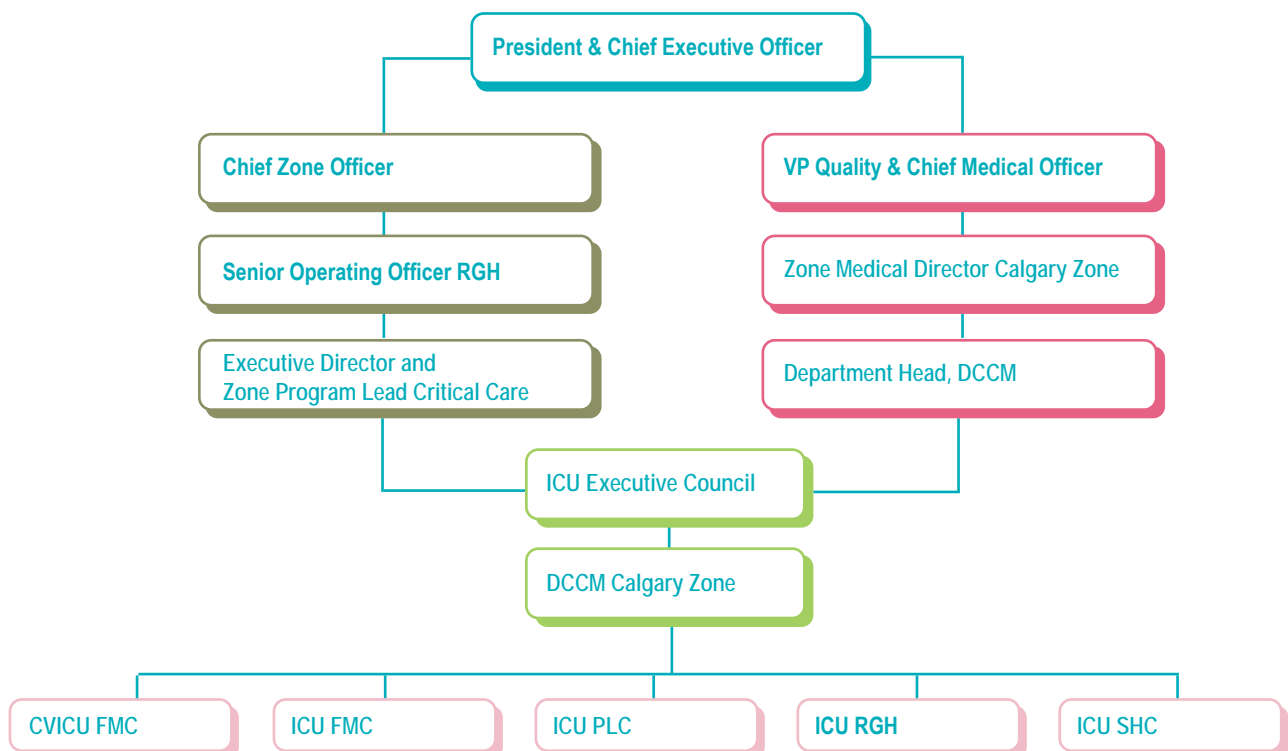
Focus Area: Research

Members of the Department

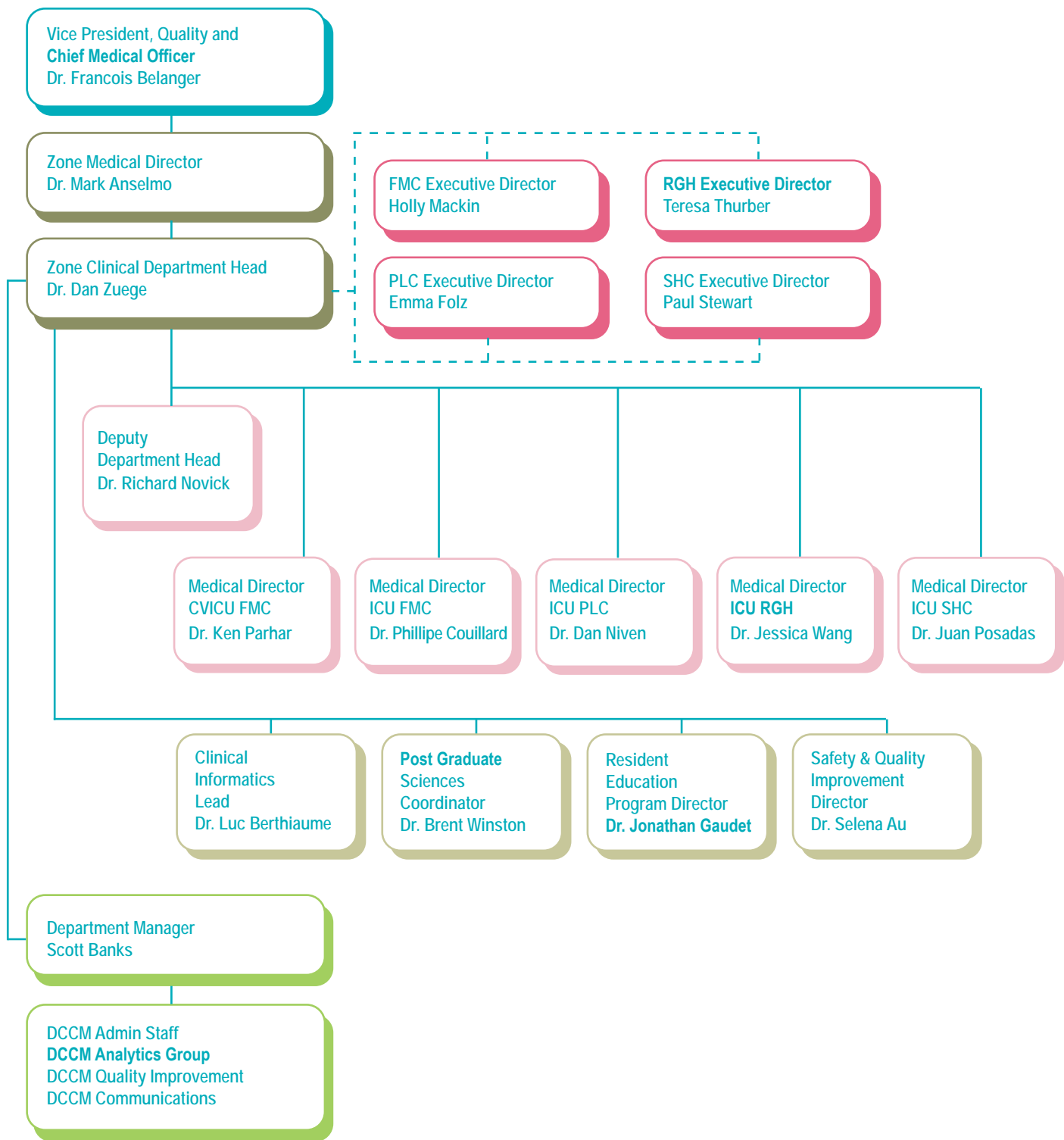
Workforce Planning

Departmental clinical functions are carried out at the four acute care sites. The Peter Lougheed Medical Centre (PLC), Rockyview General Hospital (RGH) and South Health Campus Hospital (SHC) provide general intensive care services while the Foothills Medical Centre (FMC), in addition, provides trauma and neurocritical care services. Cardiovascular Surgery Intensive Care Services are provided at the Foothills Medical Centre in a distinct ICU (CVICU) under the supervision of intensivists from the Department of Critical Care Medicine.

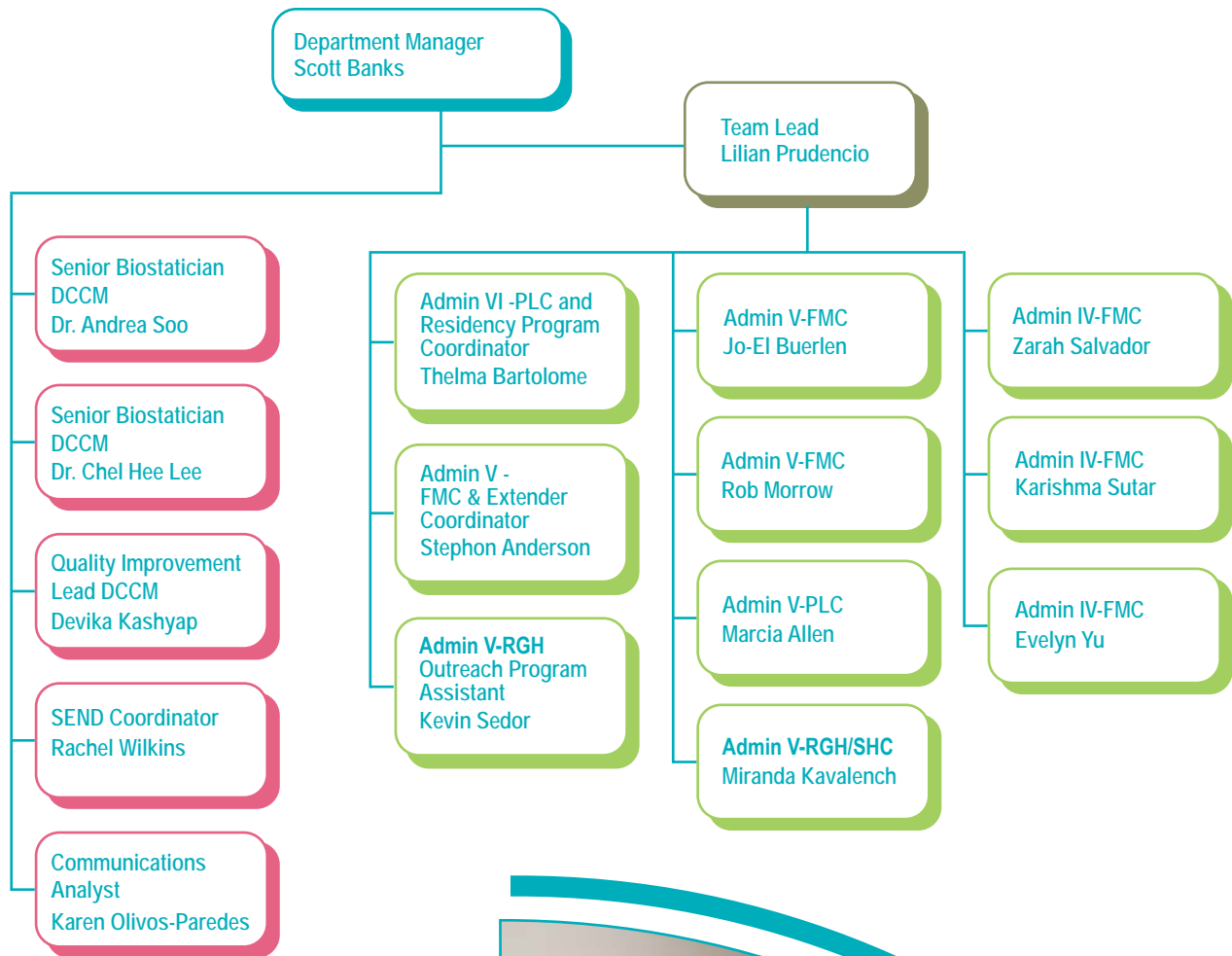
The reporting relationships and governance of DCCM within the Calgary Zone of AHS are outlined below. The DCCM Head is a member of the Zonal Medical Advisory Committee. All DCCM members share responsibility for the vision, goals and advancement of all facets of the Department: exceptional patient-and-family centred 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 and Zonal Morbidity and Mortality Working Groups, with direct links to our Departmental Quality Assurance Committee, and finally social programs foster our strong Zonal and inter-disciplinary cooperation.



