Alberta Health Services

UNIVERSITY OF CALGARY
CUMMING SCHOOL OF MEDICINE

DEPARTMENT OF CRITICAL CARE MEDICINE

PHYSICIAN ANNUAL REPORT

January-December 2015

Message from the Department Head

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

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

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

Dr. Christopher Doig

Intensive Care Commitment

We are part of a great team

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

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

We are partners in patient safety

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

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

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

Our Vision

“Providing the Best in Critical Care”

Our Mission Statement

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

Values

Service

We hold patient safety as paramount.

We treat our patients with respect, dignity and compassion.

We are transparent and accountable in all our decisions.

Knowledge

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

People

We interact with colleagues in a respectful and honest manner.

We are committed to collaborative practice.

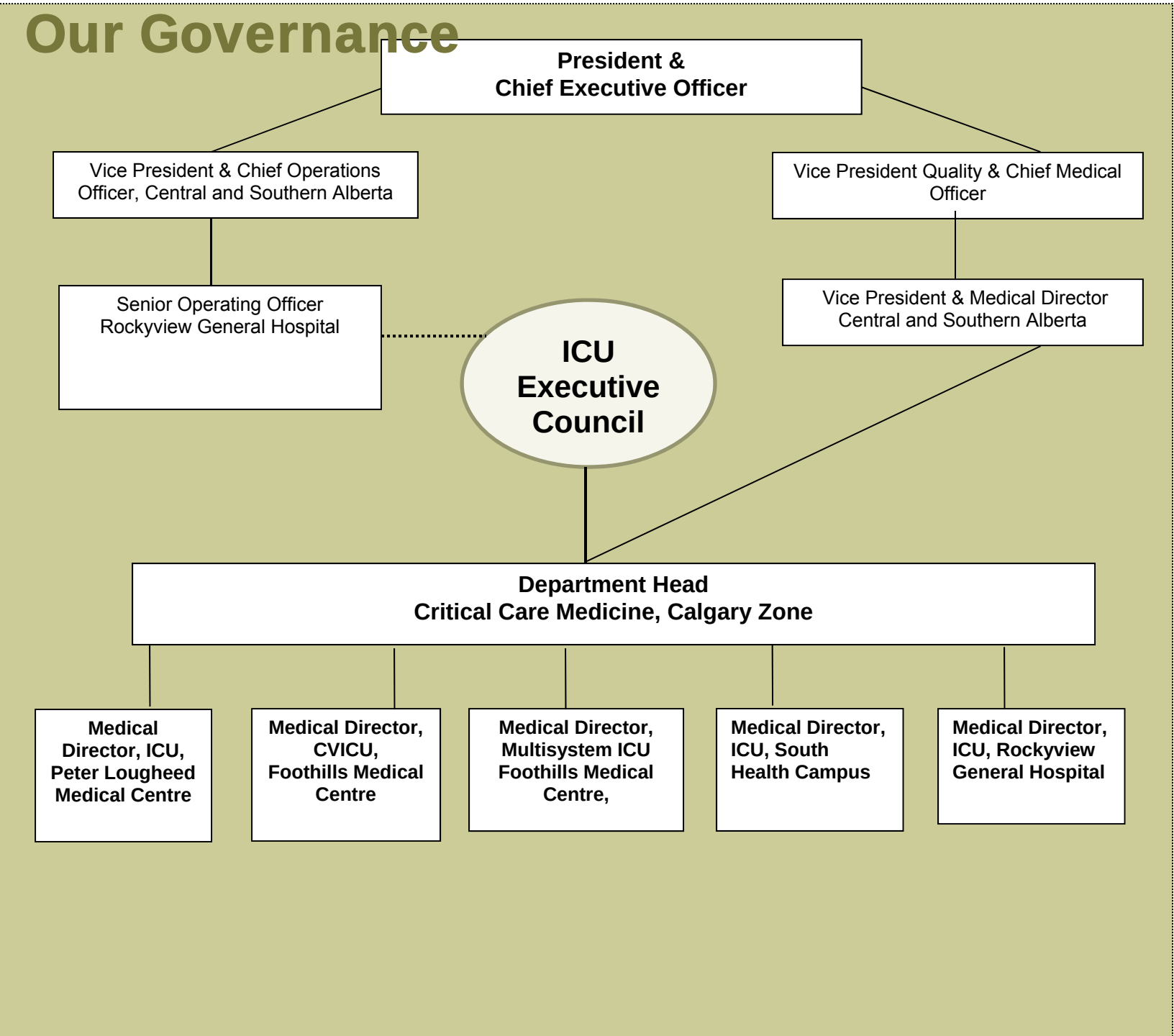
We value individuals and support their well-being.

TABLE OF CONTENTS

2.0 Department Structure and Organization

2.1 Governance

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



2.2 Structure

The Calgary Zone reporting relationships and governance of DCCM are provided in the schema outlined above. The DCCM Head is a member of the Zonal Medical Advisory Committee. All DCCM members share responsibility for the vision, goals and advancement of all facets of the Department: excellence in clinical service, administrative leadership, and scholarly initiatives in education and research that are aligned with the University's vision to be one of the top five Universities in Canada by 2016. The DCCM Head has frequent council with the members of the Department, Medical Executive Committee and also with the Zonal ICU Executive Council for operational issues. Participation by medical and non-medical ICU practitioners in our Departmental Research Seminar, our site based Morbidity and Mortality review processes with direct links to our Departmental Quality Assurance Committee and finally social programs foster our strong Zonal and inter-disciplinary cooperation.

2.3 Departmental 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.

2.3.1 ICU Executive Council

2.3.2 Quality Assurance Committee

2.3.3 Zonal Resuscitation Council

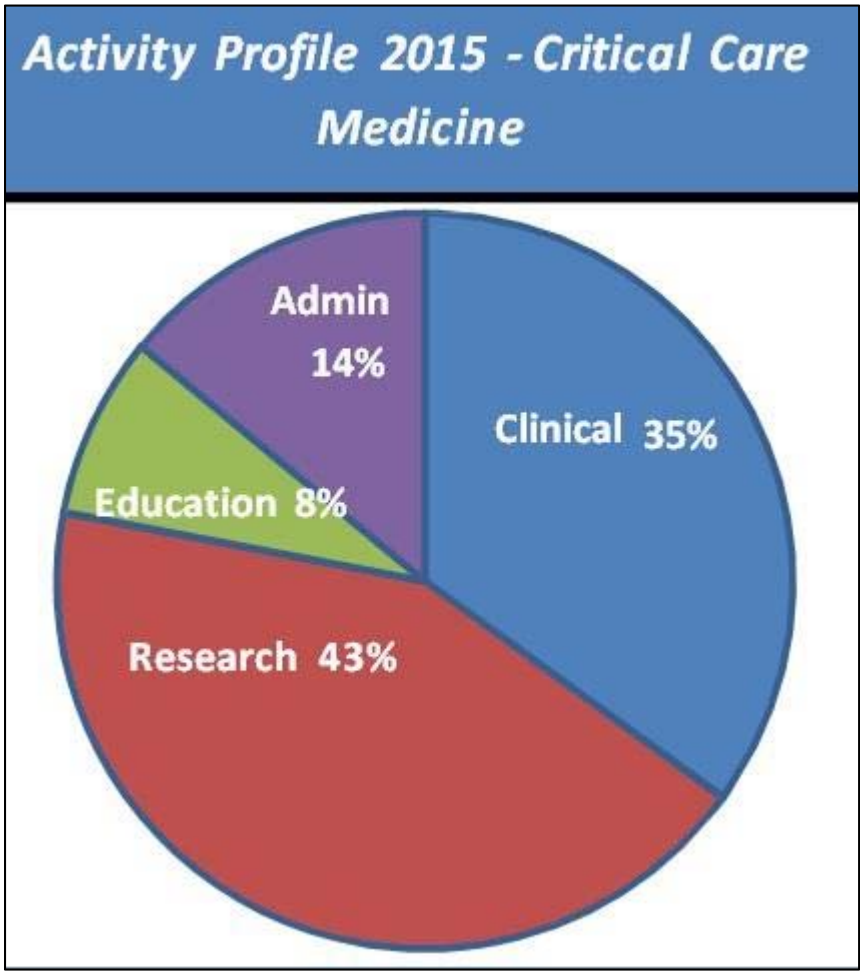
2.3.4 DCCM Research Seminar

2.3.5 Medical Executive Committee

2.3.6 Zonal ICU Outreach Steering Committee

2.4 Membership

The members of the department are listed alphabetically, also noting their administrative responsibilities in the department. There are three primary categories of appointment: University-full time, University-major part-time, and private practice with or without university appointment. The majority of members have a university appointment. The majority of members with a university appointment are members of the University of Calgary Medical Group (UCMG). 1 member of our Department retired in 2015.