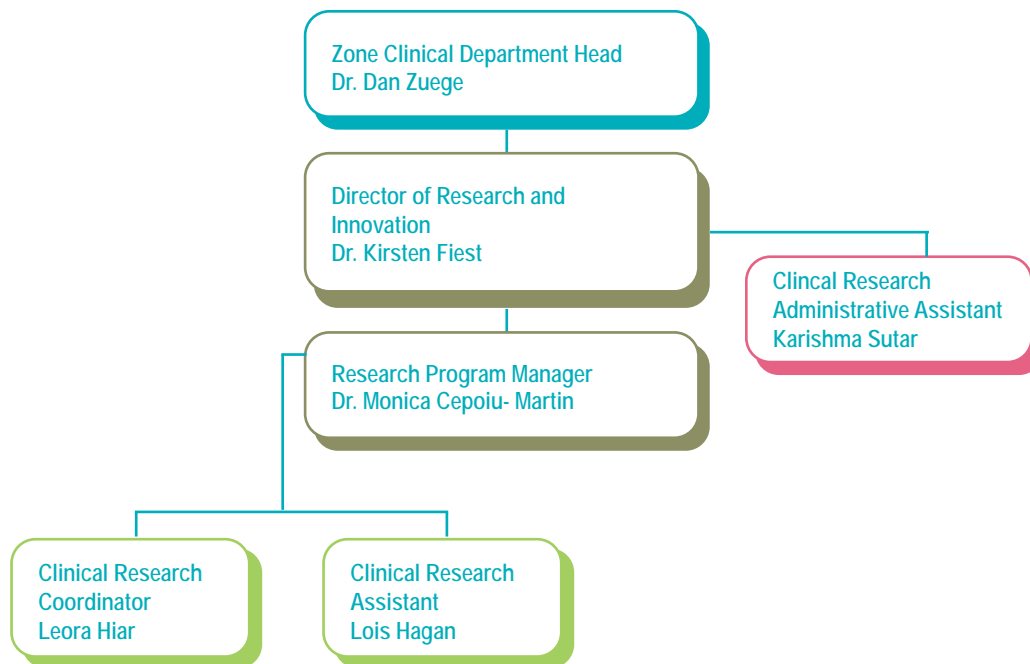
Medical Leadership and Administration



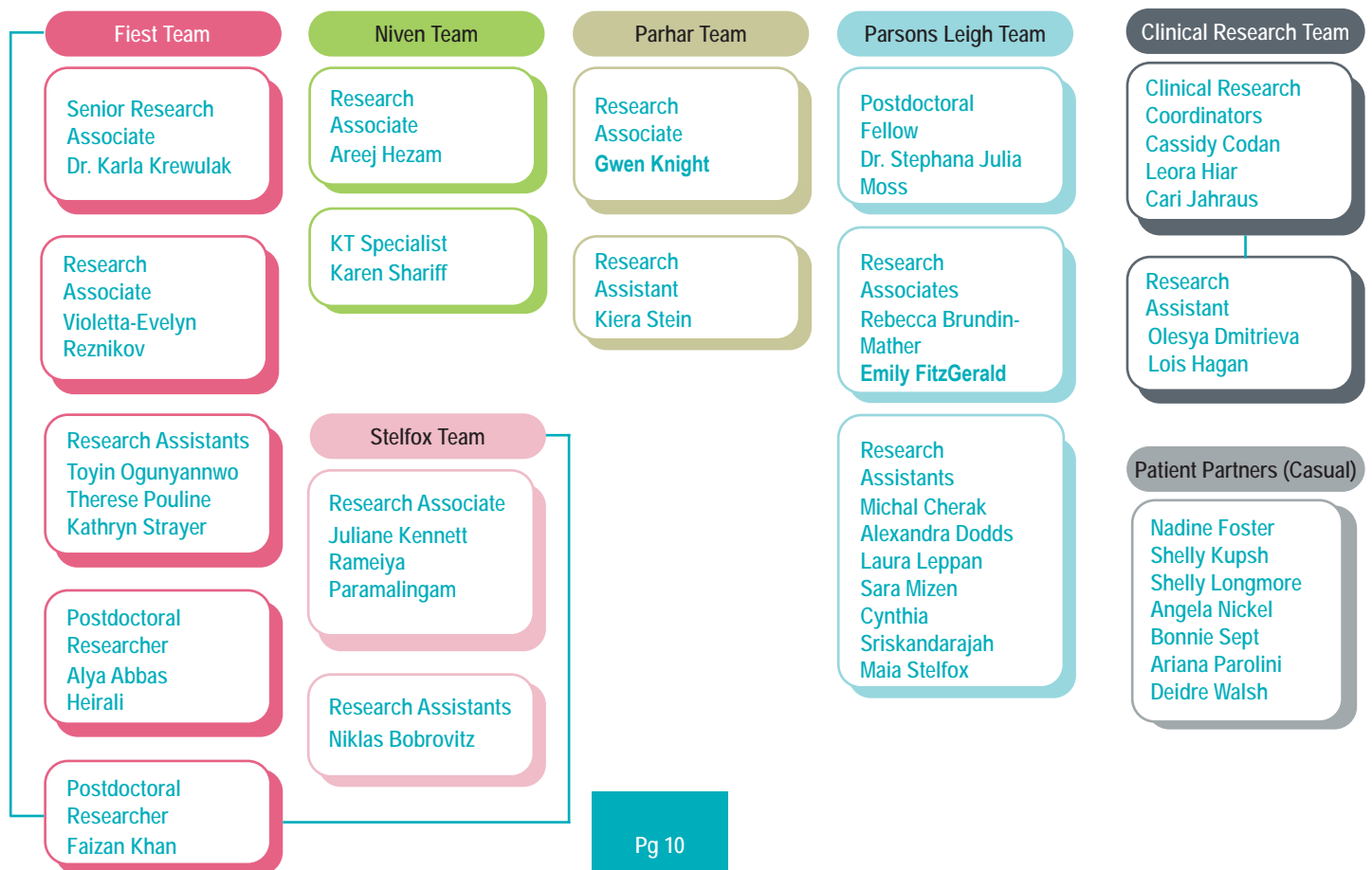
Administration and Support Staff



Clinical Research Alberta Health Services



C3RN and Clinical Staff/Trainees



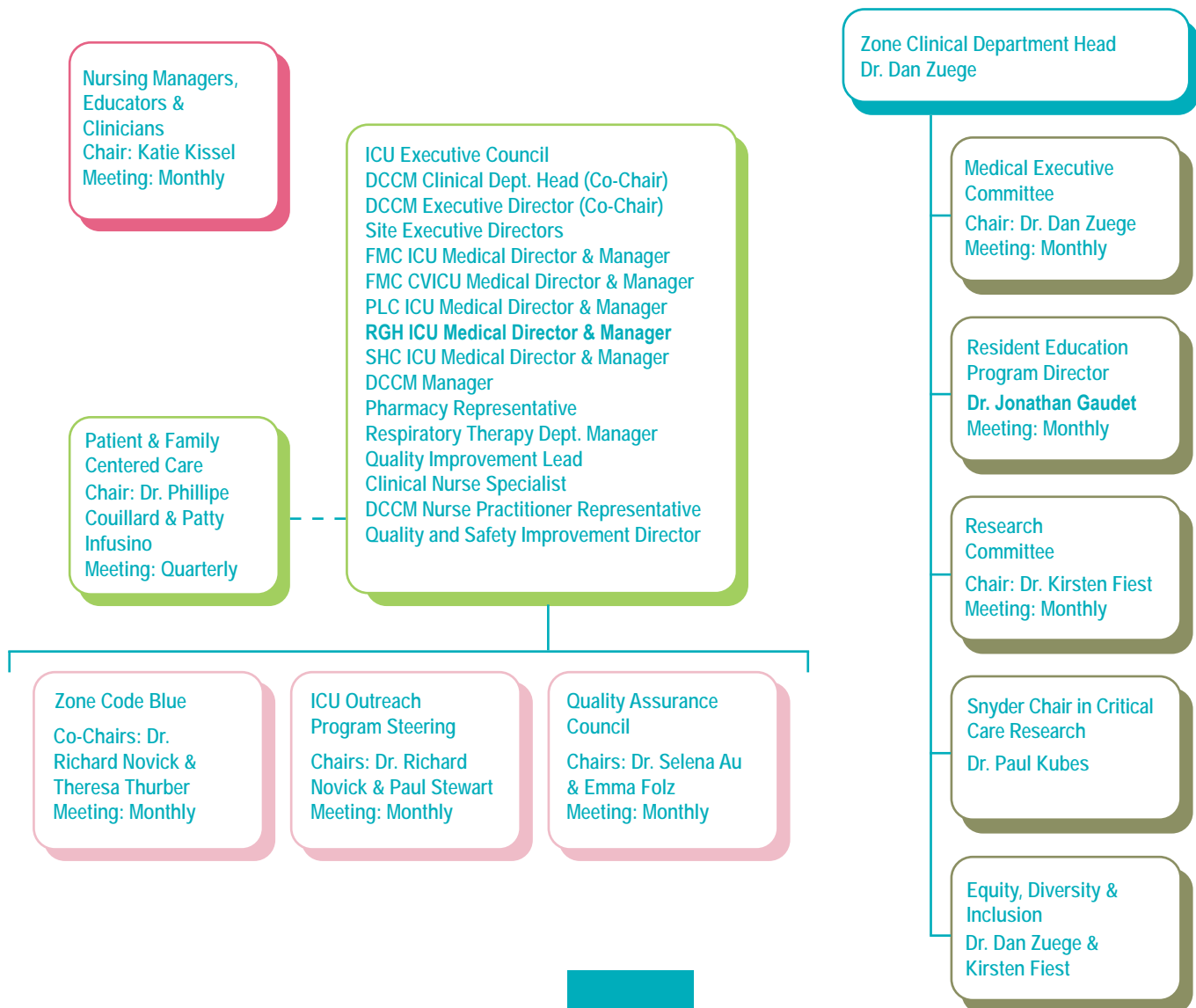
Councils and Committees

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

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

Alberta Health Services
DCCM Clinical Operations

University of Calgary
Faculty of Medicine



Focus Area: Clinical Care

Goal

Exceptional patient care that uses practices to optimize patient health outcomes

Objectives

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

Focus Area: Leadership

Goal

Develop a Just Culture

Objective One

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 the quality of care at every ICU executive meeting and at unit meetings

Objective Two

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 include patient and team perspectives

Goal One

Successful transition of critical care medicine residency program (Competence by Design)

Objective

Successful implementation of CBD transition plan

Activities

1. Train all physicians on the fundamental of CBD and support them during the transition
2. Evaluate the effectiveness of the CBD program

Goal Two

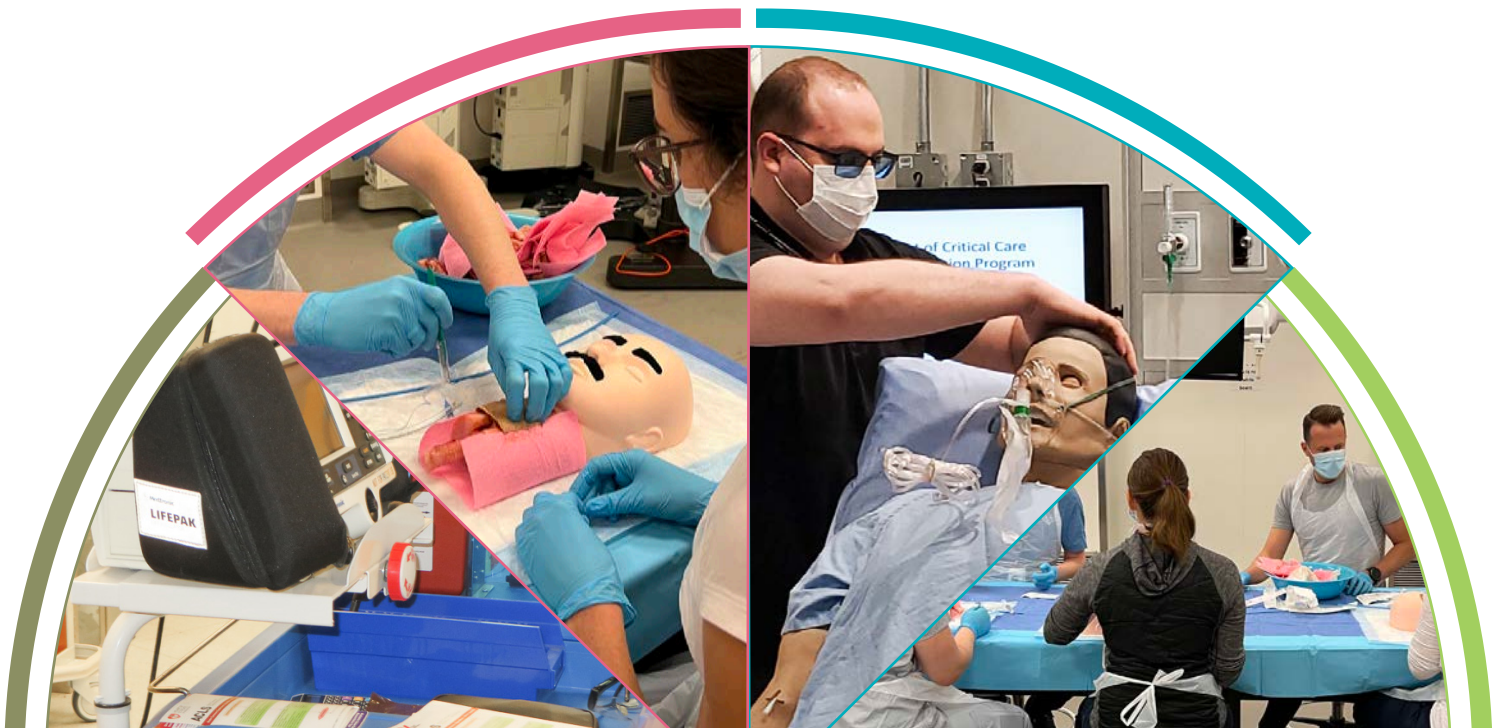
Professional development to support DCCM member's pursuit of excellence

Objective

Continuous growth and development of members

Activities

1. Solicit feedback to inform professional development opportunities
2. Establish expectations for participation in professional development activities
3. Foster a culture of growth
4. Incorporate education activities in the accountabilities of all physician and CSM faculty



Focus Area: Research

Goal One

Increase interdisciplinary research infrastructure

Objective

Maximize the impact of departmental investment in research

Activities

1. Complete implementations of existing DCCM Clinical Research Strategic Plan
2. Develop and implement a framework for prioritizing investments in research that leverages exciting departmental strengths
3. Establish a research fund development strategy
4. Support inter-professional research collaborations across departmental sites

Goal Two

Increase member capacity for research

Objective

Capacitate members to engage in research

Activities

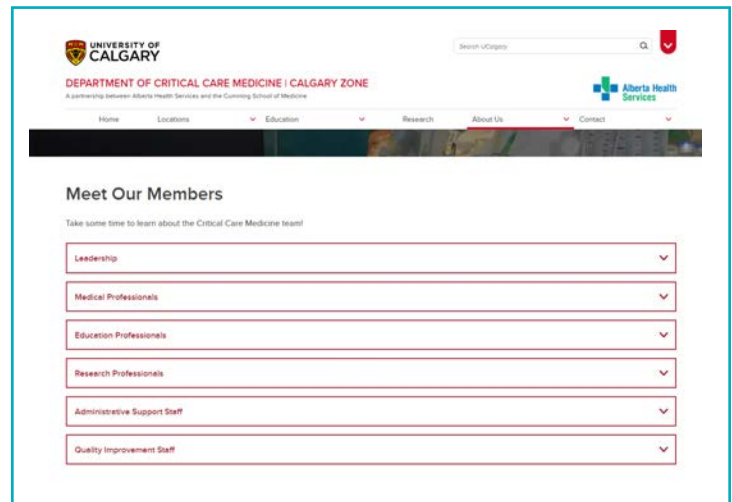
1. Incorporate research activities into the accountabilities of all physicians and CSM faculty
2. Encourage the development of interdisciplinary research teams with synergistic interests and expertise
3. Develop an interdisciplinary research training strategy

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

<https://cumming.ucalgary.ca/departments/critical-care/about-us/teams-2022>

There are six categories that members are categorized into:

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



Summary of Recruitment

- Dr. Natalia Jaworska — DCCM Intensivist
- Dr. Amanda Roze des Ordons — DCCM Intensivist
- Dr. Victor Dong — DCCM Intensivist
- Dr. Julie Kromm — Assistant Program Director
- Dr. Jessica Wang — CVICU Education Lead

University of Calgary Academic Promotions

- Dr. Dan Niven — Promoted to Associate Professor

Retirements

- Dr. Frank Warshawski — July 1, 2022
- Dr. John Kortbeek — December 31, 2022

End of Clinical Work

- Dr. Brent Winston — Dec 31, 2022
(Continuing academic role)

Awards & Accomplishments



Christopher Doig	FMC-MSA Physician of the Year Award (Established Physician)
Victor Dong	CIHR Canada Graduate Scholarship
Michael Dunham	UME Gold Star
Kirsten Fiest	CHIR Grant - CCCTG COVID-19 Defining Critical Care Capacity in Canada
Rachel Jeong and Tom Stelfox	Awarded 1st Place Presentation "Follow-Up Care of Critically Ill Patients with Acute Kidney Injury"
John Kortbeek	Dean Sandham Teaching Award
Karla Krewulak	Gamer King Award for best clinical or quality improvement study
Julie Kromm	DCCM Clinician of the Year CSM Gold Star Award CSM Associate Dean's Small Group Teaching Letter of Excellence CSM Associate Dean's Clinical Core Letter of Excellence CSM Platinum Award
Paul Kubes	Cumming Scholar Award, Cumming School of Medicine
Dan Niven	Promoted to Associate Professor
Christopher Noss	Off Service Preceptor Award
Paul McBeth	UME Honour Roll

Braedon McDonald	CIHR Early Career Investigator Award in Circulatory & Respiratory Health
Ken Parhar	2022 Clinical Research Award, Cumming School of Medicine Research Mentor Award
Amanda Roze des Ordons	Alberta Graduate Excellence Scholarship, University of Calgary
Tom Stelfox	CCCS/CCCF Distinguished Lecturer Award 2 CIHR Grants
Brent Winston	Michael Award for best basic science or translation science study
Jason Waechter	Best Poster, Diagnostic Error Conference UME Course 3 Award
Bryan Yipp	CIHR Grant - Role of Neutrophils during Influenza A H1N1 Rotating Resident Teaching Award

Communications



Our Audience

DCCM'S primary audience is our staff and physicians. Out of the four communication channels, three of them are directly targeted and can only be accessed by AHS employees. A key distinction within the DCCM communications scope is that our audience often times are also our content creators. The synergy between our audience and our communications materials presents a unique entity for DCCM. As a result, one of our key strategies is to maintain an effective and transparent communication channel.

Our secondary audience is our community. Because DCCM is a joint clinical and academic department, our public platform exists on the UCalgary Cumming School of Medicine website. The UCalgary Critical Care platform is a part of The School of Medicine's portfolio. On this site, the information available encompasses our team, education and research. In addition, the UCalgary site serves as a resource to attract medical talent.

Current Communications Channels and Materials

InSite Website (Internal) Our InSite website is our main point of contact for our staff and team. We host both clinical and educational resources. Within this site, each page has an owner and they are responsible for submitting documents and keeping their content up to date.

U of C Website (External) The CCM platform on the UofC website is DCCM's public platform. On this site, we include a description of our department, the scope of our work and our team members. In addition, we have resources related to our academic program for prospecting talent and professional opportunities.

Newsletters The DCCM Newsletter is published bi-monthly. Our newsletter celebrates our talented staff, patient success stories, department research and other news.

Grand Rounds Within our Insite website, DCCM has a designated page for the education program Grand Rounds which includes video presentations.

Summary

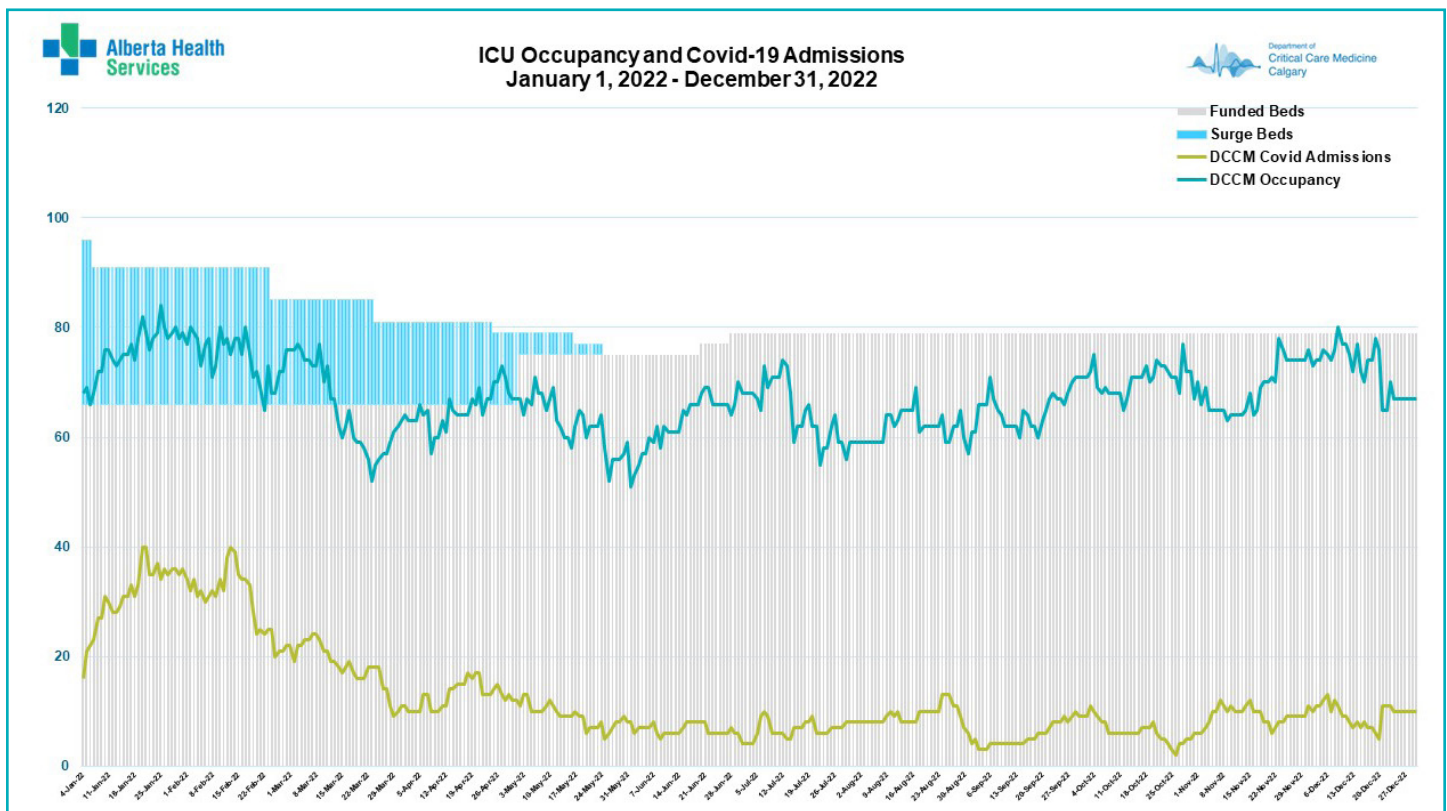
Our communications goal is to maintain an effective and transparent channel for DCCM. We will ensure our communication channels, materials and platforms are up to date.

Hopefully the Last Year of COVID-19



DCCM began 2022 in the midst of the fifth (Omicron and associated variants) wave of COVID-19 in the province. As with the years prior, this created significant challenges to our department from a clinical and organizational perspective, though in this wave and viral variant, the overall impact from the perspective of patient numbers was less than prior waves. The impact was never-the-less significant in the setting of substantial losses of staff to retirement and part-time work and burn-out of remaining staff. Despite this, and in the continued midst of adversity, we are proud to share that our DCCM staff rose to the occasion time and time again. Fortunately, the impact of COVID-19 on adult ICUs in the Calgary Zone has waned over time to a lower but sustained level, with 5-10 patients being managed in our ICUs at any given time with COVID-associated critical illness.

A summary of the impact of COVID on critical care demand during 2022 is summarized in this table:



As a result of the sustained increase in ICU demand, 13 additional ICU beds were permanently funded, increasing the general adult ICU bed capacity in the Calgary Zone from 66 to 79 beds. All prior surge beds were subsequently closed. Though the physical capacity to operate the additional ICU beds is largely present, hiring the additional nursing and allied health staff has been a significant challenge given the health workforce challenges which have evolved during the pandemic. The effects of staff fatigue and burnout are well-recognized and very impactful. A number of innovative ideas are being explored and actioned to try to reduce this impact with the expectations that recovery will most likely take many years.

A big thank you from DCCM to each and every one of our Critical Care staff across all disciplines for always stepping up to the plate to not only adapt but also find innovative ways to fill gaps and meet the demand that COVID has thrown at our department over the last three years. We know this has not been possible without a great deal of personal sacrifice. Hopefully the major impact of COVID is behind us with a brighter future for critical care.

Dan Zuege, DCCM Department Head
Emma Folz, PLC Executive Director



Despite this, and in the continued midst of adversity, we are proud to share that our DCCM staff rose to the occasion time and time again.

Site Updates



Foothills Medical Centre ICU
Foothills Medical Centre Cardiovascular ICU
Peter Lougheed Centre ICU
Rockyview General Hospital ICU
South Health Campus ICU

DCCM is a joint clinical and academic department, Alberta Health Services – Calgary Zone and Cumming School of Medicine (CSM), University of Calgary. It is comprised of members spanning multiple disciplines dedicated to improving the care and health of critically ill patients and their families. We lead critical care through our commitment to clinical care, education and research. A team of 36 intensivists, one physiatrist, and one epidemiologist work alongside a multidisciplinary team of Registered Nurses, Respiratory Therapists, Pharmacists, Physiotherapists, Occupational Therapists, Speech Language Pathologists, Dietitians, Social Workers, Spiritual Care Specialists, Unit Clerks, Health Care Aides, Volunteers, Research Coordinators, QI Staff, Research Analysts and Administrative professionals between five adult intensive care units located in four hospitals across the Calgary Zone. We have a large complement of medical students, residents, fellows and clinical scholars

The General System ICU at Foothills Medical Centre (FMC) continues to provide intensive care, code blue and outreach services to over 1100 inpatients and supports many key programs for the zone; neurosurgery, stroke, hepatobiliary surgery, head and neck cancer reconstructive surgery, burn care, thoracic surgery, and the bone marrow transplant programs, to name a few.

In June of 2022 five additional beds were added to the FMC ICU as part of the provincial initiative to create increased ICU capacity in the province, bringing the capacity to 33 beds. 12 beds are used for Neuro/trauma patients. 21 additional beds serve medical-surgical patients. Since opening these additional beds, the unit has been at 85-90% capacity. 2022 saw 1500 admissions to the ICU.

The increase in capacity and workload has created human resource challenges on the unit. A significant number of nurses, respiration therapists and support staff have been recruited and oriented to Critical Care, but vacancies remain.

Summer and fall 2022 priorities were focused on training and planning for Connect Care implementation. FMC ICU had a successful launch on November 6th with additional support from the zone and provincial superusers.

The ICU Outreach Team, with a ramp-up RN & RRT model, continues to support the site. The team responded to over 800 Code 66 calls and 1000 follow-up visits this past year. The team continues to be instrumental in the ongoing assessment and safe transfer of COVID-19 patients to the ICU as well as providing support to inpatient unit teams during this time of high capacity and acuity.

FMC ICU embraces patients and families as partners in care and we encourage their presence at the bedside and involvement in care. Changes to visitation with the easing of pandemic restrictions have been positive for our patients, families, and staff. When in-person attendance is not possible, virtual patient visits, family attendance during daily multidisciplinary rounds and family conferences with the ICU team continue to be offered. Music Therapy and Pet Therapy continue to support the holistic approach to patient wellness on our unit. Our rehabilitation team is proactive to help patients recover and transition out of ICU.

Education and Research are essential components of the ICU, and our specialty services offer unique and valuable learning experiences. FMC ICU hosts many learners, throughout the year including undergraduate nursing, Advanced Critical Care Nursing, Respiratory Therapy & Allied Health students along with medical trainees and fellows.

Kelly Coutts, FMC Patient Care Manager
Dr. Philippe Couillard, FMC ICU Medical Director

Overview

The Cardiovascular Intensive Care (CVICU) provides high-quality care for post-cardiac surgery patients. This can only happen with the amazing dedication, teamwork, and collaboration of all the departments and multidisciplinary teams involved throughout the cardiac surgery patients' journey. The unit has a total of 22 beds on two separate units (Unit 94 and Unit 104) with 16 of these beds currently funded.

The CVICU at the Foothills Medical Centre serves Southern Alberta with approximately 1500 cardiac surgery cases in 2022. The CVICU specializes in post-operative open-heart surgery with the majority of cases being coronary artery bypass graft (CABG) and valve repair or replacement. Other advanced surgeries cared for in the CVICU include complex thoracic aortic surgery, minimally invasive valve surgery including alternate access approaches to Transcatheter Aortic Valve Replacement (TAVR), as well as Extracorporeal Life Support (ECLS) for both temporary heart and lung support (VV/VA ECMO), and Ventricular Assist Devices (VAD) which provides more durable heart support.

Patient Care

The CVICU multidisciplinary team, in particular the nursing team, has remained busy. In addition to taking care of post-cardiac surgical patients, the team has continued to play an essential role in the care of patients undergoing mechanical circulatory support and ECLS. Team members are commended for their hard work, courage and dedication to providing excellent care in many different ways following the pandemic.

The CVICU consists of a large multidisciplinary team including Registered Nurses, Registered Respiratory Therapists, Cardiac surgeons, Cardiac anesthetists, Cardiovascular Intensivists (many of whom have advanced training in ECHO and ECLS), physiotherapists, and clinical pharmacists as well as many allied health care providers (Unit Clerks, Health Care Aids, housekeeping staff, social workers). CVICU has the highest number of advanced certifications in critical care including IABP, CRRT, three VAD devices, Pulmonary Artery catheters, advanced pacing, Lumbar drains as well as other ICU advanced certifications.

Quality Improvement And Research

Our dynamic multidisciplinary CVICU team continues work on Quality Improvement and research projects including:

- Improving the quality of care for minimally invasive cardiac surgery patients through the development and implementation of a care pathway to optimize recovery
- Relaunch of the Patient Flow Project – Optimizing patient flow from CVICU to cardiac surgery ward Unit 91. The goal is to improve the flow of patients from the CVICU to Unit 91
- Ongoing recruitment for the SMART-BP study which is examining the use of wireless non-invasive real-time blood pressure monitoring and comparing it to invasive blood pressure monitoring

- Ongoing participation in the Venting Wisely initiative which is a pan-provincial initiative to optimize the care provided to patients who are mechanically ventilated with hypoxemic respiratory failure and ARDS using a multidisciplinary evidence-informed care pathway
- Creation of a high-resolution (5D-ICU) quality improvement database for patients who are postoperative Cardiac Surgery to try and eliminate unnecessary variability in care.

Education

The CVICU has a very robust, clinically engaged process of educating our nurses. The extensive advanced certifications require initial certification as well as annual recertification provided by the CVICU clinical nurse educator Chris Coltman. All new ICU nurses are part of the Department of Critical Care mentorship program. This program has been customized for CVICU and provides a supportive learning environment to allow nurses to become independent and highly skilled.

We continue to expand our educational program in the CVICU. We have expanded the number of residents and fellows that rotate through on a monthly basis. We augment learning for residents through a simulation of chest reopening to enhance preparation for this type of specialized acute cardiac life support. In 2022, we welcomed our first advanced CVICU fellow Dr. Michael Chiu through our Clinical Scholar program with the Department of Critical Care Medicine. We will be offering one training position again in July 2023. The goal of this program is to help train future Cardiovascular Intensive Care physicians.

Barb Jones, FMC CVICU Patient Care Manager
Dr. Ken Parhar, FMC CVICU Medical Director



2022, following the pandemic response, the Peter Lougheed Center (PLC) has expanded to 22 permanent beds. PLC continues to actively recruit Registered Nurses to support the expanded bed map. The ICU is supported by two teams of physicians. The A team manages the more acute load, while the B team has ideally a less heavy load and focuses on consults, admissions, code blue and code 66 response. PLC welcomed the addition of two Nurse Practitioners in 2022. These valued members support the B team.

In 2022, the PLC successfully transitioned to the Connect Care clinical information system, the first Calgary ICU to do so, establishing numerous tools and resources to carry forward to future launches.

Patty Infusino, PLC Patient Care Manager
Dr. Dan Niven, PLC ICU Medical Director



Rockyview General Hospital ICU

Extensive work has been completed in regards to the planning and designing of the new Rockyview General Hospital (RGH) Intensive Care Unit. Architectural and functional assessment work has resulted in an innovative and state-of-the-art design for the new combined and expanded ICU/CCU. We anticipate construction to begin in the spring of 2023 with scheduled completion in the fall of 2024. We are grateful for this long-awaited opportunity to update our critical care clinical space to better support patients, their families, and the dedicated healthcare providers that care for them.

We continue to support and grow the Nurse Practitioner role in our ICU setting. These advanced nursing practice providers work alongside our Intensivists and medical trainees in a hybrid team model unique to the ICUs in the city. We are pleased to have spearheaded this integrated NP model, and note with pride, the evolution of this value-add model in other zonal ICUs.

The RGH ICU increased its' critical care bed capacity by 20% to support the provincial critical care capacity initiative. We continue to support our hospital and ICUs across the city, frequently operating at maximum capacity to ensure all critically ill patients receive the expert care they require.

Our Inter-professional projects remain active, including continuing work on optimizing Inter-professional patient care rounds and arterial line insertions by Respiratory Therapists. We are a high-performing site in a number of provincial critical care quality initiatives, notably our work on Delirium Mitigation and Management in the ICU setting and the Venting Wisely project. Our ICU Outreach team is initiating QI work on the review of Rapid Response calls to further optimize patient care and outcomes.

Finally, we welcome Dr. Victor Dong to the role of RGH ICU Medical Director as of March 1, 2023. Our thanks go to Dr. Jessica Wang for her leadership over the past four years, as well as to Dr. Juan Posadas as interim Medical Director over the past few months.

Melissa Redlich, RGH Patient Care Manager
Dr. Victor Dong, RGH ICU Medical Director
Dr. Jessica Wang, RGH ICU Medical Director 2018-2022



The South Health Campus (SHC) ICU focus for the past three years has been on pandemic management and a subsequent Connect Care rollout. Working on these two things has consumed most of the unit resources and not allowed for much other quality improvement work to be completed. The goal is to resume quality improvement initiatives and staff management post Connect Care rollout in the spring.

The ICU remains a very collaborative team working toward achieving patient care goals. The nursing staff is comprised of all RNs along with Nurse Practitioners, Respiratory Therapists, Nursing Attendants, Service Workers, Unit Clerks, Physiotherapists, Dieticians, Pharmacists, Social Workers and Occupational Therapists.

The ICU supports the site with an Outreach Team as well as a Code Blue Team.

Unit Accomplishments

- The multidisciplinary SHC team continues to produce local high-quality research work — the GOTCI trial was finalized and published and the TPE on Sepsis is ongoing and has just finalized recruitment. We are very excited to review the results and see this fantastic work published as well
- Consolidation of the Two Physician Model, facilitating efficient rounds, decreasing interruptions, and responding faster to codes and consults
- Successful rollout of the Venting Wisely initiative

Future Goals

- Continued support of staff to lessen stress and burnout
- Rollout of Connect Care in May 2023
- Resume the OR to ICU Handover working group to navigate deficiencies
- Resume unit-specific quality improvement initiatives
- Performance conversations in the fall of 2023

Rachel Taylor, SHC Manager
Dr. Juan Posadas, SHC ICU Medical Director



Clinical Programs



Critical Care Rehab
Critical Care Strategic Clinical Network
Extracorporeal Life Support
HRF and ARDS
Neurocritical Care
Nurse Practitioners Program
Organ Tissue Donation
Outreach Program

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

Outpatient — Calgary ICU Recovery Clinic

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

The ICU Recovery Clinic is available to ICU care providers as an outpatient rehabilitation resource. We are looking to re-aligning the Recovery Clinic in 2023 to ensure it supports the department and leverages interested providers to the best of our ability.

Inpatient — Consultation Service

An initiative to increase rehabilitation medicine's presence within the ICU was started in late 2022. On a weekly basis, Dr. Grant now rounds in the FMC ICU b-pod to see if this adds value. The feedback has been generally positive. The plan is to continue this initiative going forward. Dr. Grant continues to provide inpatient consultation as requested for various units as needed.

Research

In 2022, the clinic has continued to try to support research. The COVID-19 outcomes project (CANCOV, Herridge and Cheung) was spearheaded by Dr. Manske (Kinesiology) locally with the support of Dr. Hulme (Critical Care). Dr. Lee (Biostatistics) is continuing to look at modelling approaches to past data collected to assess muscle wasting in the ICU with ultrasound. We support various grant applications as co-investigators or collaborators but didn't run any funded studies independently in 2022. Dr. Grant participates in national committees where this is helpful (e.g., Sepsis Canada Rehabilitation and Recovery Working Group chaired by Drs Kho and Boyd).

Education

Dr. Grant contributes to fellow education intermittently at the direction of Dr. Gaudet. The brain injury rehab team remains a resource for the neurocritical care fellow. Joanna Everson (FMC ICU NP) presented at DCCM grand rounds during 2022.

Dr. Chris Grant, Physical Medicine & Rehabilitation

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 in 2022 (Dan Zuege – Senior Medical Director; Dan Niven, Ken Parhar, Kirsten Fiest – provincial project leads; Jeanna Morrissey – CCSCN Manager; Kristin Robertson, Karen Shariff, Christine Filipek, Dan Jewers, Peter Dhillon – provincial practice leads; Emma Folz, Dan Niven – Core Team membership; Faizan Khan – health system impact post-doctoral fellow; and many of our research support staff and trainees). Provincial collaboration benefits our department in many ways. This was clearly evident during the COVID-19 pandemic and continues beyond this.

Many key CCSCN 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, has completed its full implementation stage and is entering a sustainment phase. This program has demonstrated significant increases in the appropriate use of Albumin in ICUs in Alberta translating into substantial health system cost savings.

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, despite the significant stresses of a pandemic, has successfully completed its implementation phase and is now entering a sustainment phase. This program optimizes 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 improving care, patient outcome and health system costs. Thus far, this program has clearly demonstrated substantial and sustained uptake of the intervention and improved processes of care across the ICUs of 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, about to enter its implementation 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.

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, prevention and management of delirium continue, led by Dr. Kirsten Fiest and her team.

Several other CCSCN-led programs of work are evolving with close collaboration with members of DCCM:

Supporting Our Staff – a program of work emanating from the pandemic experience which recognizes the high rates and substantial impact of burnout in ICU staff across disciplines and looks to identify and action mitigations to this phenomenon that are useful and applicable to the critical care environment. Close collaboration with Dr. Tanya Mudry (Werklund School of Education, UofC) who is leading a comprehensive study of burnout in ICU professionals.

Dialyzing Wisely – a program aiming to optimize the use of renal replacement therapy in ICU.

Dr. Dan Zuege, Senior Medical Director, Critical Care SCN



Extracorporeal Life Support

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 2022, almost 40 runs of ECLS were performed in total (including both VA and VV). We are actively using our new CardioHelp system which was one of several that were generously donated to our program by the Calgary Health Trust. These units have improved our monitoring and ease of transport while minimizing risks to the patients such as air emboli and clotting.

In 2023, we look to continue our momentum by expanding our training and simulation exercises for the use of ECLS. We are building on our experience with high-fidelity simulation during the COVID-19 pandemic and expanding that to include cannulation and ECLS emergencies for non-COVID patients. We are developing our own ECLS cannulation simulator for which we hope to routinely train our CVICU fellows on cannulation. We continue to work together with the ECLS programs at the Mazankowski Heart Institute in Edmonton as well as Alberta Children's Hospital to work on areas of mutual interest such as policy, education and simulation. Finally, we move closer to our goal of being accredited by the

international Extracorporeal Life Support Organization as a "Center of Excellence" and therefore further demonstrating our commitment to providing the highest quality of care for patients requiring ECLS.

Being able to provide ECLS is a team sport. This could not happen without the hard work and dedication of our multidisciplinary team including all the nurses (CVICU, ICU, general ICU, and OR), the Perfusion team, respiratory therapists, physician colleagues (including intensivists, cardiologists, cardiac surgeons, and cardiac anesthetists), allied health care workers, as well as senior administrative support locally and provincially.

Dr. Ken Parhar, ECLS Committee Chair and CVICU Medical Director



Venting Wisely — Quality Improvement Project

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 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. Given a significant variation in care across the province, this presented an opportunity to reduce unnecessary variability and ensure all patients in Alberta were receiving the right care at the right time.

Using existing ARDS guidelines and the most recent evidence, we 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 responses 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 successfully 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 HHS grant) to scale and spread this pathway across the province. This initiative is called “Venting Wisely” and is a partnership with the Critical Care Strategic Clinical Network. Currently, we have implemented in all 16 remaining ICUs with improvement in the use of key practices such as lung protective ventilation and prone positioning. This work is being conducted in a pragmatic cluster randomized stepped wedge trial. Formal clinical outcomes will be assessed later in 2023. Focus groups and surveys are being used to conduct a process evaluation. A cost-effectiveness analysis will be conducted at the end. Sustainability efforts will include a state-of-the-art dashboard based on Connect Care data that will allow high-fidelity audit and feedback data to continue to be provided to each site.

Many members of the DCCM have a key role in Calgary-based projects along with the broader provincial-based work and include:

- Gwen Knight, Research Assistant, Dr. Andrea Soo, Senior Biostatistician DCCM, Dr. Karla Krewulak
- Pete Dhillon RRT, Dan Jewers RRT, Andrea Irwin RN MPH, Sheena Morton, RN
- Katie Kissel RN MN CNS, Vanessa Doiron CNE, Michelle Cyca RRT
- Dr Kirsten Fiest, Dr Tom Stelfox, Dr Dan Zuege, Dr Dan Niven, Dr Chip Doig

Dr. Ken Parhar, HRF and Venting Wisely Project Team Lead

The Department of Critical Care Medicine (DCCM), Neurocritical Care (NCC) Program has continued to formalize and grow over this past year. We are thrilled and grateful to be receiving a \$2.5 million dollar donation from the Calgary Health Foundation to aid in our program expansion over the coming five years. With a mission to advance NCC through clinical, education and research excellence, we envision all patients in Calgary and Central/Southern Alberta receiving exceptional, comprehensive, patient and family-centred NCC (Figure 1).