Data from Dean's database
compiled by Dr. Richard Hawkes

Name	Clinical Service 2015	Administrative Responsibilities for 2015	Fellowship and Postgraduate Training	U of C Appt
George Alvarez	RGH-MSICU SHC-MSICU PLC-MSICU		Critical Care Medicine, Internal Medicine, M.Sc., Health Informatics	Clinical Assistant Professor (MPT)
Selena Au	RGH-MSICU SHC-MSICU	QI-QAC Medical Director	Critical Care Medicine	Clinical Assistant Professor (MPT)
Luc Berthiaume	PLC-MSICU FMC-CVICU	Co-Chair, Mechanical Ventilation Committee; Site Director, PLC ICU	Critical Care Medicine, Pulmonary Medicine, Internal Medicine, M.Sc., Clinical Epidemiology	Clinical Assistant Professor (MPT)
Paul Boiteau	FMC-MSICU		Critical Care Medicine, Pulmonary Medicine, Internal Medicine	Professor (GFT)
Paul Boucher	FMC-MSICU FMC-CVICU	Site Director, FMC-MSICU; Chair, Zonal Resuscitation Committee; Critical Care Rep, Care at the End of Life Initiative; Leader, DCCM Patient Centered Care QI Team; Member of the Board of the AMA	Critical Care Medicine, Internal Medicine	Clinical Assistant Professor (MPT)
Carla Chrusch	RGH–MSICU PLC-MSICU SHC-MSICU	Site Director, RGH ICU RGH Site Education Coordinator	Critical Care Medicine, Internal Medicine, M.Sc., Epidemiology	Clinical Assistant Professor (MPT)
Philippe Couillard	FMC-MSICU	FMC Deputy Site Education Coordinator	Critical Care Medicine, Neurology	Clinical Assistant Professor (MPT)

Chip Doig	FMC-MSICU SHC –MSICU RGH-MSICU	Department Head, Critical Care Medicine Chair, MEC; Co-Chair, ICU Executive Council; Member Leadership Forum, Faculty of Medicine Member, Executive Committee for the Institute of Infection, Immunity and Inflammation; Member of the Board of the AMA	Critical Care Medicine, Internal Medicine M.Sc., Epidemiology	Professor (GFT)
Mike Dunham*	RGH-MSICU SHC-MSICU	Zonal Director for ATLS Courses Site lead General Surgery SHC Director Acute Care Surgery SHC General Surgery Finance Committee General Surgery Surgical Executive Committee General Surgery Recruitment Committee	Critical Care Medicine, General Surgery, Trauma Surgery	Clinical Assistant Professor (MPT)
Paul Easton	No direct ICU clinical responsibilities	Medical Director Lethbridge Sleep Laboratory; Chair, Advisory Committee for AADL Program of the Ministry of Seniors and Social Services	Pulmonary Medicine, Sleep Medicine, Internal Medicine Ph.D., Resp Physiology	Associate Professor (GFT)
Andre Ferland	FMC-MSICU FMC-CVICU	Site Director, FMC-CVICU;	Critical Care Medicine, Internal Medicine	Clinical Associate Professor (MPT)
Jonathan Gaudet	PLC-MSICU	PLC Site Education Coordinator	Critical Care Medicine, Internal Medicine	Clinical Assistant Professor (MPT)
Tomas Godinez-Luna	FMC-MSICU FMC-CVICU	Co-Chair, CRRT Committee	Internal Medicine	Clinical Assistant Professor (MPT)
Terry Hulme	RGH-MSICU PLC-MSICU SHC-MSICU	Leader, Pharmacy & Therapeutics Team	Critical Care Medicine, Pulmonary Medicine, Internal Medicine	Clinical Assistant Professor (MPT)
Ann Kirby	RGH-MSICU SHC-MSICU		Critical Care Medicine, Internal Medicine MPH-Clinical Epidemiology	Clinical Associate Professor (MPT)

Andrew * Kirkpatrick	FMC-MSICU		Critical Care Medicine, Trauma and General Surgery, M.H.Sc.	Professor (GFT)
John Kortbeek*	RGH-MSICU SHC-MSICU	Department Head, Surgery; Member Leadership Forum, Faculty of Medicine; International Chair, ATLS, American College of Surgeons	Critical Care Medicine, Trauma Surgery, General Surgery	Professor (GFT)

Andreas Kramer	FMC-MSICU	Medical Director, SAOTDP Chair, DCD Working Group Meeting	Critical Care Medicine, Neurocritical Care, Internal Medicine, M.Sc., Public Health	Clinical Associate Professor (MPT)
Paul Kubes #	No direct ICU clinical responsibilities	Holder of the Calvin, Phoebe & Joan Snyder Chair in Critical Care Research; Director, Institute of Infection, Immunity & Inflammation	Ph.D., CIHR Senior Scientist Dept. of Physiology & Biophysics	Professor (GFT)
Calvin Lam	FMC-CVICU FMC-MSICU	Co-Chair, CVICU ECLS Committee Critical Care Rep, Medical Informatics Zonal Team Leader, Cardio-Respiratory Therapeutics Program	Critical Care Medicine, Internal Medicine	Clinical Assistant Professor (MPT)
Jason Lord	PLC-MSICU	Department Education Director, Critical Care Residency Training Program Director, Lead, PLC Simulation Laboratory	Critical Care Medicine, Emergency Medicine, M.Sc.	Clinical Assistant Professor (MPT)
Paul McBeth	RGH-MSICU SHC-MSICU		Critical Care Medicine, Surgery	Clinical Assistant Professor
Daniel Niven	PLC-MSICU		Critical Care Medicine, Internal Medicine	Clinical Lecturer
Richard Novick	FMC-MSICU FMC-CVICU		Critical Care Medicine, Cardiac Sciences, Surgery	Clinical Professor (MPT)
Ken Parhar	FMC-MSICU FMC-CVICU		Critical Care Medicine, Internal Medicine, Cardiothoracic Fellowship	Clinical Assistant Professor (MPT)
Juan Posadas-Calleja	PLC-MSICU RGH-MSICU SHC-MSICU		Critical Care Medicine, Internal Medicine	Clinical Assistant Professor (MPT)
Amanda Roze Des Ordons	RGH-MSICU SHC-MSICU FMC-MSICU	DCCM CME Coordinator SHC Site Education Coordinator	Critical Care Medicine, Anesthesiology, Palliative Care, Master's of Medical Education	Clinical Assistant Professor (MPT)
Tom Stelfox	FMC_MSICU	Scientific Director, Critical Care OCN (Operational Clinical Networks).	Critical Care Medicine, Internal Medicine,	Associate Professor