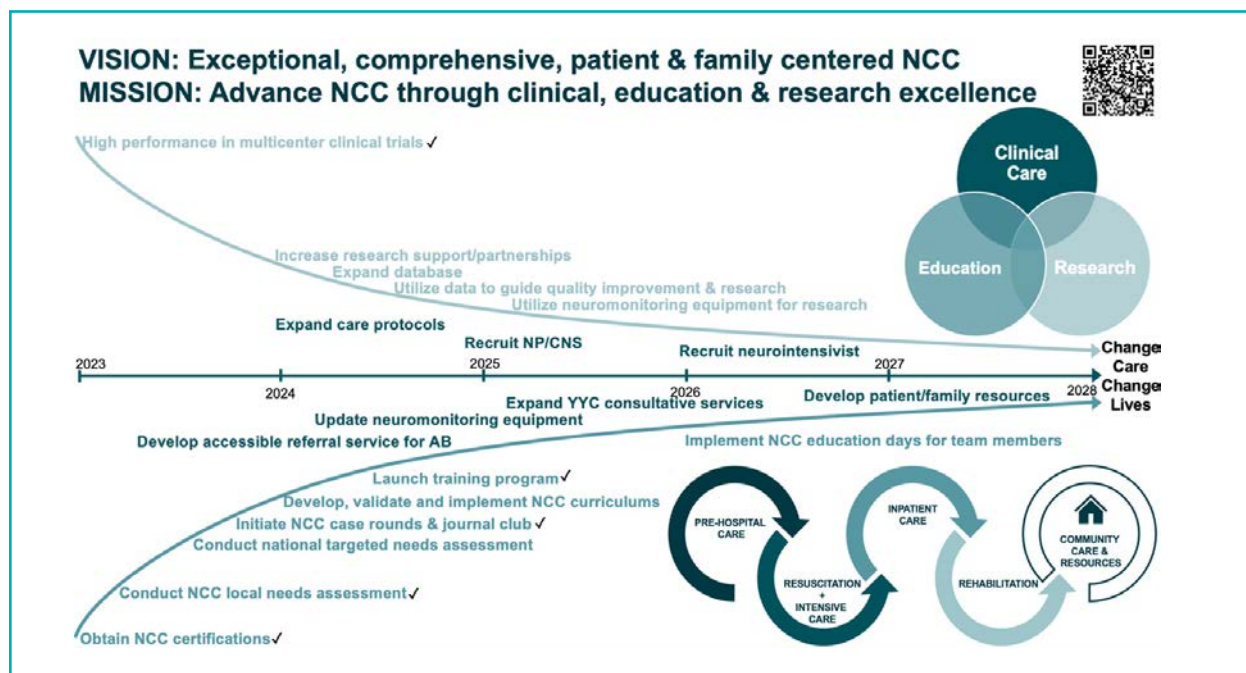


Figure 1

Neurocritical Care (NCC) is a crucial link in the chain of survival and recovery for patients with life-threatening neurological disorders. These patients account for 15-20% of annual ICU admissions within Calgary and Central/Southern Alberta. Post cardiac arrest, neuro-trauma (TBI and SCI), neuro-vascular (SAH, ICH, Ischemic stroke), and status epilepticus account for nearly 90% of diagnoses with an average age of 50 years (IQR 33-65). The rate of devastating outcomes varies widely between 20-70% depending on the diagnosis. This high morbidity and mortality, combined with relatively young patients being impacted, results in a large proportion of disability-adjusted life years. In general, NCC saves lives, improves outcomes, and increases patient/family satisfaction.

The DCCM NCC program consists of three fellowship-trained and board-certified neurointensivists — Dr. Andreas Kramer, Dr. Philippe Couillard and Dr. Julie Kromm — who work with a multidisciplinary team. The program serves Calgary and Central/Southern Alberta clinical teams and patients in need.

- Clinically we strive to assist with diagnostic workups and coordination of targeted care, prevention and management of secondary neurologic injury and systemic complications, evidence-based neuro-prognostication, and when appropriate, supporting organ and tissue donation. This is done via both in-person and telephone support.
- Research remains an additional focus for us. We continue to conduct local research. With the support of the DCCM research team, we have also continued our involvement in several national

and international research trials including HEMOTION, SaHaRA and PROTEST. We will be starting up three additional trials in the coming year including BOOST3, NeuPaRT and RAISE. We have been involved in several national and international guideline committees, whose works will be published soon. These include the Canadian NCC Society and Canadian Cardiovascular Society position statement on neurologic prognostication post-cardiac arrest; the Canadian Critical Care Society, Canadian Blood Services and Canadian Medical Associations Brain-Based Definition of Death Guidelines; and the National Institute of Neurologic Disorders and Stroke Curing Coma Campaign.

- We continue to expand our postgraduate and continuing medical education endeavours. We are thrilled to have successfully trained our first NCC fellow Dr. Ian Schoonbaert who has been hired at the University of Saskatoon as an intensivist/neurointensivist. We continue receiving several CMG and IMG applications for our NCC fellowship and will welcome Dr. Atul Phillips from India this coming academic year as our next fellow. We have also created an NCC rotation for interested residents and fellows. We have had two residents successfully rotate with us this past year and have another fellow rotation planned for the upcoming academic year. We have several past and planned presentations at the annual Neurocritical Care Society meeting, Canadian Neurological Science Federation Congress, Canadian Critical Care Forum, Canadian Critical Care Review, and the World Congress of Neurology.

With the above-mentioned generous donation from the Calgary Health Foundation, we look forward to continuing to build our NCC program through the creation of evidence-based care pathways, purchase of neuromonitoring equipment to facilitate precision/individualized NCC, creation of parallel education initiatives for both physicians and multidisciplinary team members as well as updating of our database to help facilitate ongoing research and quality improvement initiatives that will help inform our efforts moving forward (Figure 2).

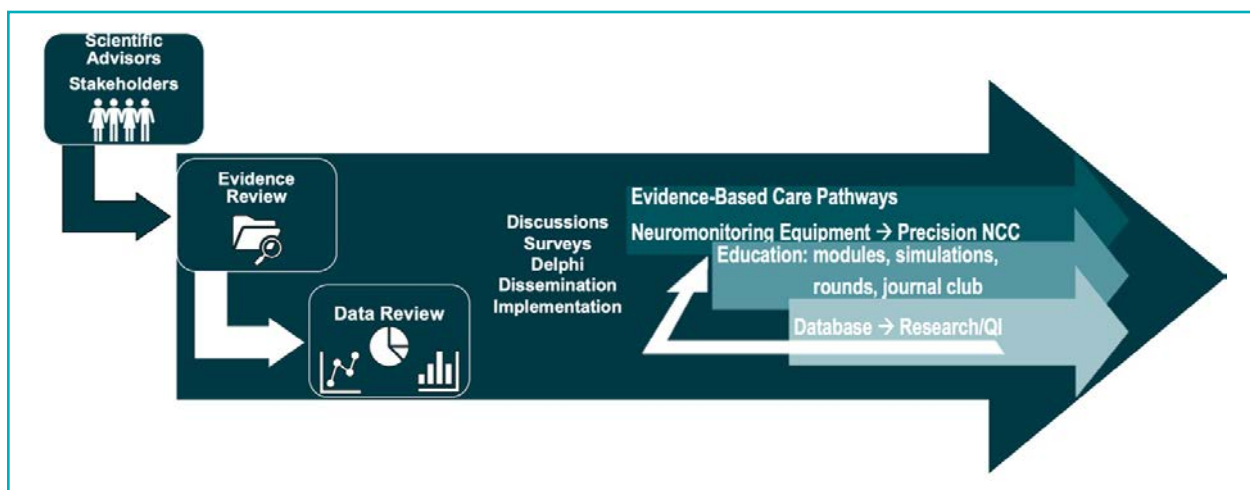


Figure 2:

Dr. Phillippe Couillard, FMC ICU Medical Director
 Dr. Julie Kromm, Neurointensivist/Intensivist
 Dr. Andreas Kramer, Neurointensivist/Intensivist

Nurse Practitioners

It has been an exciting year for the DCCM Nurse Practitioner program with a promise to ongoing progressive strides in furthering the partnership between Critical Care Nurse Practitioners and the multidisciplinary and administrative teams within the Calgary Zone adult ICUs. There has been position expansion, innovative research initiatives and the establishment of a more formalized zonal framework. As the DCCM experiences continuing challenges with ever-increasing patient acuity, census and endemic complications, the Nurse Practitioners (NPs) have continued to provide ongoing patient care excellence, resident and learner support, and inter-disciplinary collaboration.

Notably, we now have permanent NP representation in all Calgary Zone ICUs. This expansion has led to not only the opportunity to fine-tune the NP orientation process but to provide ongoing consistency in direct patient care, provide robust family support and help shape the direction of patient care in addition to improved clinical outcomes.

As highly skilled healthcare professionals with advanced training in critical care, the NPs are well-positioned to provide valuable insights into patient care issues. The DCCM-NPs have been involved in a range of projects, from establishing new treatment guidelines for the chronically critically ill to a qualitative evaluation of the NP's impact in the critical care environment. These efforts have not only helped to advance the field of critical care medicine but have also raised the profile of Critical Care NP's contribution to the service.

Another noteworthy development this past year has been the formalization of the Zonal NP Committee. Looking forward it is expected that this cohesive approach will continue to drive progress and innovation in domains such as research; quality improvement; NP orientation; continuing education; recruitment and retention of NPs and more as NPs continue to play an integral role in shaping the future of critical care medicine.

Emma Folz, PLC Executive Director
Charissa Elton-Lacasse, Nurse Practitioner



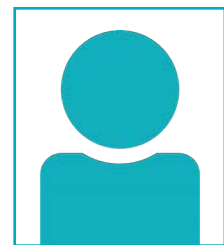
Caralyn Bencsik



Kirsten Deemer



Charissa Elton-Lacasse



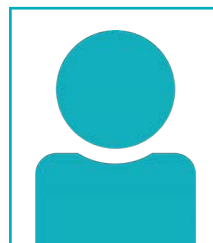
Joanna Everson



Jessica Jenkins



Andrea Petkovic-Wintemute



Robert Ralph



Mathew Wenger

Organ and tissue donation are an important component of high-quality end-of-life care in the intensive care unit. Many families of critically ill patients find comfort in knowing that something positive occurred despite their tragic circumstances. Almost a million Albertans have expressed their intent to donate organs and tissues at the end of life via the Alberta Organ and Tissue Donation Registry. Every year there are numerous Albertans that die while waiting for an organ transplant. One organ donor can potentially donate as many as seven to eight organs. One tissue donor can potentially help more than 50 patients!

In 2022, for the third consecutive year, we had our highest number of deceased organ donors ever (55; approximately 24 donors per million population). This included 35 donors after death by neurological criteria (DNC), nine donors after circulatory determination of death (DCD), and 11 patients that started out as DCD donors, but progressed to DNC during organ allocation. There were 97 patients that were referred to the Southern Alberta Organ and Tissue Donation Program (SAOTDP) for consideration of organ donation. There were also 20 tissue donors (ocular or non-ocular).

The “Specialist in End-of-Life Care, Neuroprognostication, and Donation” (SEND) Program has been an important part of improving donation-related care of patients within Southern Alberta. Calgary-based SEND physicians in 2022 included Philippe Couillard, Julie Kromm, Chip Doig, Selena Au, Paul Boucher, and John Kortbeek. With John Kortbeek’s retirement, Jessica Wang has kindly agreed to take on this role. Other SEND physicians that collaborate closely with our group include Meagan Mahoney (ACH), Adam Hall (Red Deer), Tavish Barnes (Lethbridge), Sean Spence (Lethbridge), and other colleagues



One organ donor can
potentially donate
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from northern Alberta, led by Dennis Djogovic (HOPE Medical Director). The SEND Program has greatly enhanced the process for transfer of potential organ donors from outside Calgary. The provincial program hosted a very successful donation symposium in November 2022, attended by about 250 critical care professionals and other stakeholders.

One of the roles of the SEND program is to review medical records for the purpose of identifying missed organ donation opportunities. Every month, there are an average of about four to five missed opportunities across the province. Our goal is to bring this number close to zero. Missed opportunities are regularly shared with our critical care and emergency department teams, seeking ways to minimize these cases in the future. An important finding of medical record reviews has been that critical care and emergency professionals are still underutilizing the provincial donation registry. All of this information is reported quarterly to ICU Medical Directors.

An amendment to the Alberta Human Tissue and Organ Donation Act was passed in the Alberta Legislature in May of 2022 and will come into force on April 1, 2023. An important aspect of this legislation is the new requirement for “mandatory referral” of all deaths (except when overt contraindications to donation are present) to SAOTDP.

The Department of Critical Care Medicine continues to be involved in research related to organ and tissue donation. A particularly important publication this year that included patients and families from Calgary was Sarti et al, The experiences of family members of deceased organ donors and suggestions to improve the donation process: a qualitative study. CMAJ 2022; 194: E1054-1061. Families of organ donors voiced the need to have greater support during critical transitions in the donation journey (e.g. when death is declared and the donor’s body goes to the operating room).

Chip Doig, Julie Kromm, and Andreas Kramer have all been heavily involved in the development of the new Canadian guidelines for death determination, which are due to be published in April 2023. Knowledge translation initiatives are being planned to assist the Department of Critical Care Medicine in adopting these revised recommendations.

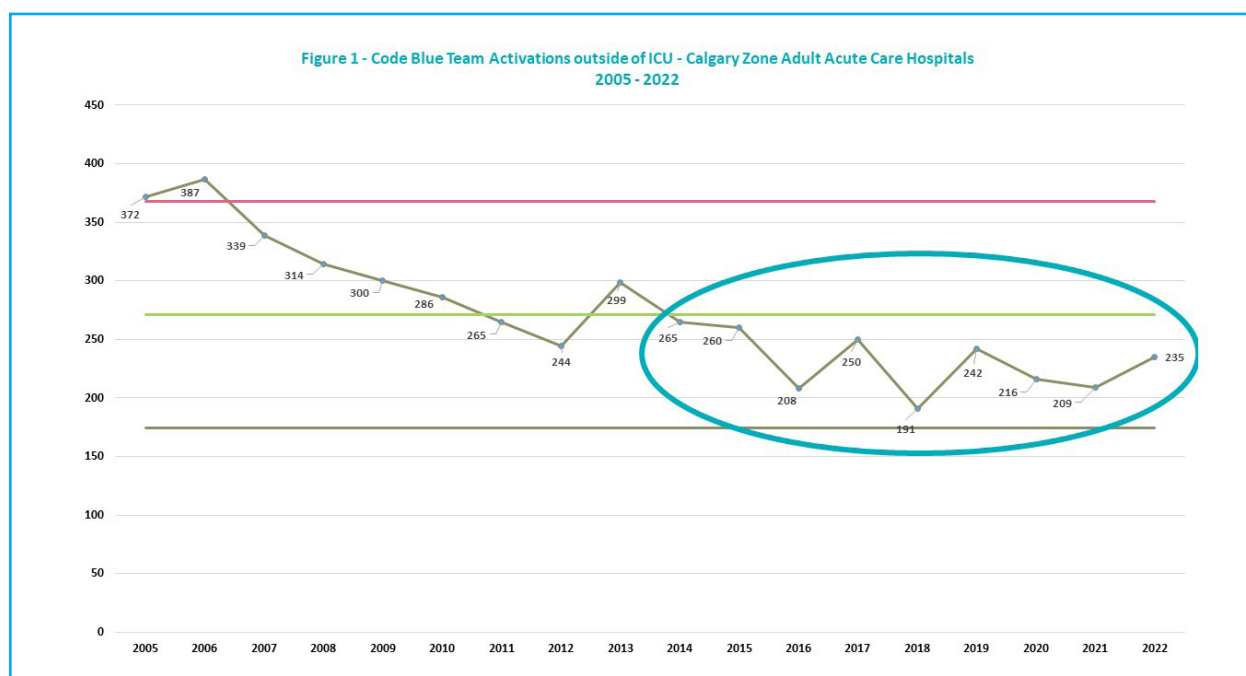
We are very grateful for the consistent and enthusiastic support of the Department of Critical Care Medicine for organ and tissue donation. Providing great end-of-life care is definitely a team effort!