		Member of the Executive, University of Calgary Institute for (CIPH); Head, Health Care System Performance Improvement Research Subgroup, CIPH; Chair, Performance Improvement and Patient Safety (PIPS), Trauma Association of Canada; Chair, Benchmarking Committee, National Trauma Registry Advisory Committee; Member of the Executive, Canadian Critical Care Trials Group (CCCTG)	Ph.D., Health Policy - Statistics & Evaluative Sciences	(GFT)
Sid Viner	PLC-MSICU FMC-MSICU	Associate Zone Medical Director	Critical Care Medicine, Pulmonary Medicine, Internal Medicine	Clinical Associate Professor (MPT)
Jason Waechter	FMC- MSICU FMC-CVICU	FMC, Site Education Coordinator Co-Chair, DCCM Website Committee	Critical Care Medicine, Anesthesia	Clinical Associate Professor (MPT)
Frank Warshawski	RGH-MSICU FMC-CVICU SHC-MSICU	Member, Staff Work Life Program	Critical Care Medicine, Pulmonary Medicine, Internal Medicine	Clinical Assistant Professor (MPT)
Brent Winston	FMC-MSICU	Coordinator for Post-Graduate Sciences Chair, Canadian Critical Care Translational Biology Group (CCCTG); Chair, Lung Association of Alberta & NWT	Critical Care Medicine, Pulmonary Medicine, Internal Medicine	Associate Professor (GFT)
Bryan Yipp	RGH-MSICU SHC-MSICU		Critical Care Medicine, Internal Medicine	Assistant Professor (GFT)
Dan Zuege	PLC-MSICU	Medical Director eCritical Alberta; Leader, Infection Prevention Program; Co-Chair, VAP and CRBSI QI Teams.	Critical Care Medicine, Pulmonary Medicine, Internal Medicine, M.Sc., Resp Physiology	Clinical Professor (MPT)
Craig Jenne∞		Canada Research Chair in Imaging Approaches Towards Studying Infection Snyder Institute for Chronic Diseases	Dept of Microbiology, Immunology and Infectious Diseases Critical Care Medicine	Assistant Professor (GFT)

* Primary appointment is with the Department of Surgery

Primary appointment is with the Department of Physiology & Biophysics, University of Calgary

∞ Primary appointment is with the Department of Microbiology, Immunology and Infectious Diseases, University of Calgary

FTE of Professors, Associate Professors and Assistant Professors

FTE[2]	Department	2012-13	2013-14	2014-15[1]
	Critical Care Medicine	4	6	6
	Basic Sciences	129.8	125.8	126.3
	Clinical Dept. w/ AARP	237	228.8	224.8
	Clinical Dept. w/out AARP	147	153	155
	CSM	513.8	507.6	506.1

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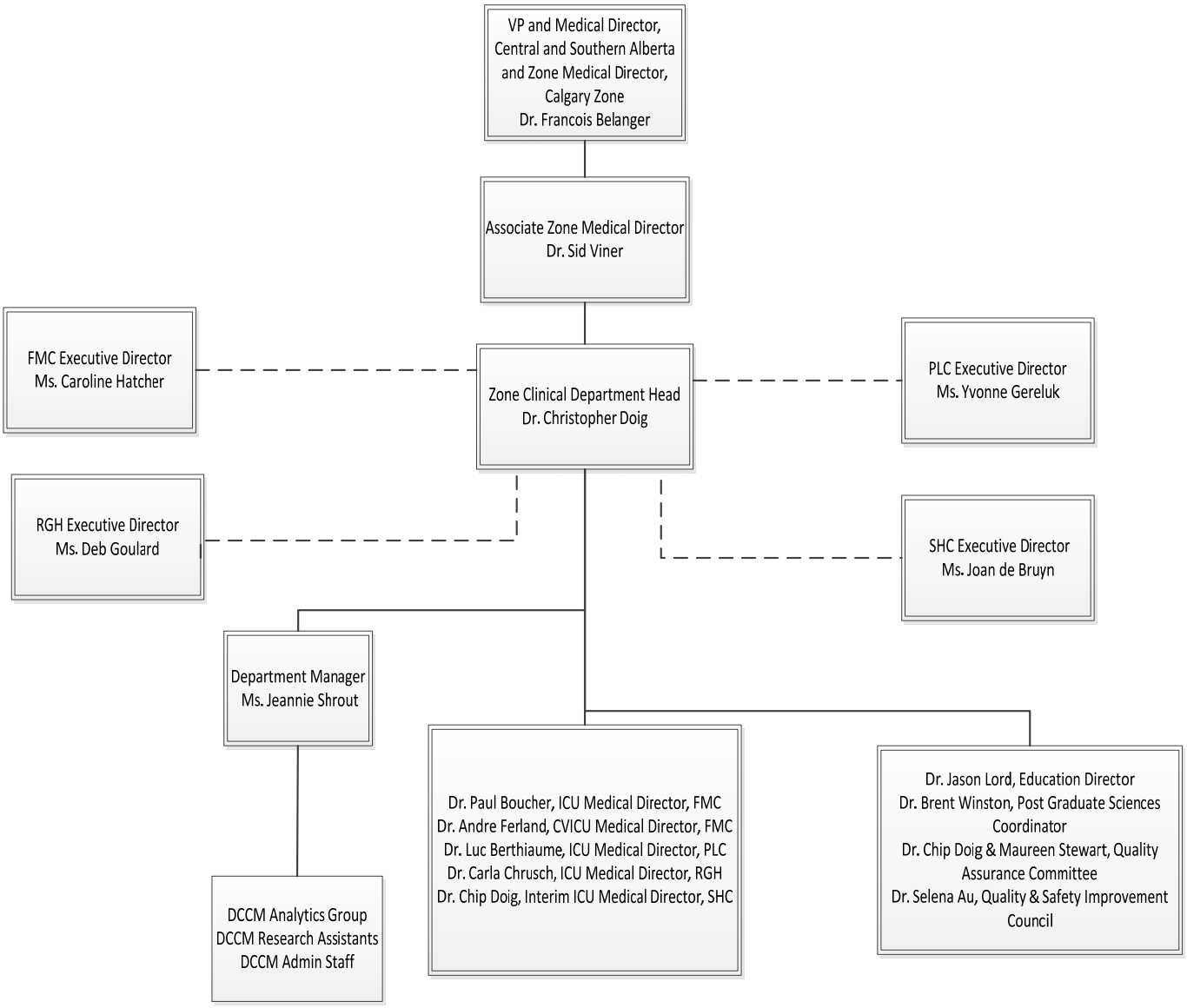
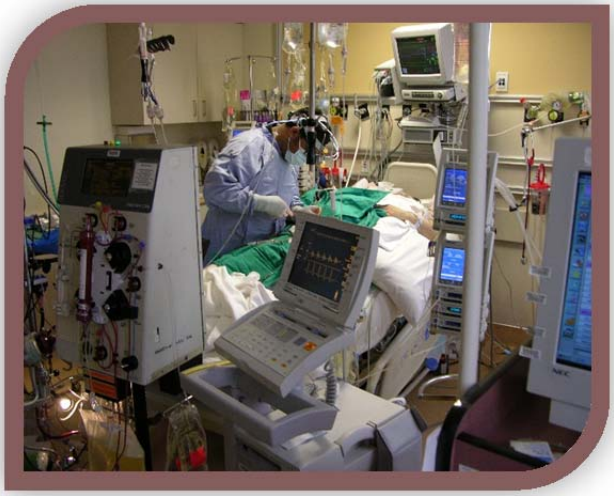

VP and Medical Director, Central and Southern Alberta and Zone Medical Director, Calgary Zone
Dr. Francois Belanger
Associate Zone Medical Director
Dr. Sid Viner
FMC Executive Director
Ms. Caroline Hatcher
Zone Clinical Department Head
Dr. Christopher Doig
PLC Executive Director
Ms. Yvonne Gereluk
RGH Executive Director
Ms. Deb Goulard
SHC Executive Director
Ms. Joan de Bruyn
Department Manager
Ms. Jeannie Shrout
Dr. Paul Boucher, ICU Medical Director, FMC
Dr. Andre Ferland, CVICU Medical Director, FMC
Dr. Luc Berthiaume, ICU Medical Director, PLC
Dr. Carla Chrusch, ICU Medical Director, RGH
Dr. Chip Doig, Interim ICU Medical Director, SHC
Dr. Jason Lord, Education Director
Dr. Brent Winston, Post Graduate Sciences Coordinator
Dr. Chip Doig & Maureen Stewart, Quality Assurance Committee
Dr. Selena Au, Quality & Safety Improvement Council
DCCM Analytics Group
DCCM Research Assistants
DCCM Admin Staff

3.0 Our Business

3.1 Clinical Activity and Organization

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



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

http://iweb.calgaryhealthregion.ca/clin/icu/policies_protocols/admin/Administrative_Out_of_Region_Referrals_October_2008.pdf

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

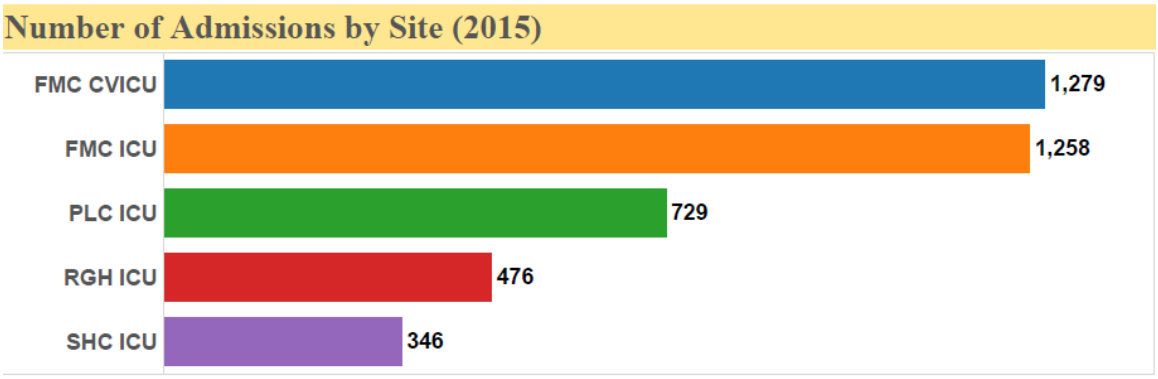
http://iweb.calgaryhealthregion.ca/clin/icu/policies_protocols/admin/a200_icu_admission_transfer_discharge.pdf

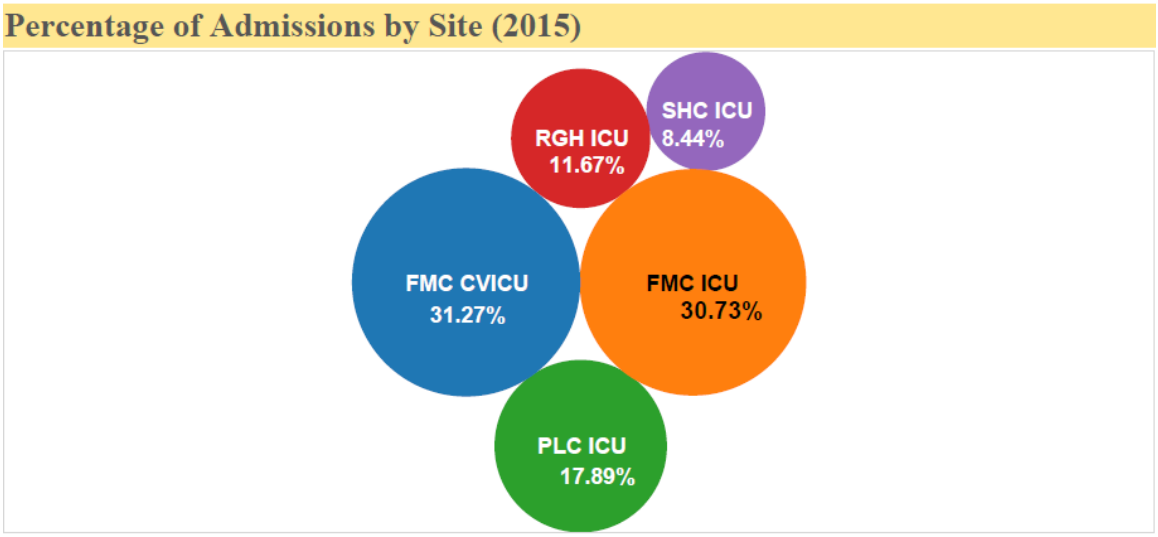
Department of Critical Care Medicine through RAAPID. The RAAPID dispatcher engages in a conversation with the most appropriate site Intensivist according to patient needs and regional ICU capacity.

This process is facilitated by a flow map which is a joint initiative of the Department and RAAPID (see DCCM website).

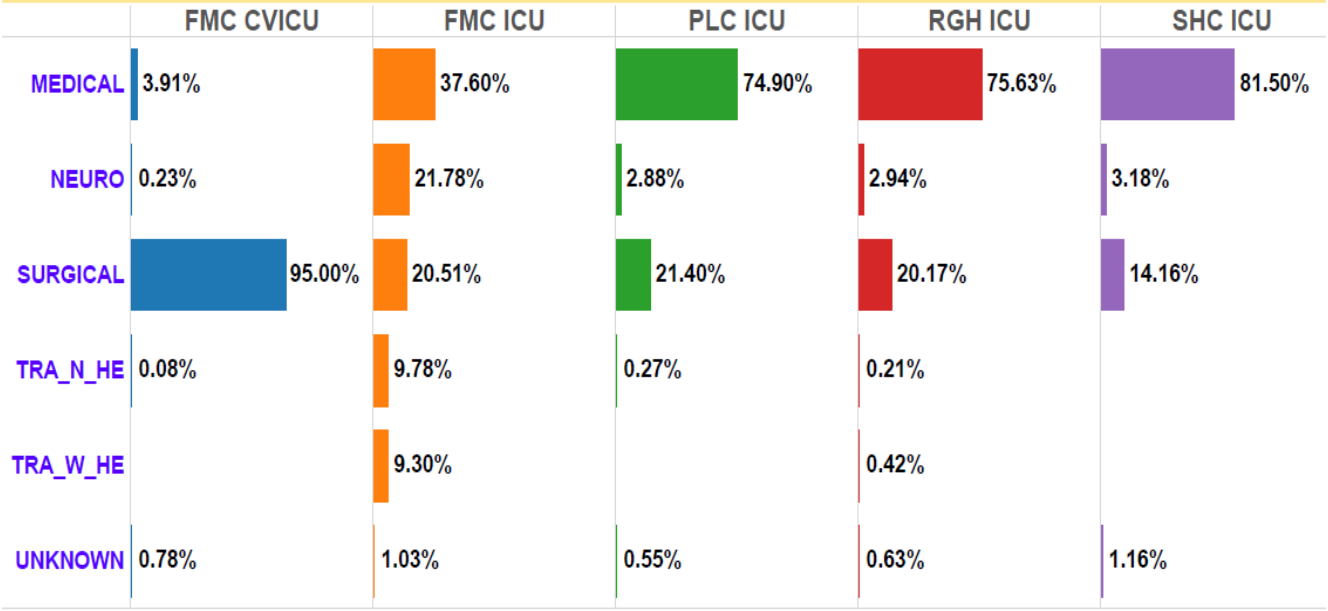
The key to the success of this process is for all participants and stakeholders to demonstrate the necessary flexibility as our Zonal and Provincial landscape changes. A conference call with the ICU attending, the referring physician, the STARS 'flight' doctor, and any other specialist can be immediately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

There were 4088 admissions in 2015 in the Departmental ICU's.





Percentage of Class Admissions by Site



% of Total Number of Records for each Admit Class broken down by Site. Color shows details about Site. The marks are labeled by % of Total Number of Records. Percents are based on each column of the table.