Dr. Andreas Kramer, SAOTDP Medical Director
Lead, Southern Alberta SEND Physician Program

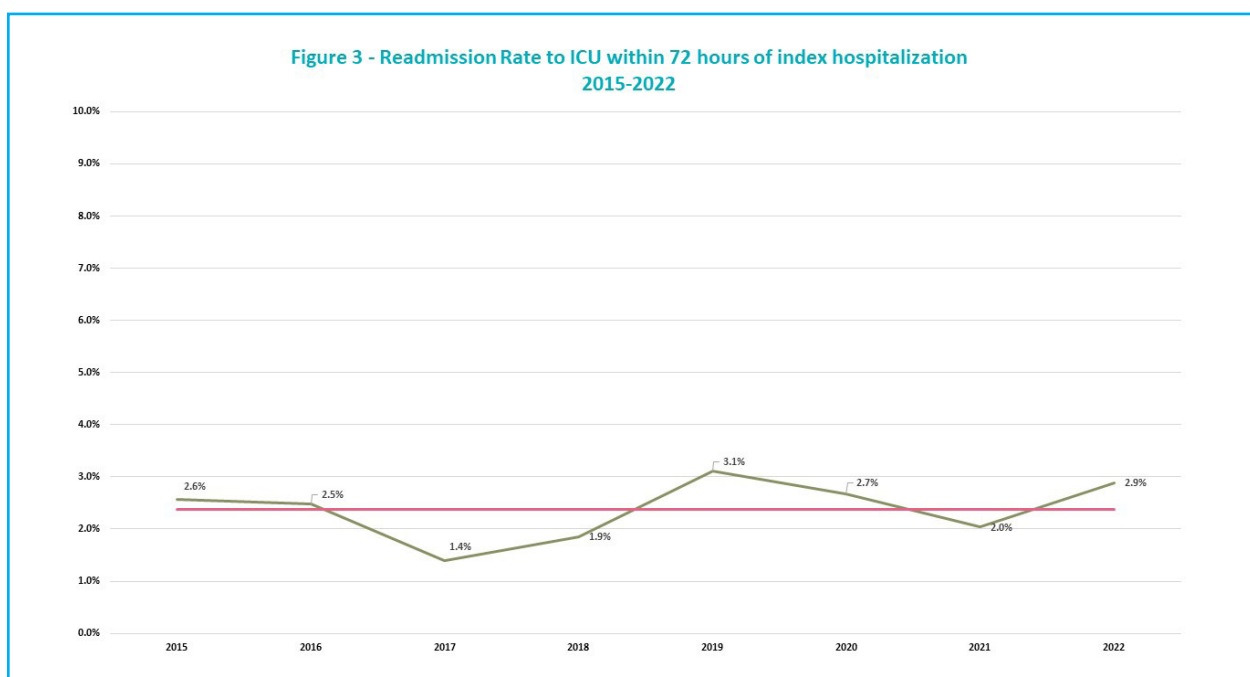
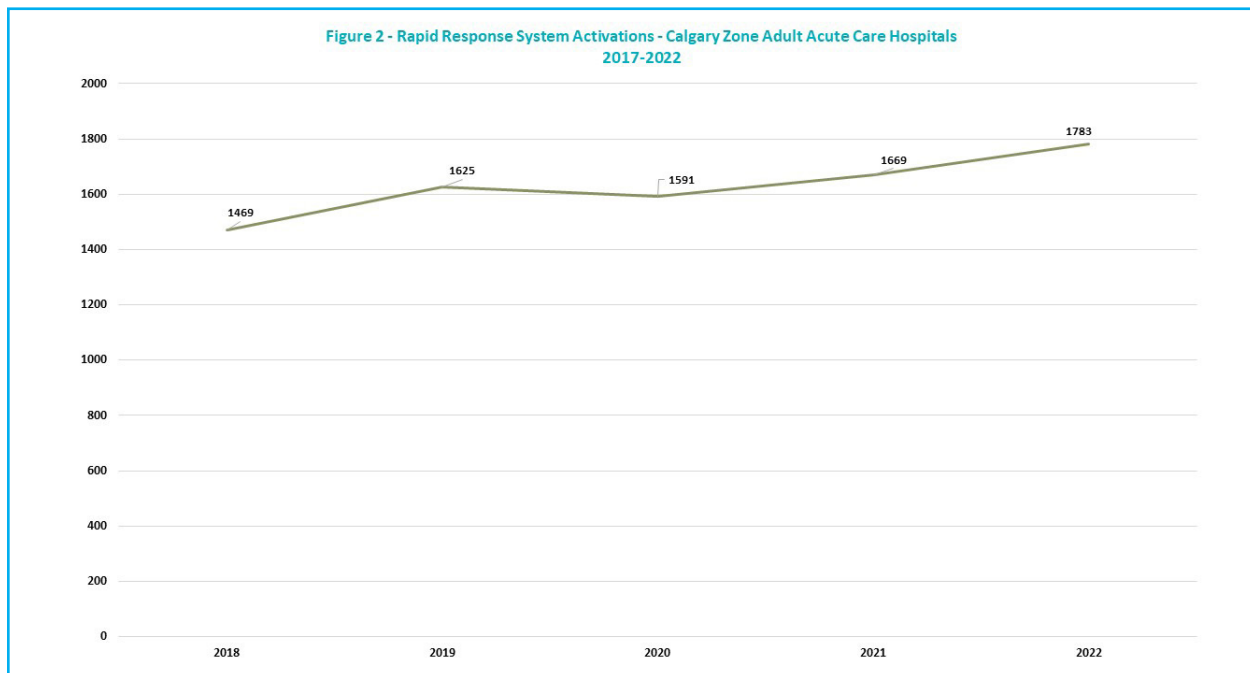
The provision of high-quality critical care within our five busy ICUs in the Calgary Zone requires the 24/7 on-site presence of providers who continuously oversee the complex care needs of this patient population, including responding to rapid changes in physiology which happen frequently and over short time spans. In addition to the care provided to those already admitted to the ICU, an integral component of our program is a multidisciplinary rapid response (outreach) team, comprised of an experienced ICU nurse, respiratory therapist and physician, who respond to urgent medical activation and code blue calls, and consult on clinically deteriorating patients on inpatient units. The overriding goal of this team is to improve patient outcomes — either by preventing the need for intensive care (via rapid assessment and appropriate ward-based treatment and decision-making) or by the rapid institution of critical care. ICU outreach physicians are the core physician providers for the ICU outreach teams and are also key tier-one providers in all five ICUs from 17:00 to 8:00 hours every night, thus providing mission-critical staffing of our adult ICUs.

Our ICU outreach program was implemented in 2006 in all adult Calgary hospitals at the request of the former Calgary Health Region, to address concerns about the safety of care provided to hospitalized patients whose health deteriorates during their hospital stay, in particular during off-hours when fewer medical resources are available on-site. Recently published systematic reviews have shown that implementation of ICU outreach/rapid response programs results in clinically significant reductions in cardiac arrests and deaths in hospitalized patients. The ready availability and advanced skill set of multidisciplinary ICU outreach teams were pivotal in our care protocols during the COVID-19 pandemic, when hospitalizations and inpatient acuity significantly increased. In April 2022, 13 new beds were added to our four medical-surgical ICUs, a relative 19.7% increase, from 66 to 79 beds.

As shown in **Figure 1**, the number of code blue team activations in hospitalized patients outside of our adult ICUs decreased from 387 in 2006 to 242 in 2019, with no significant change during the past three years, despite the dramatically increased number of hospital admissions during the COVID-19 pandemic.



This has occurred despite a significant (21.4%) increase in the number of overall rapid response team activations since 2018, as shown in **Figure 2**. These data highlight the positive impact that our ICU outreach/rapid response team has had in reducing the incidence of inpatient cardiac arrests, despite increasing patient numbers. In addition, as shown in **Figure 3**, our ICU readmission rate within 72 hours of discharge from the unit has remained below 3% during the past two years, despite enhanced patient acuity during and after successive waves of the pandemic.



The specific metrics related to multidisciplinary rapid response calls in the calendar year 2022, are highlighted for each of our four medical-surgical (non-cardiac) ICUs in **Table 1**. Despite an increasing number of calls relative to previous years, the time spent at the patient's bedside has averaged 77 minutes, highlighting the complex care needs of this patient cohort.

At present, there are 33 outreach physicians on our rota, who are credentialed family physicians, anesthesiologists, emergency medicine physicians, internal medicine physicians or cardiologists, with additional Critical Care training and experience. We are continuing to recruit highly skilled and motivated practitioners to this mission-critical role.

2022	FMC				PLC				RGH				SHC				Total			
# calls	849				252				509				173				1783			
Level of Call	I 47%	II 46%	III 8%		I 37%	II 54%	III 9%		I 34%	II 60%	III 6%		I 35%	II 47%	III 17%		I 40%	II 52%	III 8%	
Time on a call	103 minutes				53 minutes				58 minutes				57 minutes				77 minutes			
% admitted to ICU	22%				21%				12%				14%				18%			
MRP responded	57%				76%				83%				48%				66%			
MRHP directed care	46%				62%				74%				45%				56%			
GOC	R 75%	M 23%	C 0%	U 1%	R 71%	M 29%	C 0%	U 0%	R 70%	M 28%	C 0%	U 2%	R 73%	M 25%	C 0%	U 2%	R 73%	M 26%	C 0%	U 1%
Change in GOC	R-M 3%	R-C 1%	M-C 2%	M-R 1%	R-M 2%	R-C 1%	M-C 4%		R-M 2%	R-C 1%	M-C 3%		R-M 4%	R-C 1%	M-C 2%		R-M 3%	R-C 1%	M-C 3%	

Table 1

Dr. Richard J. Novick, Deputy Dept Head, DCCM
Kevin Sedor, Outreach Program Assistant

Clinical Informatics



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

Connect Care

Successful implementations at PLC in May 2022 and at FMC in November 2022 with planned implementation in May 2023 at SHC and RGH. At planned implementation sites, numerous planning activities are underway with active unit engagement. Fortunately, there is a lot of accumulated experience and expertise within the Department which can serve as a resource to area trainers and superusers that are busy training end users for the SHC/RGH ICU implementation. The Connect Care Critical Care Area Council and its adult subgroup have significant Calgary leadership (Emma Folz, Dan Zuege) and representation. There are numerous activities supporting Connect Care optimization at FMC and PLC.

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 the department transitions from MetaVision to Connect Care for clinical purposes, we are busy ensuring that we continue to provide near real-time summary operational, quality and performance data to support optimal care delivery and planning. Several provincial quality improvement initiatives have been supported by reporting this data. For example, these datasets have been an invaluable resource for provincial initiatives such as the appropriate use of albumin in critically ill patients and the appropriate use of mechanical ventilation in patients with Acute Respiratory Distress Syndrome (ARDS). New initiatives such as the appropriate use of blood transfusions and optimizing the use of renal replacement therapy in critically ill patients will be supported by these datasets.

The vital importance of a critical care-focused informatics team, with knowledge and skill in both the clinical and informatics aspects of critical care in Alberta, independent of the information systems in use, cannot be overstated. 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.

Dr. Luc Berhiauume, Medical Informatics Lead

Quality Assurance & Patient Safety



Patient safety culture starts with awareness and readiness to review safety events in a timely and just manner. The DCCM Patient Safety Roadmap summarizes how we learn about safety events in our department, as well as how we respond when serious safety events occur. The Reporting and Learning System (RLS) reports, and the zonal Mortality Working Group (MWG) reviews are important forums for how we learn about and discuss safety events.

2022 Patient Safety Cases and Outcomes Driven by RLS and MWG

Tracheostomy change complications — Policy Update led by Tona Laerz

Within the span of two months, the Quality Assurance Committee (QAC) reviewed seven RLS related to complications of tracheostomy change. Issues related to knowledge gaps and team readiness during the procedure were addressed via an update to a zonal practice support document. With respiratory therapy (RT) leadership from Tona Laerz, the tracheostomy practice support guideline was updated to include the use of a pre-trach change assessment/risk review checklist, incorporation of the airway management pause, and infographics depicting varying tube diameters and shapes. In addition to the presentation at a zonal MWG in March, there were lectures to disseminate document updates to the RT staff.

Milk Allergy Anaphylaxis – Safety Consult led by Tracey Receveur and Selena Au

A patient was admitted to the ICU, intubated and sedated. As part of standard admission, tube feeds were initiated. Shortly after, the patient developed hypotension, tachycardia and was difficult to oxygenate and ventilate. It was then noted that the tube feed initiated contained milk protein; the patient had a documented anaphylactic allergy to milk.

This case was examined as a consult to build on previous work done through a pediatrics QAR. A Connect Care allergy build request has been submitted by Nutrition Services for soy, milk, and fish products. In the interim, we've disseminated these learnings via posters, our departmental newsletter and grand rounds teaching.

Mental Health Event — QAR led by Katie Kissel, Tracey Receveur and Selena Au

A patient with known mental health history admitted with a self-harm attempt was able to access medical scissors within the ICU with thoughts of self-harm. Existing patient monitoring documents did not include

physical environment reviews for risks to patient safety. The DCCM updated its policies to include environmental preparedness steps for patients with self-harm risk. Work for the Behavioural Safety Program has been underway since the summer of 2022 for staff assessment and readiness for patients at risk of violence.

RGH Airway Events – Aggregate QAR for the RGH QAC led by Jessica Wang, Melissa Redlich and Brian Zarsky

Two events occurred with patient deterioration and delays in airway capture. A quality assurance review (QAR) has been completed by the RGH QAC to involve the Departments of Anesthesia and Emergency Medicine as stakeholders in the development of a site-based strategy for the provision of emergency airway services on the ward.

Difficult Airway Events — Aggregate QAR led by Selena Au, Tracey Receveur and Anne Chang in collaboration with Departments of Otolaryngology (ENT), Anesthesia and Emergency Medicine

Three additional events relating to airway capture occurred during the 2021–22 year. In December, we hosted a virtual QAR meeting focused on improving care for difficult airway patients with nearly 100 multi-professional participants from DCCM, ENT, Anesthesia and Emergency Medicine. The recommendations from these rounds include the formation of an Advanced Airway working group involving The Department of Critical Care Medicine, Anesthesiology, Emergency Medicine, Airway Surgical Services, Respiratory Services and Connect Care to address issues of difficult airway documentation/provider flagging, creation of a Difficult Airway Care Plan, and creation of Site-Specific Difficult Airway Resource Pathway algorithm.

Retained Guide Wire – Concise QAR led by Selena Au and Tracey Receveur

A patient at a rural hospital was found to have a retained central line guide wire from central line placement several months ago at one of the Calgary ICU sites. A concise QAR was done to follow up on previous recommendations for procedural documentation to incorporate formal line count. The case was reviewed with partners in Diagnostic Imaging to optimize best communication practices when foreign bodies have uncertain significance during the radiological review. Teachings were disseminated at ICU Grand Rounds.

Just Culture

Over the course of 2022, the DCCM has submitted 1409 RLS. The staff are encouraged to submit events where they see a risk of harm or actual harm. Thank you to our staff for their tireless efforts to document safety events within a Just culture! These reports are reviewed both individually and in aggregate for trends that drive change. Examples of RLS trends reviewed with intervention include medical device examination (e.g. recurrent thrombophlebitis from IVs), safety flagging (e.g. central line with sulfa components used in a patient with sulfa allergy), and heparin protocol changes during Connect Care transition.



Thank you to our staff
for their tireless efforts to
document safety events
within a Just culture!
These reports are reviewed
both individually and in
aggregate for trends that
drive change.

RLS Reports Submitted Per Unit	
FMC ICU	409
FMC CVICU	147
PLC ICU	423
RGH ICU	237
SHC ICU	193
Total	1409

Learning Culture

All charts from patients dying within the ICU and within 48 hours of ICU discharge are subject to quality assurance review by the 36-physician member Mortality Working Group. Multi-professional site-based meetings are held to discuss opportunities for system improvement, as well as to learn from academic autopsies presented in partnership with the Department of Pathology. Cases requiring longer analysis and/or with learnings ready for staff dissemination are presented at bimonthly Zonal Mortality Working Group meetings to allow for department-wide sharing in a collaborative open-discussion environment.

2022 Mortality Working Group Year at a Glance

Site	MWG Cases (Deaths)		Educational Autopsy Cases	Summary of Classification (Collected for notable themes)				Summary of Recommendations (Summarized for classes II to IV)		
	Number of Charts Reviewed	Charts Reviewed out of ICU deaths		I	II	III	IV	External	Internal	Both
FMC	81	81/301	31	68	10	2	1	3	6	4
PLC	129	129/163	17	116	12	1	0	6	5	2
RGH	92	92/98	12	74	16	1	1	10	6	2
SHC	82	82/84	7	76	5	1	0	2	2	2
TOTAL	328	328/646	67	334	42	5	2	21	19	10

Legend: Classification I- No care process concern, II- Suboptimal care processes, III- Suboptimal care processes causing patient harm, IV-Suboptimal care processes causing severe patient harm. Cases of Classification II-IV are referred to the QAC for review internally (DCCM) or externally (non-DCCM)

Special Thanks

We would like to thank Tracey Receveur as the DCCM Patient Safety Lead for the last 5 years, and Drs Luc Berthiaume and Frank Warshawski for their many years of clinical and patient safety expertise contributed to the QAC!

Dr. Selena Au, QAC Co-Chair & QI Medical Director
 Emma Folz, QAC Co-Chair & Executive Director
 Dr. Dan Zuege, Department Head DCCM
 Tracey Receveur, Patient Safety Lead
 Katie Kissel, Clinical Nurse Specialist
 Alan Sutton, Respiratory Therapy Lead
 Kelly Coutt & Dr. Paul Boiteau, FMC Representatives
 Patty Infusino & Dr. Kevin Solverson, PLC Representatives
Melissa Redlich & Dr. Victor Dong, RGH Representatives
 Rachel Taylor & Dr. Selena Au, SHC Representatives
 Miranda Kavalench, Administrative Support

Quality Improvement



The culture of Quality Improvement (QI) is integral to the strategic direction, planning and operations for the 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.

Quality Improvement Culture

Quality Improvement (QI) is integrated and considered in all aspects of Critical Care clinical operations and supporting processes. The QI portfolio is one small component of the broad scope of QI work that occurs across the department; QI methodology essentially touches all aspects of care and operations — a guiding principle towards the mission of continuous improvement in patient care.

Active Quality Improvement Initiatives

Contact Lens Screening Program

In critical care, there are challenges in knowing the contact lens status of patients due to their critical illness and eyes being closed for extended periods of time. To address this and prevent potentially serious adverse events, the DCCM developed a process with supporting practice support documents and education for the screening, assessment, detection and removal of contact lenses for ICU patients. Efforts in 2022 – early 2023 have prioritized Connect Care nursing content revision, supporting both documentation and information retrieval central to key process steps during ICU admission processes:

1. RN screening of contact lens wearer status — wearer, non-wearer, or unknown
2. Basic RN assessment for contact lenses
3. Advanced MD blue light (foreign body) assessment for contact lenses with removals, where detected

In Connect Care, this nursing documentation during ICU admission will be supported in a single location, in order to ensure information regarding process completion can be easily retrieved by nurses. [The Contact Lens Screening, Detection, and Removal Practice Support Document](#) (last updated March 2023) reflects these new and current practices.

One good news story on this initiative was staff discovered a patient from another province was transferred with contact lenses in situ; these were found as a result of the education and checklist that had been developed for the zone.