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

ADMIT_CLASS for ALL Adult ICU & CVICU Sites - Calendar 2015 - by ADMIT DATE							
SITE	YEAR	TOT_ADMIT_NO	MEDICAL	NEURO	SURGICAL	TRA_WO_H-INJURY	TRA_WITH_H-INJURY
FMC CVICU	2015	1279	50	3	1215	1	0
FMC ICU	2015	1258	473	274	258	123	117
PLC ICU	2015	729	546	21	156	2	0
RGH ICU	2015	476	360	14	96	1	2
SHC ICU	2015	346	282	11	49	0	0
ADMIT_CLASS for ALL Adult ICU & CVICU Sites - Calendar 2015 - by DISCHARGE DATE							
SITE	YEAR	TOT_DISCH_NO	MEDICAL	NEURO	SURGICAL	TRA_WO_HINJURY	TRA_WITH_HINJURY
FMC CVICU	2015	1277	50	3	1213	1	0
FMC ICU	2015	1257	478	269	260	120	117
PLC ICU	2015	729	545	21	157	2	0
RGH ICU	2015	477	363	14	94	1	2
SHC ICU	2015	346	283	10	49	0	0

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

There are five adult high-frequency oscillatory ventilators (HFOV) in Calgary; these ventilators are shared across sites. Patients experiencing catastrophic lung failure, in the absence of multi-system organ failure, may be referred to our Zonal Extra-Corporeal Lung Assist Program, a collaborative effort between Departmental Intensivists working in the FMC CVICU, cardiovascular surgeons and perfusionists from the Department of Cardiac Sciences at the FMC. Intracranial pressure monitoring is performed at the FMC-MSICU; the standard is percutaneous ventricular drains placed by Neurosurgery, and managed by Critical Care. Jugular venous oxygen saturation monitoring, interventional hypothermia and continuous EEG recording are also commonly used. In the past few

years, the FMC ICU has been using cerebral microdialysis in association with the placement of intra-parenchymal Codman microsensor ICP transducers and brain tissue Po2 probes as part of a research program in Traumatic Brain Injury under the leadership of Dr. David Zygun prior to his departure to Edmonton at the end of 2012. The decision to concentrate the provision of neurologic critical care services into one pod at the FMC (C Pod) will allow the development of advanced competencies for both nursing and medical staff while enabling the Critical Care Residency Training Program to move forward with establishing a Neurocritical Care Fellowship program for physician trainees following the completion of 2 years of general critical care medicine training.

In the summer of 2006, the ICU Outreach Team (Code 66) was born from the realization that our healthcare system needed to recognize critical illness early and to respond to patients wherever they are in the hospital. It is the concept of an "ICU without walls" where critically ill patients can be treated aggressively by a physician led team specializing in critical care. The goal of having such a Team was to facilitate timely admission of patients to ICU when required, allow direct access of all health care personnel to the expertise of a critical care team to assist in the care of their patients, share critical care skills and expertise through educational partnerships, promote continuity of care by providing follow-up to patients transferred out of ICU and ultimately to improve communication and relationships among health care teams within our acute care sites. The novelty of this concept resides with the fact that the Team can be activated by any health care provider guided by predetermined triggers (e.g., Respiratory rate < 8 > 30 / min, Change in O2 saturation to < 90% when O2 > 5L/min, Pulse rate < 40 > 140 / min, Systolic BP < 90 mmHg or acute decrease in systolic BP, etc.). The system was first implemented in the summer of 2006 at the FMC followed by a fall implementation at the PLC and a summer of 2007 implementation at the RGH. This latter hospital had piloted a project in 2004 on the ICU Outreach concept and had never abandoned the service however it did not have dedicated physician or nursing resources to meet the expectations of a fully operational Team.

During the reporting period of January 01, 2015 to December 31, 2015, our ICU Outreach Teams have responded to 1823 Code 66 calls which translate to approximately 152 calls per month. The vast majority of patients remain on their respective nursing units with about 20% requiring transfer to one of our ICUs. The most common reason for the team activation is a decrease in patient level of consciousness (53%) followed by respiratory distress (40%). They also completed 5,197 follow-up visits with patients after being discharged from ICU, experiencing a code 66 or a code blue.

This observation has in fact led to the Department increasing simulation based training for ICU rotating resident physicians to perfect their leadership skills and techniques in the provision of resuscitative services including CPR as these clinical opportunities become increasingly rare events in our healthcare system. Additional information pertaining to our ICU Outreach Program can be found in section 9.

Thanks to the leadership of Dr. Dan Zuege and Ms. Laurie Harding, the Department supported the successful implementation of *e*Critical Alberta Project in all adult ICU's of the Calgary Zone.

The vision of the *e*Critical Alberta Project (formerly the Critical Care Clinical Information System (CCCIS) Project), is to deliver the most comprehensive, multimodal and integrated data repository of patient-specific critical care clinical information in the nation, which will present real-time information in an intuitive fashion for optimal and timely patient-specific decision making, while also enabling the creation of timely unit, zonal and provincial reports for administrative, quality improvement, education and research purposes. Ultimately, the Project will deliver a single system – *e*Critical Alberta – with a single access point for critical care where all charting, documentation, decision support and interfaces to other dependant systems will occur. To accomplish this, *e*Critical Alberta requires two key components – a bedside clinical information system (MetaVision) and a data warehouse (TRACER). The initial adult ICU build of MetaVision for Wave 1 of *e*Critical Alberta was completed in December 2011. Rigorous testing of *e*Critical followed. Wave 1 sites were fully implemented June - August 2012. South Health Campus in Calgary went live with the opening of their new unit in February 2013.

The Sunrise Clinical Manager hospital information system is used for order entry, allergies and medication administration. Selected data elements from the bedside charting system are exported into a departmental data warehouse (TRACER), where it is merged with related data from other regional information systems to form a framework for the structured reporting of information required for unit based administration (activity and resource utilization), quality improvement projects (intervention related outcomes), education (types of different pathologies encountered, number of opportunities to master technical competencies) as well as clinical and health services research.

The Department of Critical Care Medicine continues to be involved in the initiatives to develop a national critical care data set. A breakthrough in reaching a consensus on ICU data elements necessary for the creation of an initial “Report Card” occurred in February 2005 at the Rocky Mountain Critical Care Conference held in Vernon, British Columbia. Representatives from the following organizations subsequently partnered in submitting a grant to the Canadian Patient Safety Institute in July 2006 on the value of a Critical Care Report Card in driving institutional quality improvement and patient safety initiatives: Vancouver Coastal Health Region, Calgary Health Region, Winnipeg’s Regional Health Authority, London Health Sciences Centers, the Ottawa Hospital, Sunnybrook Health Sciences Centre and the Sir Mortimer B. Davis Jewish General Hospital in Montreal. The grant application was successful and critical care leaders from across the country have been working earnestly on the project since early 2007 with an objective to agree upon indicators and their definitions and standardized methodologies for the collection/reporting of key data elements in critical care as well as encouraging

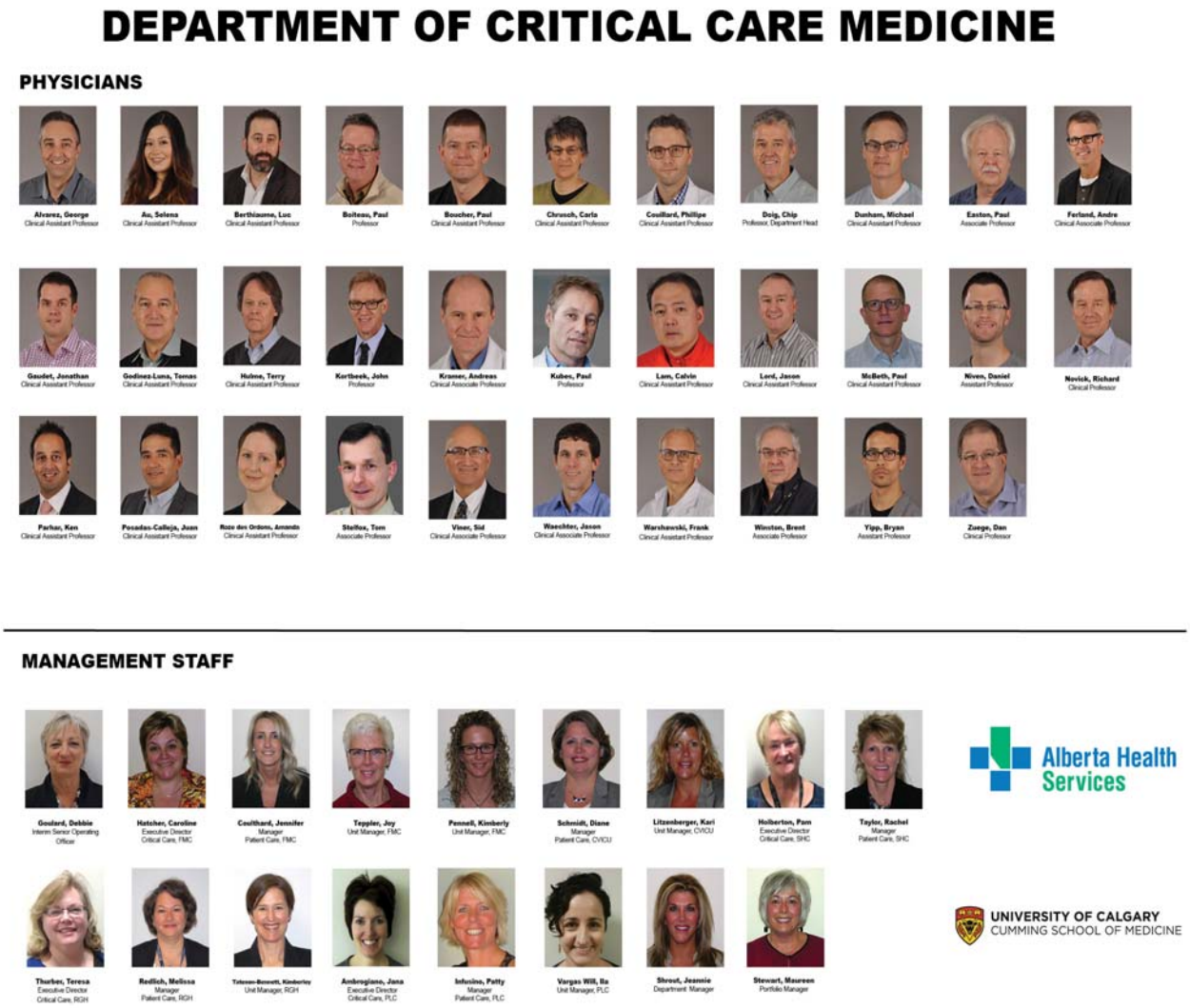
participants to share their administrative and clinical data for the benefit of their respective organizations and ultimately patients across the country.

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

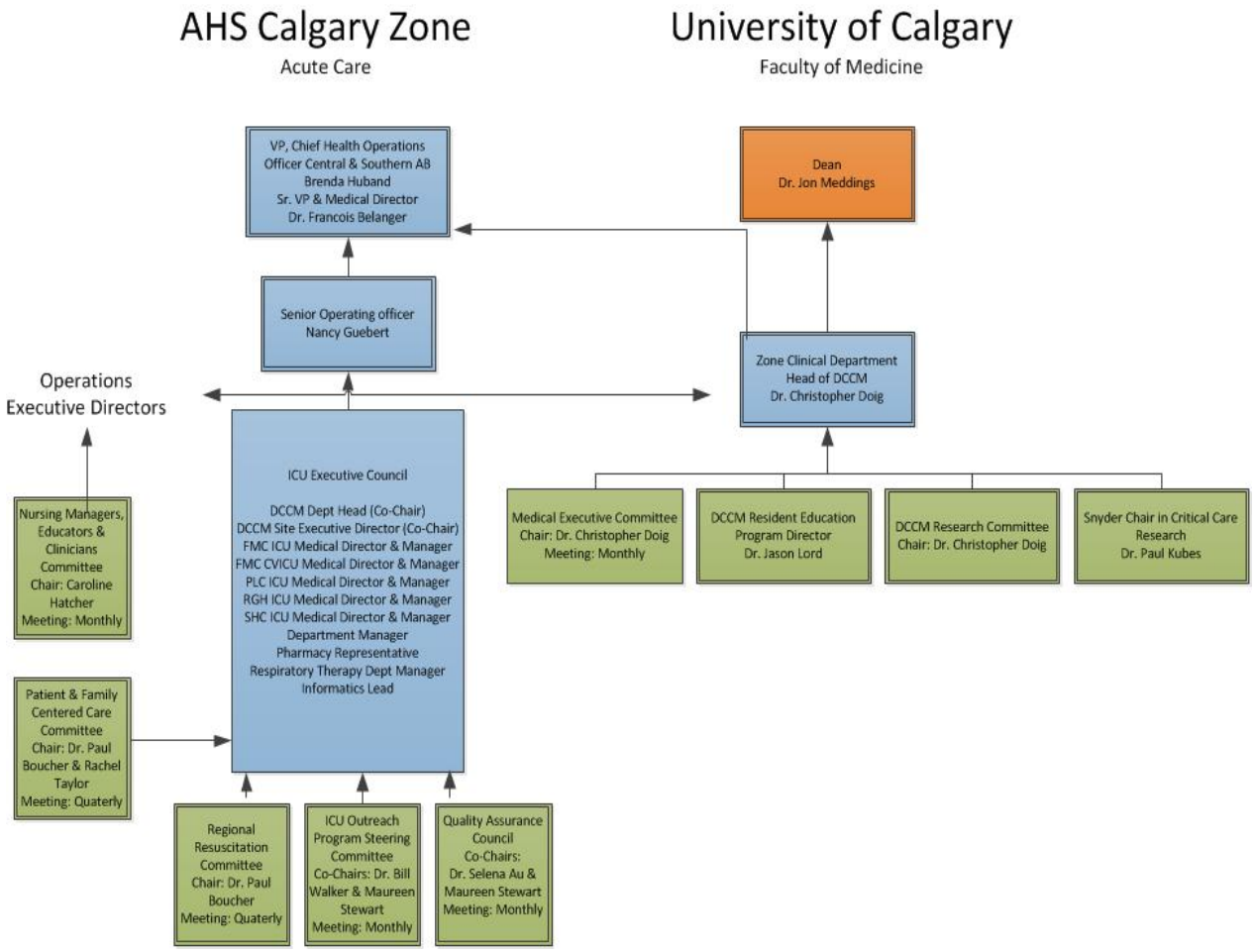
Continuous development and enhancements on our departmental web site made this site an important communication tool. Among the many useful features of our internet website we can mention; a unit bed capacity monitor, online quizzes and surveys, physician's call schedule, policies and procedures, documentation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

Since April, 2004, Department members at all sites have been working with Regional planners in the creation of site-specific ICU functional programming documents to guide the expansion of critical care services. Bed modeling exercises, done in collaboration with the Regional Health System Analysis Unit established the need for 58 multi-system ICU beds by 2005-2006 and 72 beds by 2010-2011. This represents 21% and 46% increases respectively from the maximum ICU capacity expected. These modeling strategies have been more recently validated by using population based mechanical ventilation incidence data from the Province of Ontario between 1992 and 2000 and projecting utilization over the subsequent twenty-five years. Using the predictions of Needham D.M. and colleagues and our current patterns of ICU utilization, the Calgary Zone required 56.4 multi-system ICU beds by 2006 and 73.6 beds by 2011. Signing off on the final ICU designs for the PLC and FMC sites occurred several years ago, with PLC ICU opening Fall 2009 and the FMC ICU opening Spring 2011. The SHC ICU opened February 2013. We await funding and completion of a new ICU at Rockyview General Hospital.