Staff Safety

The Quadruple Aim of healthcare delivery includes improving the experience of providing care. Several incidents have highlighted the urgency of addressing staff safety from patients and their visitors. Staff safety is a priority — Since the summer of 2022, collaborative work has been underway with Workplace Health and Safety to address violence to the staff at a system level.

Safety From Violent Patients

The creation of a targeted ICU Behavioral Safety Program (BSP [adapted from the AHS provincial BSP program]) was completed in 2022 with the endorsement of the ICU executive and key unit stakeholders. The majority of Calgary Zone ICUs have proceeded with implementation in early 2023 (where prior implemented, units have also updated processes to reflect zonal ICU [alert application and removal processes](#)). Key components of the ICU BSP include:

- Standardized process to enroll patients in the BSP when the risk of patient-worker violence is identified. There are two processes for behavioral safety alert application:
 - Witnessed violence/threats of violence
 - Use of the provincially endorsed VAST (violence and aggression screening tool) for ICU patients, per ICU team clinical judgment (deemed best approach after stakeholder review, given lack of tool validity for the ICU population in entirety)
- Daily safety planning with the interdisciplinary team, including review of patient-specific triggers/escalating behaviors, supportive interventions and plan of care
- Use of standardized communication aids (e.g. posted purple circles) to promote interdisciplinary discussion and staff safety prior to room entry
- A standardized approach to remove the behavioral safety alert when no longer appropriate
- Key emphasis on staff safety. RN education has included:
 - Recognition of clinical scenarios/risk factors posing a risk of violence
 - Recognition of escalating behaviors
 - Training in de-escalation and emergency response strategies (including Non-Violence Crisis Intervention (NVCI) Training — ongoing across the zone)

Links to additional BSP resources can be found on the DCCM website, Education Page, under Shared Zonal Education.

Safety From Violent Visitors

Abuse from non-patients is a safety issue that is often under-reported by staff members but remains a risk to mental injury and burnout. To understand the current environment, the DCCM completed a zone-wide multi-professional scoping Survey on Staff Safety from Visitor Violence in October 2022. Survey results indicated gaps in staff training for self-protection, awareness of visitor policy, and practices in staff reporting/debriefing/support. Staff provided suggestions for educational support. Clearly, an intervention to create a safe work environment must be comprehensive and responsive to all staff. In this initial phase, Workplace Health and Safety will be presenting with DCCM in April 2023 a primer to de-escalation strategy, as well as reviewing additional resources available for staff education and support.

QI Projects in the Sustainability Phase

In the last two years, the quality improvement portfolio had pivoted to pandemic planning and reporting and current site-based priorities are for Connect Care implementation. In 2020, the OR-to-ICU Handover Project entered its sustainability phase at FMC and PLC ICUs, implementation phase at the SHC ICU and planning phase at the RGH ICU. Following the successful Connect Care implementation, renewal of the site-based multi-departmental team meetings for ongoing QI work on this important project is scheduled to continue. Other ongoing QI work within the DCCM entering its sustainability phase include Venting Wisely, Rational Use of Albumin, and quarterly delirium provincial metrics reporting.

Upcoming QI Projects

Novel QI Rounds

Since the fall of 2022, the DCCM has updated the bimonthly multi-professional Zonal Patient Safety Rounds to incorporate elements of practice metric review as a springboard to new quality improvement work. With special thanks to the Physician Learning Program for their partnership, Dr. Selena Au (DCCM QI and Patient Safety Medical Director) and the DCCM have begun work on an ICU physician practice metric dashboard, and creation of data visualization usable by DCCM teams during rounds to discuss best practices in critical care medicine therapeutics. We look forward to the further development of ICU Learning QI Rounds in 2023!

Provincial Partnerships

Dialyzing Wisely, a provincial initiative to improve the provision of dialysis to critically ill patients led by Dr. Oleksa Rewa began its implementation phase in Calgary sites in late 2022. The Calgary DCCM is keen to support Dr. Rewa and the CCSCN for this important body of QI work!

Local Wins

Led by ICU NP, Andrea Petkovic, the PLC ICU site commenced the “Getting to Know the Residents” QI project to welcome in our rotating trainees. The Fun Factsheets are one way for residents to share something about themselves prior to starting a challenging rotation as integral members of the ICU teams!

Dr. Selena Au
Quality Improvement Medical Director

De-implementation of Low-Value Albumin Fluid Resuscitation in Critical Care

Overuse of low-value care remains a major threat to providing high-quality healthcare. Fluid resuscitation using human albumin is an exemplar low-value care practice. Albumin is a blood product used intravenously to treat patients whose intravascular volume is severely reduced. Evidence has identified a small number of patient populations that derive benefit from the use of intravenous albumin, however, the vast majority of albumin is commonly prescribed for patients where rigorous science indicates no benefit. The objective of the current study was to reduce low-value albumin use among adults admitted to ICUs in Alberta, Canada.

Since 2016, Dr. Niven has led a program of research to reduce low-value albumin use among adults admitted to ICUs in Alberta. The work began with a successful pilot study in the Edmonton Zone ICUs during 2017 and 2018. From this came the scale and spread of the albumin intervention through the RATIONALE (Critical Care Optimization of Albumin Ordering in Alberta) study. RATIONALE was a registry-based stepped wedge quality improvement intervention trial designed to reduce low-value albumin use among adults admitted to ICUs in Alberta. Implementation took place in all 16 adult ICUs in Alberta and was driven by a team of Calgary investigators facilitated by collaboration with the Alberta Critical Care Strategic Clinical Network (SCN) as well as the Physician Learning Program. Clusters of two ICUs began using the intervention every two months until all 16 ICUs were using the intervention. The quality improvement intervention targeted established barriers and facilitators and was co-developed by a multi-disciplinary working group and consisted of:

1. identifying clinical champions in each ICU;
2. targeted and tailored education to prescribers and bedside nurses;
3. changes to the way in which albumin was ordered; and
4. bi-monthly unit-level audit and feedback.

Data was obtained from eCritical, the provincial electronic medical record and data registry for all ICUs. The primary outcome was the proportion of patients without an evidence-based indication for albumin who received at least one unit of albumin during ICU admission. Secondary outcomes included the number of albumin units prescribed per patient that received any albumin, and the amount of avoided biomedical waste, and cost savings from avoiding unnecessary albumin use.

RATIONALE – Critical Care Optimization of Albumin Ordering

RATIONALE is a provincial quality improvement initiative led by Dr. Daniel Niven with the goal of aligning clinical practice for albumin fluid replacement with strong evidence that indicates that for most patients, normal saline or ringer's lactate can be used with less risk to the patient and lower cost to the healthcare system while producing similar outcomes.



↓ 2,749

patients have avoided an unnecessary blood product



↓ 36.7%

reduction in low value albumin use after rollout



↓ 2,444

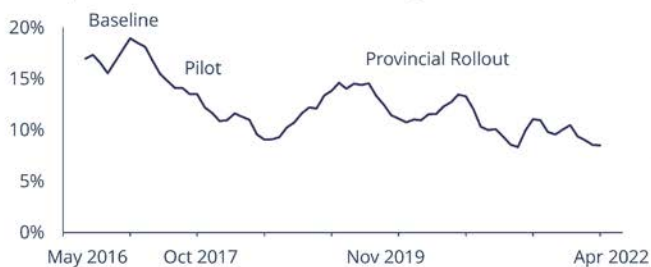
kg of biomedical waste saved from incineration



\$ \$790,212

real savings generated from albumin not delivered

% of patients admitted to ICU receiving low value albumin



Intervention rolled out to 16 ICUs in Alberta

- clinical champions
- education
- process change (order sets)
- bi-monthly audit & feedback data reports
- Tableau dashboard to support sustainability



Alberta Health
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Physician
Learning
Program

Intervention implementation began with the first cluster of ICUs in November 2019. The final ICUs were brought on board in January 2021. As of September 2022, RATIONALE was associated with a 43.9% relative reduction in the proportion of patients without an evidence-based indication for albumin who received at least one unit of albumin during ICU admission. This resulted in 1,347 patients avoiding unnecessary blood product exposure, 1,219kg of biomedical waste from being sent to incineration and a real savings of \$400,279. Since the inception of the albumin program of research in 2016, 2,749 adults admitted to Alberta ICUs have avoided unnecessary blood product exposure. This has led to \$790,212 in real savings.

Al albumin quality improvement dashboard has been built to aid in the sustainment of the successes of RATIONALE. It can be found on eCritical home page on AHS Insite. Sustainability will also be facilitated by the Critical Care SCN through their recently formed sustainability office.

Dr. Dan Niven
PLC ICU Medical Director and RATIONALE Study Lead

Education



Critical Care Medicine Residency Program

The DCCM at the University of Calgary has been lucky to train adult Critical Care Medicine (CCM) physicians for the past 34 years. The Royal College of Physicians and Surgeons 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.

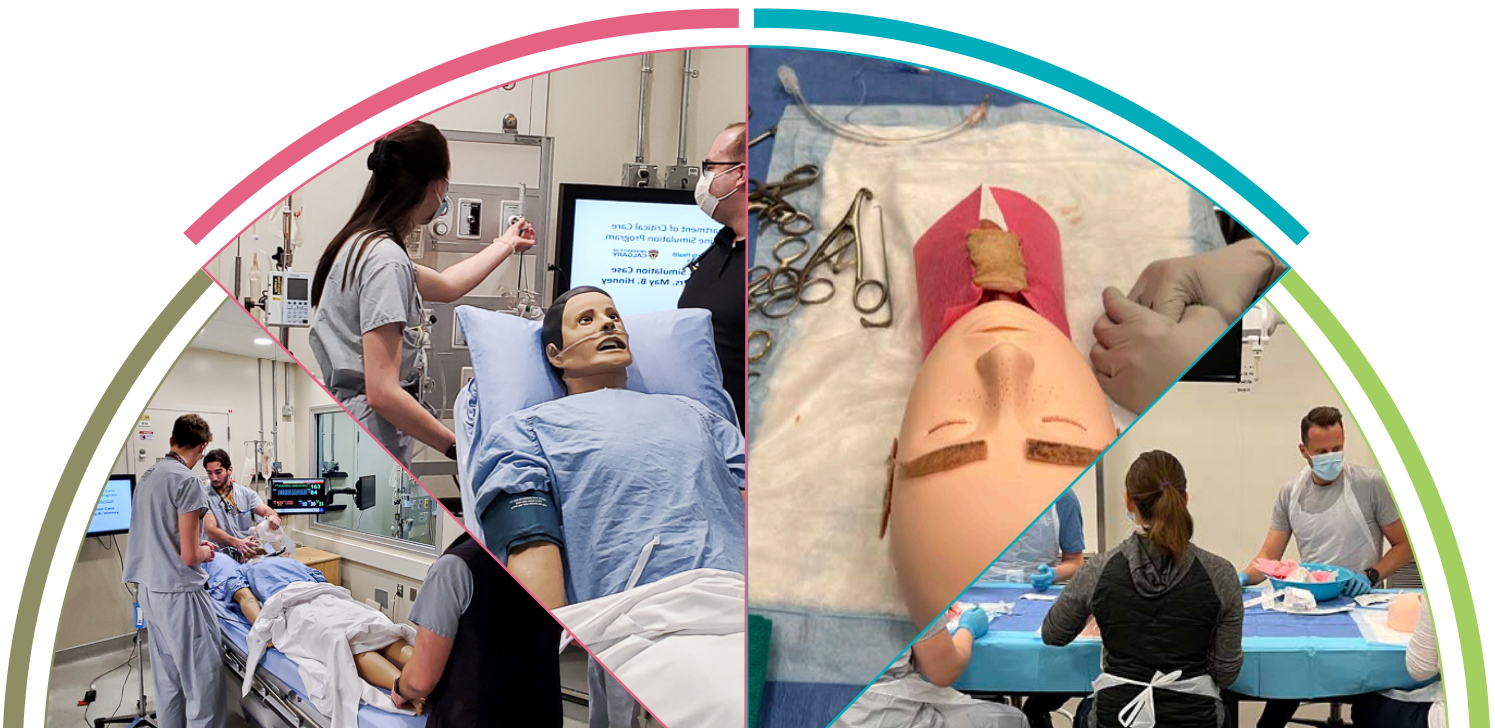
Presently, there are eight trainees in our CCM Training Program from a variety of base specialty backgrounds. We continue to provide entry positions for four trainees each year with a guarantee of two years of funding. Recruitment was once again highly successful this year with four applicants from across 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 four graduating trainees were once again successful in attaining their FRCPC designation in CCM this past fall.

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) has been 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. Experience to date with the new paradigm has been positive and has afforded our trainees and clinical faculty greater hands-on experience with workplace-based observations, feedback, and coaching in the moment. We remain excited about this transformational educational change and are actively furthering education scholarship by exploring our experience with the transition to, and lived experience of, this new educational paradigm.

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.



Continuing Professional Development

High-caliber citywide CCM Grand rounds continue to be a weekly staple as part of our continuing professional development activities. 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. We continue to offer these sessions in webinar format due to the impacts of the COVID-19 pandemic. Webinar recordings are available for review on our DCCM website.

MDSC Program

Believing that we needed to continuously “raise the bar” in critical care education, a Critical Care MSc/Ph.D. graduate training program was developed nearly two decades ago within the University of Calgary Department of Medical Sciences to better support departmental academic activities. It offers MSc/Ph.D. 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 three 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 Ph.D. 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 or Dr. Brent Winston, Graduate Coordinator, Critical Care Graduate Program at bwinston@ucalgary.ca.

Curriculum Innovations

Several curriculum innovations have been firmly embedded in recent years. Our didactic and hands-on curriculum on the application of ultrasound and echocardiography in the ICU is now a staple. 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. Top-quality portable 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 due to the high-quality teaching and learning opportunities 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.

Community ICU

To further enhance our clinical and academic collaboration with our referring rural centers, the Training Program integrates a one-month community-based rotation at the Red Deer Regional Hospital intensive care unit. Our fellows participate in this rotation supported by the Distributed Learning and Rural Initiative (DLRI) Program offered by the UofC. The educational experience and professional development afforded by this rotation continue to be universally highly regarded and immensely valued by our trainees. We're appreciative of our Red Deer colleagues for fostering such a great experience as well as the resources in kind 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 remained high in 2022. Based on medical student requests for the upcoming academic year, CCM rotation interest remains strong.

Clinical Scholar Program

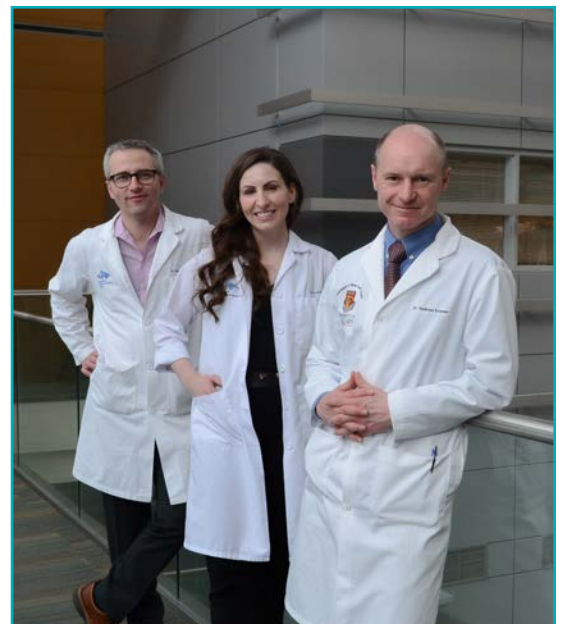
2022 heralded the reinvigoration of a Clinical Scholar Program for the DCCM and a renewed commitment by the department to sustain it long-term. Two scholarship opportunities have been made available to Canadian-trained Critical Care Medicine (CCM) physicians who desire additional specialized training in anticipation of an academic CCM career. The first is a Cardiovascular Intensive Care (CVICU) Clinical

Scholar position to help candidates develop the requisite knowledge and skills required to work in a specialized CVICU. This advanced clinical fellowship training opportunity allows for 12 months of integrated training in CVICU and all relevant related disciplines. The second is a general Clinical Scholar position. This academic opportunity allows for up to 24 months of protected time to complete academic pursuits relevant to the field of CCM. The program allows for the Clinical Scholar to pursue a higher degree (MSc or PhD) as part of the academic component of the Clinical Scholar role or additional subspecialized clinical or research fellowship training relevant to the practice of CCM. To support additional academic training, Clinical Scholars are provided the opportunity to work a limited number of locum physician weeks within the Calgary Zone of Alberta Health Services. The successful completion of the Program is an important pathway of individual professional development and career advancement for Canadian-trained CCM specialists after their base training. It's also an important way that the DCCM contributes to the development of subspecialized national CCM expertise and advances the science of caring for the critically ill.

Neurocritical Care Fellowship Program

The DCCM was thrilled to develop and launch a neurocritical care fellowship program in 2021 at the University of Calgary. Recognizing the paucity of opportunities within Canada to obtain subspecialized training in caring for neurologically injured patients, the DCCM has responded by developing a structured, competency-based fellowship opportunity. Spearheaded by Dr. Julie Kromm and neuro-intensive care colleagues Drs Andreas Kramer and Philippe Couillard this comprehensive training opportunity has come to life welcoming our first fellow in July 2021. We anticipate one position available on a yearly or biannual basis going forward. This

will help grow both local and national expertise in neurocritical care and meaningfully impact patient care in centers across Canada.



COVID-19 Pandemic

Finally, the COVID-19 pandemic has once again made 2022 a challenging year with far-reaching impacts experienced across all facets of the Education Office's endeavors. 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 were once again recalled to home service in the ICU to meet surging patient care needs because of the pandemic. Simultaneously, the DCCM also benefitted from the "can-do" attitude of other departments whose trainees volunteered to redeploy to help out during several waves of COVID-19 pandemic surges impacting 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 reimagined in new ways. Our curriculum has had to move to an online format leveraging Zoom. We successfully hosted our CaRMS interviews virtually as well.

In closing, we would like to recognize and celebrate all 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 emergency. 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 thankful to see the pandemic start to subside and looking forward to brighter days ahead.