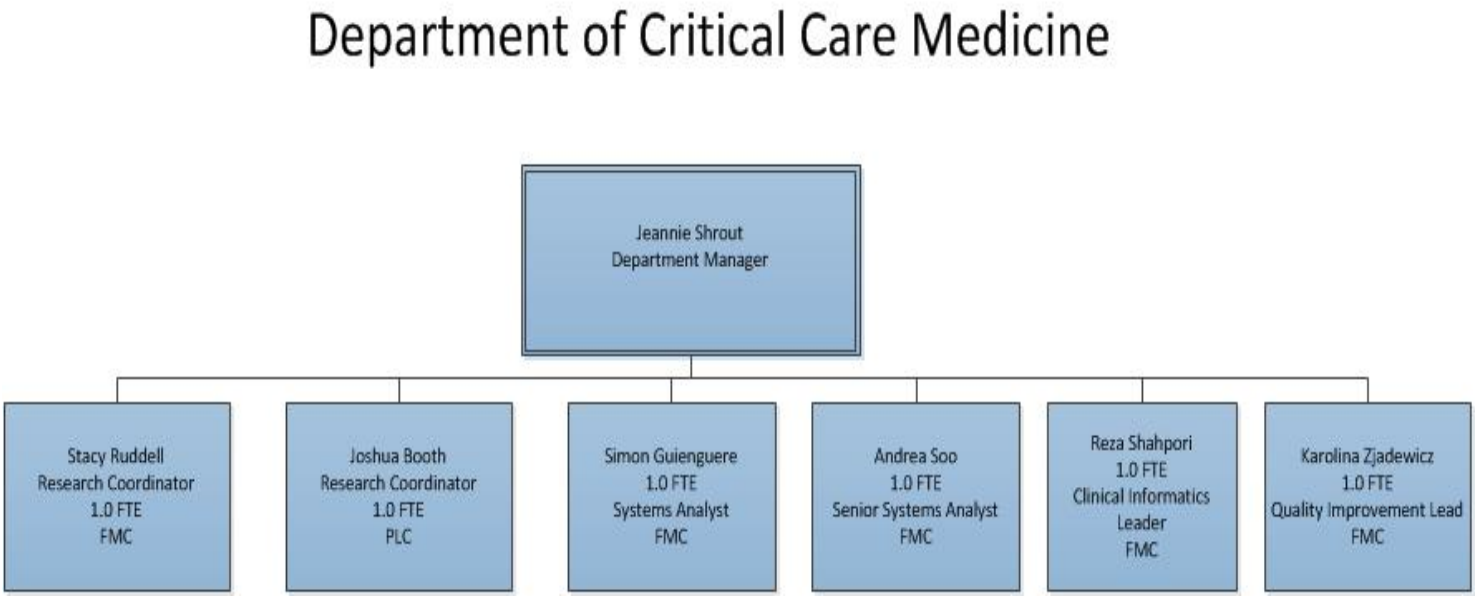
3.2 Medical Leadership & Administration



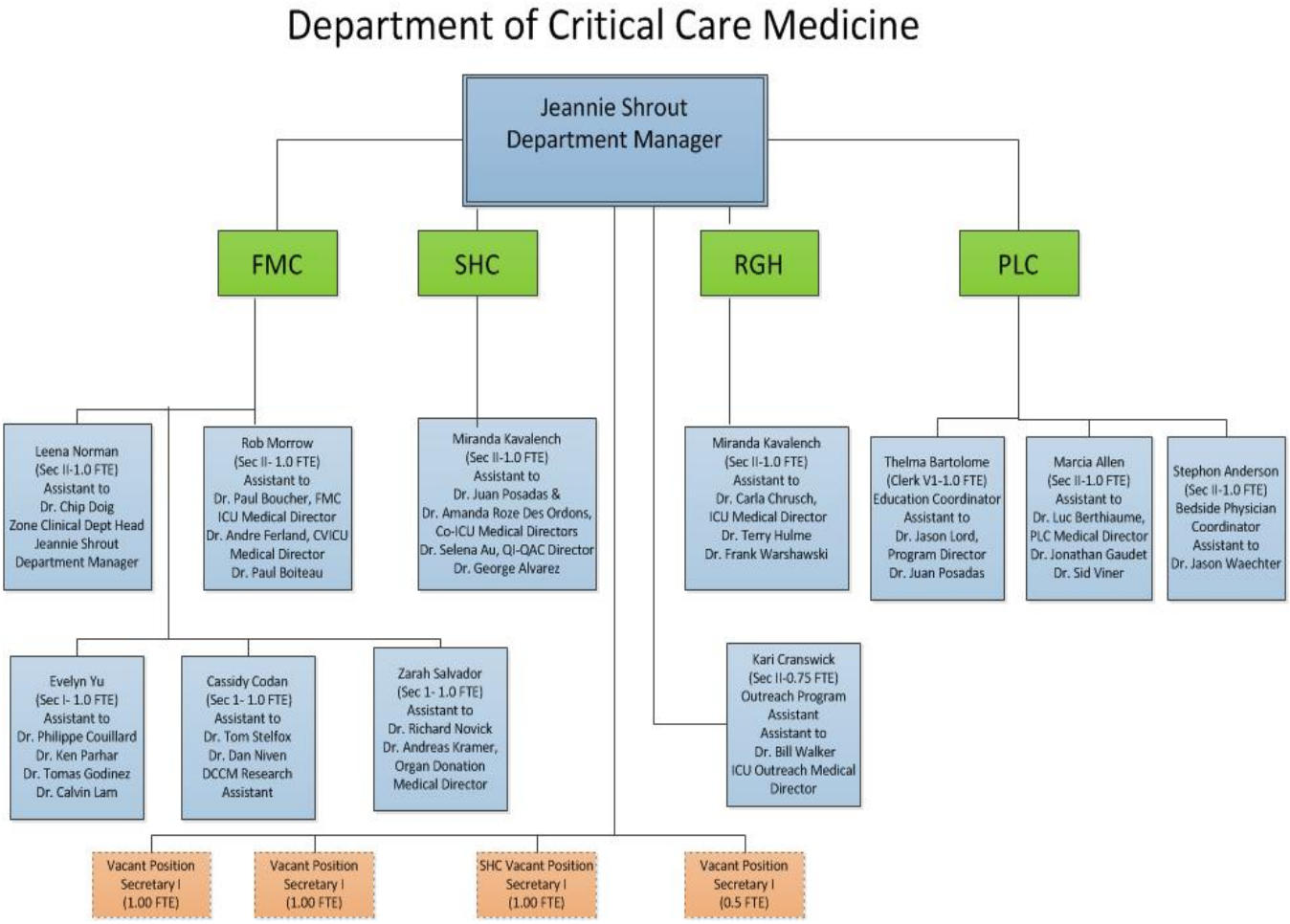
The following organizational chart illustrates the central role of the ICU Executive Council in overseeing all Department clinical operations. This chart also highlights the reporting mechanisms for the various standing Departmental Councils and Committees.



The following organizational chart illustrates the reporting mechanisms for the research and Analytics staff in all Department operations.



The following organizational chart illustrates the reporting mechanisms for the administration in all Department operations at all sites.



4.0 Site Updates and Accomplishments

4.1 Foothills Medical Centre Intensive Care Unit

The FMC ICU continues to support the largest hospital in Calgary. We provide intensive care and outreach services to over 1000 inpatient beds. The Foothills Medical Centre houses many of the key programs for the zone; trauma, neurosurgery, stroke, hepatobiliary surgery, head and neck cancer reconstructive surgery, burn care, thoracic surgery, and the bone marrow transplant program, to name a few. The unit has 28 funded beds with a total capacity of 36. We have a dedicated pod with 12 beds that support the trauma and neuro program for Southern Alberta. We have two Neuro intensivists that lead our program. Their expertise, along with our nursing staff and educators allow us to provide comprehensive multi-modality monitoring for neuro patients. This includes monitoring of intracranial pressure, temperature, oxygen tension, continuous EEG, and microdialysis. This team approach helps to provide the highest standard of care to this complex patient population.

The FMC ICU supports the critical care burn needs of patients for Southern Alberta. We work closely with the burn unit and have collaborated to send representation to the Canadian and American burn conferences over the past year.

The unit has embraced patients and families as partners in care and encourages families to participate in rounds. We have a strong presence on the DCCM's zonal PFCC committee. Our focus in the upcoming year with the PFCC committee is to improve the support of our patients, families and staff at End of Life Care (EOLC).

The Department has begun an ICU follow up clinic with the help of a newly hired Nurse Practitioner and physiatrist. This clinic is run out of our rehab space and currently sees patients one day a week. Our NP has been incorporated into the ICU team on non-clinic days to help out on our non-teaching service. Many of our more chronic patients are on this service and this model has help provide a greater degree of continuity in their care.