Dr. Jonathan Gaudet, Critical Care Medicine Residency Program Director

Clinical Research



Clinical Research
Graduate Program — MDSC Program
McDonald Lab Highlights
Parhar Lab Highlights
Winston Lab Highlights
Departmental Research Report Q3
Research at a Glance
Supervised Research Trainees
Research Grants
Research Publications/Presentations
Abstracts

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 as follows.

2022 brought many changes to the Department's research infrastructure. We welcomed Dr. Monica Cepoiu-Martin as Research Program Manager and Dr. Braedon McDonald served as Interim Director of Research and Innovation. We continued our momentum in recruitment, enrolling 180 patients in 14 studies across the Calgary Zone.

We saw major publications from Dr. Parhar's prone positioning trials (led out of Calgary) in JAMA and BMJ, with many local co-authors. Calgary also contributed to the ARBS-Corona study, the results of which were published in Critical Care Medicine with Dr. Winston as co-author. Calgary was a large contributor to other clinical trials, including REVISE (co-led locally by Drs Niven and Stelfox) and Co-Pilot (led by Dr. Kramer). The department initiated new trials in collaboration with our funding partners at the Canadian Critical Care Trials Group, including FISSH and LIBERATE. Some studies closed in 2022 after highly successful recruitment periods, including REVIVAL (led locally by Dr. Doig) and INDEX (led locally by Dr. Couillard).

Department members published at a greater pace than ever before, with 111 publications in 2022. Dr. Yipp received a highly competitive CIHR Project Grant for his work on neutrophils in H1N1 influenza. Many department members collaborated on other major funding applications, the results of which are still incoming.

Through periods of uncertainty and flux we continue to pursue research opportunities as a department that will ultimately improve the care and lives of critically ill patients and their families.

Dr. Kirsten Fiest, Director of Research and Innovation

Critical Care Graduate Program — MDSC Program

Several years ago, a Critical Care MSc/Ph.D. graduate training program was developed within the University of Calgary Department of Medical Sciences to better support departmental academic activities. It offers MSc/Ph.D. 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 three 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 Ph.D. degrees. Many Critical Care trainees have augmented their training by getting an advanced degree in the MDSC Critical Care subspecialty program. Students enrolled in the program are expected to present their basic science and clinical research at local, national and international conferences and students are expected to publish 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 Medicine 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 David Gugel, MDSC Graduate Program Administrator, Graduate Sciences Education in the Cumming School of Medicine at medgrad@ucalgary.ca or Dr. Brent Winston, Graduate Coordinator, Critical Care Graduate Program at bwinston@ucalgary.ca.

Trainee Achievements 2022

McDonald lab trainees published 9 papers (first or co-authors) in 2022, presented 13 abstracts at conferences, and received 5 major awards.

1. Ph.D. program transfers — Jared Schlechte and Diana Changirwa successfully transferred to the Immunology Ph.D. program.
2. New student — Toluwatise Ehindero joined the lab as a Cellular, Molecular, and Microbial Biology (CMMB) honours student for a 1-year project investigating *Candida albicans* colonization in the lungs of ICU patients.
3. Awards — Diana Changirwa (Ph.D. student) received an Immunology Program Entrance Award, as well as a trainee travel award for a platform presentation at the Fungal Immunity — Gordon Conference in Galveston Texas.
4. Awards — Jared Schlechte (Ph.D. student) received the Alberta Graduate Excellence Scholarship - Indigenous award, the William H Davies Medical Research Award, as well as the Immunology Program Ph.D. transfer award.
5. Award — Breenna Dobson (MSc Student) received the 2022 Sepsis Canada Scientific Meeting Trainee Award.
6. Award — Dr. Benjamin Gershkovich (ICU fellow) received the 2022 ASICP Best Oral Presentation Award.



Notable Publications 2022

McDonald lab led 6 and co-authored 4 additional publications in 2022 (including 1 in press, and 1 preprint). This includes 5 first or co-first-author papers for trainees in the lab. The common theme across all publications was collaboration – including collaborations with other DCCM research groups including Dr. Yipp and Dr. Doig, as well as many other local and external collaborators.

Notable Studies 2022

Analysis of the first phase of the MICRO-ICU study (Microbiota-Immune Interactions and Critical Illness Outcomes in the ICU) was completed in 2022, and results will be forthcoming in a publication in Nature Medicine (in press, 2023).

Notable Grants 2022

A Clinical Problems Incubator Grant from the Snyder Institute catalyzed a new project investigating the impact of *Candida albicans* colonization on immune function and outcomes in critical illness.

[Dr. Braedon McDonald, Interim Director of Research and Innovation](#)

Parhar Lab Highlights

Team Members

In 2022, we had a team of as many as seven members (three hired research assistants as well as four KT practice leads) in addition to multiple multidisciplinary team members. In 2021, Ken took on his first Graduate Student Committee membership for an MSc student in Community Health Sciences. In 2023, we look forward to welcoming our first graduate student as part of the Parhar Lab. Through hard work, resiliency and collaboration there were many major milestones and successes to celebrate in 2022.

Actively Funded Major Projects

Implementation Science and Cluster Randomized Stepped Wedge Trial (TheraPPP study) implementing the “Venting Wisely” pathway in all adult Critical Care studies

In this study, our team in partnership with the Critical Care Strategic Clinical Network completed the implementation of a care pathway for patients who are mechanically ventilated. This project uses an

implementation science-based strategy to adopt this pathway. The pathway was piloted successfully in one ICU and has successfully been implemented in all 17 adult ICUs in the provinces as a stepped wedge cluster randomized study. Data analysis on outcomes will begin in the spring of 2023. This work has been funded by CIHR (KP-NPA) and Alberta HHS funding (KP – NPA).

Awake Prone Positioning for COVID respiratory failure

We co-led (with Jason Weatherald-Edmonton and Waleed Alhazzani-McMaster University) an international multicenter RCT looking at the role of awake-prone positioning for patients with COVID-19. This work was successfully published in the Journal of the American Medical Association (JAMA) in late spring 2022. As follow-up work, we co-led and conducted a systematic review on awake-prone positioning that was published in the British Medical Journal in late 2022, where Ken Parhar was the co-first and corresponding author. This work led to a rapid practice guideline that we were a part of publishing. We are currently assisting the World Health Organization (WHO) with a rapid practice synthesis of the awake-proning evidence to support a WHO guideline.

Collaborative Projects

Ken is a co-applicant and co-investigator on several CIHR-based project grants from within the Department of Critical Care (Stelfox – Accelerate and Fiest – COVID family), as well as outside DCCM (Murve – Inflammation). In addition, he has an expanding role in multiple national and international collaborations including being a steering group/CIHR co-applicant on several respiratory failure projects including the use of helmets and non-invasive ventilation (HONOUR, Scales Sunnybrook), and Dual Lumen catheters for ECMO (Fan, TGH). Most recently he has been invited to be on the steering group for a large international platform trial (PRACTICAL) for respiratory failure interventions being led by the University of Toronto. This will provide Calgary the opportunity to play a key role in likely future landmark Critical Care trials which will include re-examining the role of steroids in ARDS and also the role of Driving Pressure in the mechanical ventilation strategy.

Notable Presentations in 2022

In 2022, Ken was invited to present at the Canadian Critical Care Forum as a speaker to provide a presentation on Mechanical Power and he was faculty at the Canadian Critical Care Review Course and gave a lecture on the Management of Cardiac Patients in the ICU.

Dr. Ken Parhar, FMC CVICU Medical Director

Winston Lab Highlights

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 the Medical Sciences Graduate Program. Dr. Winston also coordinates two of the three graduate courses in the Critical Care Graduate Program and is on the GEC of the DCCM. In 2022, Dr. Braedon McDonald assisted with coordinating the MDSC 623.02 course and Dr. Kevin Solverson assisted with coordinating the MDSC 623.03 course.

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 distress syndrome (ARDS, both covid and non-covid mediated), in sepsis and septic shock and in severe traumatic brain injury (TBI), with the goal of applying precision medicine in these disease processes. Currently, Dr. Winston is examining the metabolomics of COVID-19 pneumonia and ARDS and is planning to examine the metabolomics of COVID-19 Variants of Concern. As part of Dr. Winston's research team, Dr. Winston is working with Mohammad Banoei (who finished his Ph.D. and is doing metabolomics in Dr. Ian Lewis' lab). He has had two summer students and has a new graduate student starting in his lab. He works closely with Dr. Chel Hee Lee in biostatistics in the DCCM. Dr. Winston has been working closely with the ARBs Corona Group over the last year on COVID-19. The Winston team has published seven publications over the year and has received four grants — three as a PI and three CIHR grants as a co-I or collaborator.

His team has been involved in Clinical trials involving sepsis, COVID-19 and ARDS. Dr. Winston was an invited presenter to the American Thoracic Society annual meeting and the ICRP Seminar series at the University of Calgary. He is a regular presenter at the Canadian Critical Care Translational Biology Group (CCCTBG) and the Canadian Traumatic Brain Injury Research Consortium (CTRC). Dr. Winston filed a new patent in 2021-2022: US Patent application 111218P-2. Filed July 2021. Metabolomic profiles in serum predict global functional neurological outcome and death at three and 12 months following severe traumatic brain injury by Mohammad Banoei, David Wishart and Brent W. Winston.

Dr. Brent Winston, Coordinator of the Critical Care Graduate Program

Yipp Lab Highlights

The Yipp lab continues to pursue discovery research to generate new information in which to base translational medicine. In 2022, the Yipp lab led two major programs that culminated in highly impactful publications. Using patient blood samples from all four adult Calgary ICUs, we performed single-cell genomics on thousands of immune cells to understand how each individual cell contributes to the immune cellular community. We did this in patients with life-threatening COVID-19 and compared them to life-

threatening bacterial infections. In addition to discovering how divergent individual immune responses were between infections, resulting in global community-level immune alterations, we also discovered new ways in which corticosteroids work in COVID-19. Interestingly, the immune-altering benefits of dexamethasone were only observed in males, and our provincial eCRITICAL database supported the idea that females in Alberta ICUs did not have improved outcomes when given steroids for COVID-19, unlike males. This multidisciplinary project was published in [Nature Medicine 2022](#). This publication has already been cited 84 times, covered by 18 news outlets and has an online Altmetric score of 280, which places it in the top 1% of the >400,000 articles published at the same time.

The second major research program directed by the Yipp lab in 2022, was a study inspired by ICU mortalities due to severe influenza and secondary fungal pneumonia. Here, Nicole Sarden a PhD candidate in the lab used mouse models and human ICU blood samples to show that influenza, SARS-CoV-2 and steroids all negatively impact the bodies natural antibody-producing cells called innate B1-lymphocytes. This was fundamentally important as it finally shed light on virus-associated lethal fungal infections. Indeed, both influenza and COVID-19 increase risk for severe pulmonary Aspergillosis, and now we have a mechanistic reason that could lead to improved diagnostics and therapeutics. This research was published in [Science Translational Medicine 2022](#), [Research journal club 2022](#), [Watching the immune system](#). Since December 2022, this article has received an Altmetric score of 295, and has been covered by 11 news outlets. Its Altmetric score also places it in the top 1% of the >400,000 articles published at that time.

There was substantial online and radio media coverage related to both of the articles.

Dr. Bryan Yipp, Intensivist, Associate Professor, University of Calgary



The Department of Critical Care Medicine (DCCM) is fortunate to have strong ties to multiple institutes across the Cumming School of Medicine. Researchers in our department are members of the Calvin, Phoebe and Joan Snyder Institute for Chronic Diseases, the O'Brien Institute for Public Health, the Libin Cardiovascular Institute and the Hotchkiss Brain Institute. These ties allow for collaborations across disciplines and methodologies, strengthening the impact of the research we conduct.

The Snyder Institute is focused on advancing the capacity to ease the burden of chronic and infectious diseases through foundational work on prevention, treatment, and cure. The DCCM is happy to partner with the Snyder Institute on its Clinical Problems Incubator Grants, which are designed to spur novel clinical questions into experimental research. Snyder members include Drs McDonald, Winston, and Yipp. The O'Brien Institute's mission is to advance public health through research excellence, championing research to promote population health and high-quality sustainable health care for all. It is led by two DCCM members, Dr. Tom Stelfox (Scientific Director) and Dr. Kirsten Fiest (Associate Scientific Director, Health Systems), and also counts Drs Doig, Jaworska, Niven, Parhar and Zuege as members. The Hotchkiss Brain Institute strives to inspire discovery and apply knowledge toward innovative solutions for neurological and mental health disorders. Drs Couillard, Kramer, and Kromm represent the DCCM as members of the Hotchkiss Brain Institute. The Libin Cardiovascular Institute connects cardiovascular research, patient care and education in Southern Alberta. Drs Boucher, Ferland, Parhar and Zuege represent the DCCM as institute members.

[Dr. Kirsten Fiest, Director of Research & Innovation](#)

Jenne Lab Highlights

The Jenne Lab had six papers published in 2022. Collectively these works focus on the role of inflammation in the host response to both infectious and non-infectious diseases and included an assessment of clotting potential in at-risk metastatic bone disease patients and the use of viruses to treat cancer. In addition, the Jenne Lab received two CIHR project grants to use intravital microscopy to study animal models of viral infection. The Jenne Lab has also been engaged in public outreach, participating in more than 120 local, national and international media interviews in 2022 and contributing to numerous public lectures and panels on viral disease and vaccines. Dr. Jenne was recognized with the 2022 Distinguished Immunologist award from the University of Manitoba Immunology Graduate Students Association and received the University of Calgary Teaching Award for Full-Time Academic Staff.

Dr. Craig Jenne, Associate Professor, University of Calgary

Kubes Lab Highlights

Dr. Paul Kubes continued to study how the immune system affects the host during infections. This year he published a paper in Nature (Impact factor-69.5) showing how the immune system helps to repair a wound after an S.aureus infection. He discovered a novel role for monocytes in the repair process that included the regulation of leptin. The work involved four institutions and four CSM institutes and two faculties. He has collaborated with numerous international researchers in the area of the host response to S.aureus. He also published a number of additional papers exploring the importance of immunity in cancer (Nature Communications, Cancer Immunol Res) and led a consensus conference on neutrophils and cancer published in the Journal of Experimental Medicine.

Dr. Kubes was successful in multiple applications this year including one at CIHR and a second bridge grant from CIHR. He also wrote a grant on behalf of the Vice President of Research Office at the University of Calgary Biosciences Research Infrastructure Fund CFI for \$13 million to expand the level three facility so that COVID-19 research and other pathogens including TB that has allowed the recruitment of Dr. Nargis Khan a TB researcher from McGill.

Dr. Kubes was on the scientific board of Sepsis Canada and participated in the Canadian Critical Care Translational group.

Dr. Paul Kubes, Professor, University of Calgary

Current DCCM Clinical Studies

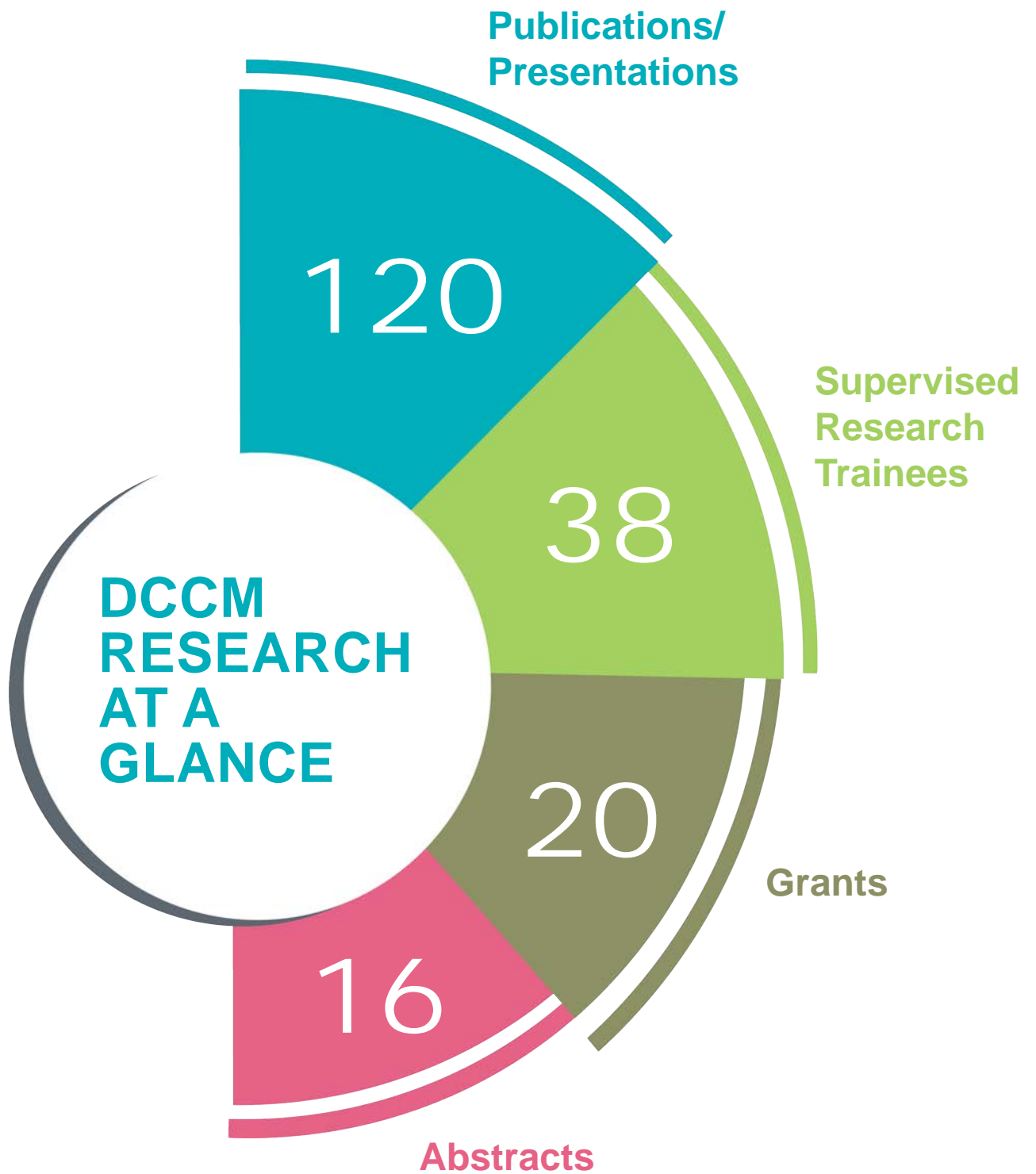
Clinical Studies					Department Member Participation (n=)	
Industry Trial	Non-PI Grant	Local Initiated Trial	Not funded	DCCM PI Grant	PI	Co-I
1	14	3	2	2	10	23

On-going Enrolment – Calgary Zone

Study Name	# Active Enrolment Sites	Patient Enrolment		Start Date
		Most Recent Quarter	Total	
ARBS Corona	2	0	400	Jul-20
Balance	2	0	48	Jan-16
BOOST 3	1	0	0	Feb-22
COVI-PRONE	4	0	92	Oct-20
CATCO	1	0	12	Jun-20
Corona I	4	0	12	Nov-20
CCEPTR	2	0	16	Jan-20
Co-Pilot	1	0	50	Nov-19
ECMOCARD	1	0	89	Jan-20
FISSH	2	0	3	Apr-22
HEMOTION	1	0	32	Nov-18
INDEX	1	0	47	Feb-18
MICRO ICU	1	0	55	Aug-19
Neur02	1	2	2	Jan-22
Protest	1	0	18	Nov-19
RE-ENERGIZE	1	0	14	May-16
REVISE	2	5	92	Jan-20
REMAP-Cap	4	2	4	Apr-21
REVIVAL	4	0	13	Jun-21
SAHARA RCT	1	2	24	May-18
Sprint-Sari	1	0	150	Jan-20

Patient Enrolment (YTD)

2022	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	Nº per 100	Total	Nº per 100	Total	Nº per 100	Total	Nº per 100	Total	Nº per 100
Screened	832	53	66	13	371	45	68	14	1,337	40
Missed*	0	0	0	0	0	0	0	0	0	0
Enrolled	40	3	1	0	19	2	1	0	61	2
Admitted	1,559		512		829		483		3,383	



Supervised Research Trainees

Trainee Name	Primary/Co-Supervisor
Simon Guienguere (Doctoral candidate) Amanda Leong PhD student, Pharmacist - Critical Care Medicine	Dr. Christopher Doig
Therese Poulin, BSc Neurosciences Student Em Schalm, MSc in Epidemiology Abby Thomas, MSc in Epidemiology Laurie Lee, PhD Epidemiology Janelle Boram Lee, PhD Epidemiology Dr. Faizan Khan, Post-Doctoral Research Fellow Dr. Anmol Shahid, Post-Doctoral Research Fellow Dr. Yiyang Lee, Post-Doctoral Research Fellow Research Mentor, Dr. Natalia Jaworska, Clinical Assistant Professor	Dr. Kirsten Fiest
Tanner Fahlman, Undergraduate Project Student Kathryn Strayer, Undergraduate Project Student Amanda Zucoloto, PhD Student Chris Connors, Visiting PhD Student - University of Birmingham, UK Diana Changirwa, MSc Student Jared Schletche, MSc Student Breenna Dobson, MSc Student Gabriela Quiroz-Olguin, PhD student	Dr. Braedon McDonald
Amanda Leong, PhD Student Research Mentor, Dr. Natalia Jaworska, Clinical Assistant Professor Research Supervisor, Dr. Andrew Bond, Internal Medicine Resident	Dr. Daniel Niven
Dr. Stefan Edginton – Critical Care Fellowship – PEEP in ARDS Dr. Lawrence Gutman – Critical Care Fellowship – Academic Advisor Abby Thomas, MSc in Epidemiology	Dr. Ken Parhar
Dr. Irina Adamova, Palliative Care Medicine fellow, University of Calgary Dr. Andy Wong, Critical Care Medicine fellow, University of Calgary Chanda Mwansa, medical student, University of Calgary Catherine McIntyre, Masters of Nursing, University of Calgary	Dr. Amanda Roze des Ordons

Trainee Name	Primary/Co-Supervisor
Em Schalm, MSc, Department of Community Health Sciences Maruthi Mutnuri, MSc., Department of Community Health Sciences Camillo Valderrama Cuadros, Postdoctoral Fellow Dr. Faizan Khan, Post-Doctoral Research Fellow Dr. Anmol Shahid, Post-Doctoral Research Fellow	Dr. Thomas Stelfox
Dr. Chris Humphries, Resident Dr. Brandon Hisey, Critical Care Medicine Fellow Stefan Edginton. Critical Care Medicine Fellow	Dr. Kevin Solverson
Riley Fedorak, Critical Care SCN Studentship Muhammad Saahim Salman, Critical Care SCN Studentship Eric I Pimentel Guerrero, MSc, Medical Sciences Program Mariam Ansari, Medical Sciences Program	Dr. Brent Winston
Mika Virues- Summer Student Mahum Rashid- Summer Student Stuart Doig- Summer Student Eliana Pyon- Summer Student Carlos Hiroki. PhD Immunology program Nicole Sarden. PhD Immunology program Luke Brown. PhD MDSC Mortaza Hassannabad. MSc MDSC Dr. Masato Watanabe MD. Visiting professor	Dr. Bryan Yipp

Research Grants

Year	Sponsor	P/CO Investigator	Title	Amount
2022-2026	CIHR	PI: Dr. K. Fiest	Canadian Critical Care Trials Group COVID-19 Response: defining critical care capacity in Canada; testing treatments through large-scale adaptive clinical trials; & establishing the evidence base to inform clinical and health system management decisions	\$4,000,000
2022-2025	CIHR	Co PI: Dr. T. Stelfox	Canadian Training Platform for Trials Leveraging Existing Networks (CAN-TAP-TALENT) (P.I A. Cheung)	\$4,314,243
2022-2026	CIHR	Co PI: Dr. T. Stelfox	Re-purposing the Ordering of 'Routine' laboratory Tests among hospitalized medical patients (RePORT study) (P.I A. Ambasta)	\$665,552
2022-2027	CIHR Project grant	PI: Dr. B. Yipp	Investigating the role of neutrophils during influenza A H1N1	\$1,021,275
2022-2022	Snyder Institute for Chronic Diseases (Clinical problems incubator program)	NPI: Dr. B. McDonald	Combatting infections in the ICU by targeting the fungal microbiome	\$27,730
2022-2204	CIHR	COI: Dr. K. Fiest, Dr. Niven	Moral distress in critical and primary care providers from the COVID-19 pandemic: A cross-provincial mixed-methods case study.	\$248,373
2022-2027	CIHR	COI: Dr. K. Fiest	The Life-Threatening Illness National Group (LifTING) Research Training Platform: Spanning Boundaries Between Research and Care'	\$240,000
2022-2022	Ontario SPOR SUPPORT Unit (OSSU)	COI: Dr. K. Fiest	Co-creation of a framework to engage patients in preclinical laboratory research	\$25,000
2022-2023	CIHR	COI: Dr. K. Fiest	Partnering with Canadian Youth and Families to Co-design a User-centered Digital Health Tool to Manage the Effects of the COVID-19 Pandemic and Future Public Health Crises on Youth Mental Wellbeing	\$99,525

Year	Sponsor	P/CO Investigator	Title	Amount
2022-2025	Clinical Trials Project CIHR	COI: Dr. K. Fiest	The Corticosteroid Early and Extended (CORT-E2) Randomized Controlled Trial	\$4,266,042
2022-2024	HAHSO AFP Innovation Grant Competition	COI: Dr. K. Fiest	The Corticosteroid Early and Extended (CORT-E2) Randomized Controlled Trial	\$194,962.02
2022-2024	CIHR	COI: Dr. T. Stelfox, Dr. Niven	Stress Ulcer Prophylaxis in the Critically Ill; REVISE Renewal Grant	\$2,328,750
2022-2025	CIHR	COI: Dr. T. Stelfox	Balance+: A Platform Trial for Gram Negative Bloodstream Infections	\$1,703,209
2022-2025	CIHR	COI: Dr. T. Stelfox	Non-invasive Ventilation and Dex in Critically Ill Adults (inDEX)	\$4,573,268
2022-2023	The Lung Association of Alberta	COI: Dr. B. Winston, Dr. C. Hee Lee	System biology approach to developing bedside early detection formula with COVID-19 ARDS patients	\$30,000
2022-2025	CIHR	COI: Dr. B. Winston	Umbilical Mesenchymal Stem Cells as Cellular Immunotherapy for Septic Shock (CISS): A Phase II RCT	\$1,318,713
2022-2025	Stem Cell Network	COI: Dr. B. Winston	Umbilical Mesenchymal Stem Cells as Cellular Immunotherapy for Septic Shock (CISS): A Phase II RCT	\$999,850
2022-2027	CIHR Project grant	COI: Dr. B. Yipp	Body heat-sensing proteins that control bacterial biofilm growth and immunopathogenesis.	\$914,176
2022-2023	OTA	COI: Dr. Dan Niven	Timely Hip Fracture Care Pathway Implementation:	\$65,000 (USD)
2022-2024	SSHRC Insight Development Grant	COI: Amanda Roze des Ordons	Uncovering the roots of resistance towards the integration of social justice within a professional training program	\$71,972

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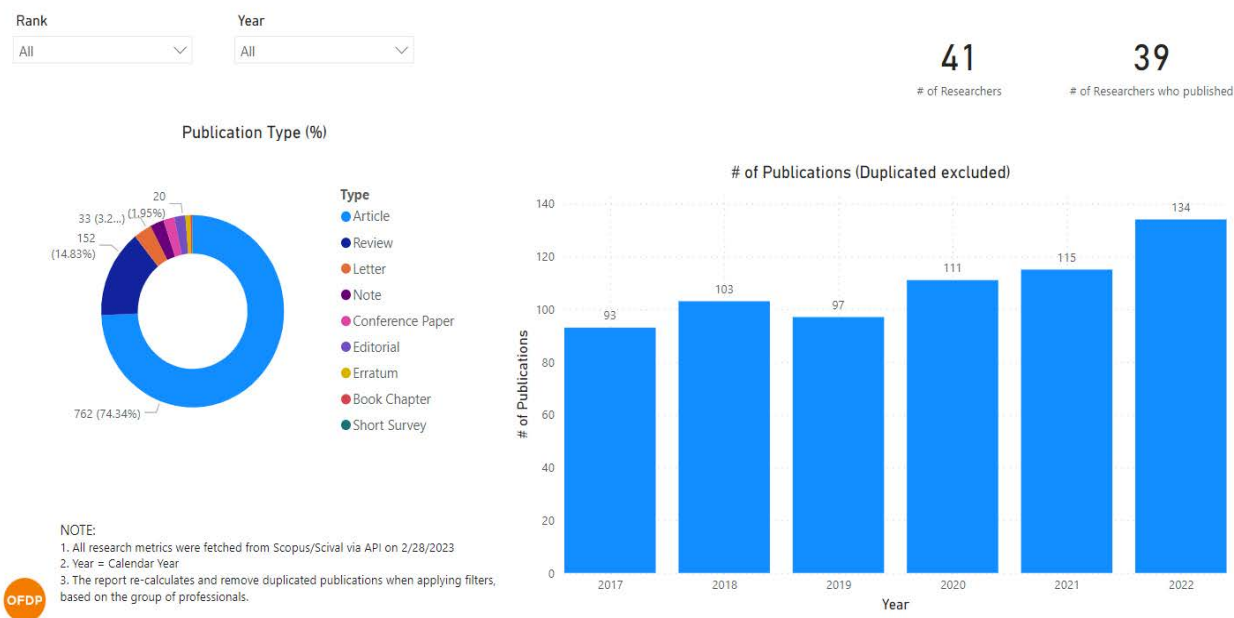
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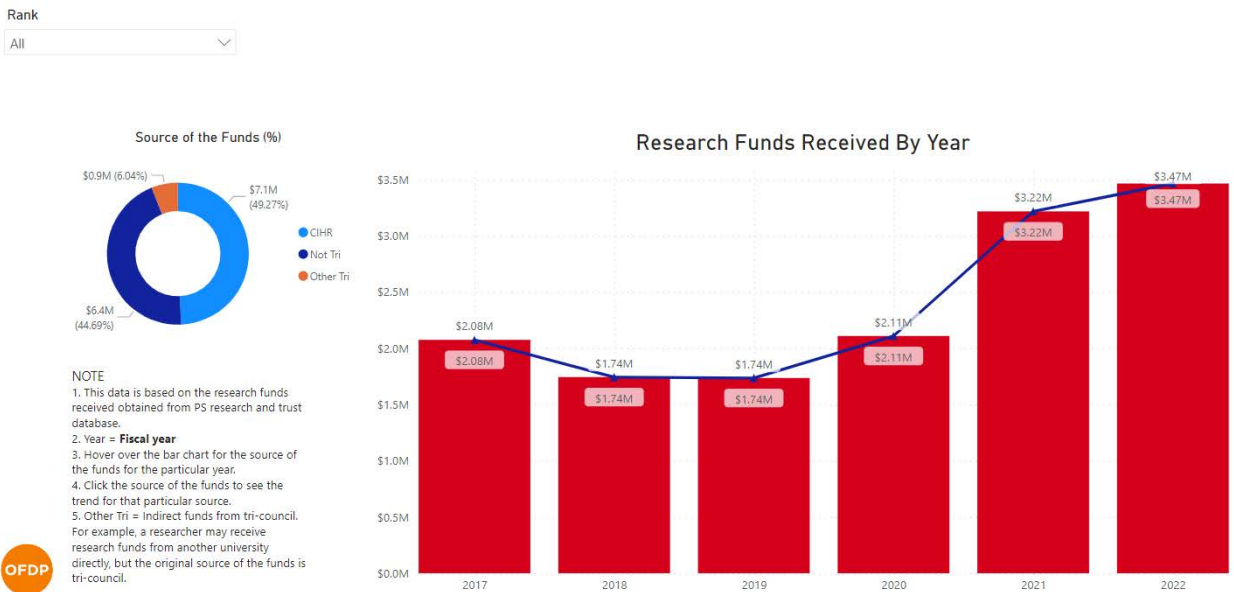
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2. **Winston BW, Lee CH,** M. Banoei, M. Ansari, U. Trahtemberg, A. Kumar, M. Lou, C. dos Santos, A. Baker, J. Russell, and the ARBs CORONA I Group ARDS Heterogeneity: A Metabolomics Comparison of Different Causes of ARDS (COVID-19, H1N1- and Bacterial Pneumonia-Induced ARDS) Show Significant Differences. PANDEMIC OUTPUT: ALL THAT IS COVID-19. May 1, 2022, A5287-A5287
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6. **Dong V,** Robinson A, Karvellas C, Dionne J, Rewa O. Continuous renal replacement therapy and transplant-free survival in acute liver failure: a systematic review and meta-analysis. Abstract for University of Texas Southwestern Medical Center Acute Liver Failure Symposium, May 2022
7. **Niven DJ,** Shariff K, Law S, Robertson K, **Soo A, Zuege DJ,** Bagshaw SM, Au S, Harris J, **Stelfox HT.** De-implementation of Low-Value Albumin Fluid Resuscitation in Critical Care –Customized KT During a Pandemic. Knowledge Translation Canada Scientific Meeting 2022. Virtual Congress May 4-6, 2022 (Oral Presentation)
8. **Niven DJ,** Shariff K, Law S, Robertson K, **Soo A, Zuege DJ,** Bagshaw SM, Au S, Harris J, **Stelfox HT.** De-implementation of Low-Value Albumin Fluid Resuscitation in Critical Care – Customized KT During a Pandemic. Choosing Wisely Canada's National Meeting 2022. Virtual Congress, May 25-26, 2022 (Oral Presentation)
9. **Chel Hee Lee,** Mohammad Banoeii, Uriel Trahtemberg, Anand Kumar, Claudia Dos Santos, Andrew Baker, James A Russell, **Brent W Winston,** and the ARBs CORONA I Group. A metabolomics comparison of COVID-19-, H1N1- and bacterial pneumonia-induced ARDS. Presented at the Canadian Respiratory Conference, April 2022. Canadian Journal of Respiratory, Critical Care, and Sleep Medicine, Volume 6, Issue sup2 (2022)

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10. **Lee CH**, Banoei M, Ansari M, Trahtenberg U, Kumar A, Lou M, dos Santos C, Baker A, Russell A, **Winston BW** and the ARBs CORONA I Group. ARDS heterogeneity: a metabolomics comparison of different causes of ARDS (COVID-19-, H1N1- and bacterial pneumonia-induced ARDS) shows significant differences. Presented at the ATS annual meeting, May 2022
 11. Banoei MM, **Lee CH**, Hutchison J, **Winston BW** on behalf of the CanTBI Investigators, and the Canadian Traumatic Brain Injury Research and Clinical Network (CTRC). Can Serum Metabolomics Help Detect Primary and Secondary Brain Injury in sTBI. Presented at the CTRC meeting, June 2022
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Department of Critical Care Medicine Publication Data Between 2017 and 2022



Department of Critical Care Medicine Research Funds Received by Year



Research Keywords WordCloud Between 2017 and 2022



Who Sponsored Critical Care Medicine's Research?

Year	Sponsor Name	Amount
2022	CIHR	\$1,240,578
	Multiple Sources	\$1,062,744
	Canada Foundation for Innovation/ AB Jobs, Economy and Innovation	\$358,411
	AB Innovates	\$185,508
	AB Health Services	\$150,000
	Izaak Walton Killam (iwk) Health Centre	\$144,950
	AB Health Services / Department of Critical Care Medicine	\$111,507
	Brenda Strafford Foundation	\$90,310
	World Health Organization	\$59,795
	Canada Foundation for Innovation	\$38,293
	AB Lung & Nwt (formerly Lung Association, AB & Nwt)	\$30,000
	Baxter Corporation Canada	\$20,235
	Canadian Critical Care Trials Group	\$5,000
	George and Mary Turnbull Foundation	\$5,000
	University of Manitoba	\$2,500
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\$3.47M

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29

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216.63K

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