We are committed to ensuring that our patients are cared for safely. We embarked on a quality improvement project to improve patient safety at the time of hand offs from the operating room to the ICU. The "OR to ICU handover project" was successfully implemented this year. We are currently wrapping up this work and will be expanding the scope of this project to the rest of the zone in the coming year.

We remain committed to addressing the incidence and prevalence of delirium in ICU. We have fully rolled out all stages of this QI project and are now in the auditing and maintenance phases. We continue to work closely with our colleagues across the zone to address issues as they arise through feedback received by the team.

In an effort to create a culture where staff feels empowered to communicate with each other, we have begun town hall meetings for the unit. These meetings provide a forum for feedback on quality measures and safety issues. They are also meant to encourage open, honest dialogue between all team members.

Our staff recently participated in an end of life care educational day to re-launch our EOLC champion program. This program was created in 2009 to elevate the standard of care we provide to dying patients and their families. Our EOLC champions mentor their colleagues, and help promote a number of tools that have been developed to standardize care at the end of life."

4.2 South Health Campus Intensive Care Unit

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

SHC ICU received the Angel of Sight Award from the Southern Alberta Organ and Tissue Donation program recognizing the staff for referrals made regarding tissue donation.

Staffs from all over the globe have come to work in this unit bringing many ideas and talents with them.

The ICU is a very collaborative team regarding working toward achieving patient care goals. The nursing staff is comprised of all RNs along with Nurse Practitioners, Respiratory Therapists, Nursing Attendants, Service Workers, Unit Clerks, Physiotherapists, Dieticians, Pharmacists and Social Workers in the environment. Our Intensivist teams are responsible for all patients within the unit and are the medical leads of the team.

Nurse Practitioners play a very large role within the ICU. Our NPs are integral in ensuring continuity of care for our patients and families.

The ICU supports the site with an outreach team as well as a code blue team. The code blue team is comprised of staff from both the ICU and ED.

Significant accomplishments this past year include continued growth and development within the unit. This is regarding building staff skill sets and increased acuity within the environment as well as continued team building.

The ICU prides itself on trying innovative ways to do our work. We collaborate with our ED and Respiratory partners closely in achieving goals for both the unit and site. The RRTs perform arterial line insertions and intubations which is novel to our site.

4.3 Peter Lougheed Centre Intensive Care Unit

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

All admissions to the unit are accepted by our Intensivists as we are a closed unit. The PLC ICU is a teaching unit that includes Fellows, various levels of Residents, Clinical Clerks, Respiratory therapy and Nursing students in their final practicum.

The ICU also supports patients requiring ICU care for the Southern Alberta Renal Program, which covers southern Alberta, southern BC and areas of Saskatchewan. Additionally, the PLC also houses the Chronic Vent Program for the Calgary zone.

On average we have over 80% of our beds occupied in the year with peaks of 116% occupancy. We average over 11 ventilated patient days on a regular basis. Most of our population has multisystem organ failure, sepsis, ILI (influenza like illness) or are complicated vascular patients mostly with aneurysms and other health issues. We also admit all vascular patients that require directed TPA therapy.

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

The PLC ICU is focused on patient and family centered care and encourage family participation during rounds conducted by the team. We are actively participating in the Calgary zone delirium protocols, medication reconciliation protocols and many varied research projects within the Calgary zone and the University of Calgary.

4.4 The Rockyview General Hospital Intensive Care Unit

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

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

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

The Outreach team at RGH does over 400 calls per year on the site. The Outreach team is available for consults for patients on the inpatient units and completes follow up visits on all ICU discharges to units. Over the last couple of year, there has been a change in the responsibilities for Outreach as team members spend time in providing and enhancing care of the population within the ICU to ensure skills are current and workload is evenly distributed.

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

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

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

UNIT ACCOMPLISHMENTS:

PATIENT AND FAMILY CENTERED CARE

- Time to Contact
- Family presence at Rounds
- Critical Care Information wall
- Family Journals / Pagers
- Family Room upgrade
- Visitor/Patient Internet access
- End of Life Care Champions and Checklist
- White Rose – Compassion Cart program

QUALITY IMPROVEMENT INITIATIVES

- Delirium Assessment and Management Processes development and implementation
- Medication Reconciliation on Transfer
- Safety Audits
- Safety Rounds
- Patient and Family Satisfaction Audits
- iPUP survey (Pressure Ulcer Prevention and Management processes survey)
- Braden Scoring on admission and daily
- Hand Hygiene Auditing
- VTE (venous thromboembolism prophylaxis) audits
- Fall Risk assessment

4.5 Pharmacy

Our pharmacists and the rest of the pharmacy team have worked hard this year to address some challenges in health care. During the past year, we have continued to make a concerted effort to maintain our exceptional patient care experience as we continued to experience unprecedented national and international drug shortages.

Our department's drug use and inventory groups have allowed us to continue to deliver our standard of uncompromising care by managing system inventory levels of critical drugs and quickly developing alternatives when necessary. Their hard work is particularly evident in the access to care we now offer throughout AHS. The role and duties of pharmacy on the critical care team continues to evolve and I will expand on some of these in this summary.

We have expanded our Pharm D pharmacy training programs to include more sites and students, as well as maintaining rotations in critical care for our current pharmacy residents. Our staff members participate in provincial and national pharmacy organizations providing input and leadership for positive change in pharmacy. Many of our pharmacists in Critical Care have been nominated for teaching/preceptor awards over the past year and some were fortunate enough to have been selected as recipients of these awards.

The role of the pharmacists in each site and area varies but areas of emphasis include a collaborative team based approach that focuses on medications associated with mechanical ventilation, medications dosed for renal and liver function, sedation and delirium protocols, antibiotic stewardship, anticoagulation, and other high-risk medications.

The pharmacists assist with drug information questions, medication reconciliation, pharmacokinetics, medication procurement, and have multiple physician and nurse interactions to ensure that high-quality care is accessible always for patients.

Due to bed shortages onsite, many patients have actually been discharged home from our units particularly the SHC ICU. The pharmacists there play an active role in discharge planning with the patient. The pharmacists are also expected to manage an ambulatory care practice in the Home Parenteral Therapy Program clinic when they are not practicing in the SHC ICU, dispensary or Emergency room.

The pharmacists actively participate in various DCCM groups and AHS committees. An example is the SHC ICU educational committee. This committee is responsible for planning journal clubs, education days and fundraising to send staff to educational events.

Pharmacists are involved in medication reconciliation at all sites. Additionally, the ICU pharmacists at SHC have been asked to help with the implementation of BPMH at transfer and discharge.

Most of our pharmacists have their additional prescribing authority or are completing the process. Some have also completed their injecting authorization and have been utilized in the flu campaign. Our goal is to work to our full scope of practice and discussions are underway as to how to best utilize this new role in the DCCM.

4.6 Respiratory Therapy

Respiratory Therapists (RT's) are integral members of the Dept. of Critical Care multidisciplinary team. Their role in Intensive Care includes ventilator and airway management, delivery of respiratory medications, internal patient transport, bronchoscopy assist, arterial blood gas procurement and analysis, equipment maintenance and troubleshooting. RT's are also members of the Code Blue and ICU Outreach Teams.

Over the past year, Respiratory Therapists across the Calgary Zone have participated in QI projects within Critical Care including the Delirium Initiative, Patient & Family Centre Care Committee, End of Life Care Workshop and the OR/ICU Handover Project.

Over 185 therapists work in the Adult Intensive Care Units across the Calgary Zone. They are supported by 6 Clinical Supervisors and 6 Clinical Educators who, while site based, work collaboratively in the zone to provide consistent orientation and continuing education programs, as well as, research best practice and develop clinical practice guidelines. High fidelity simulation is frequently used for education programs and annual competency and the majority of Clinical Educators have completed WISE (Workshop in Simulation Education) training for medical simulation. The zone is also supported by a part time IT Specialist and an Equipment and Safety Lead.

Respiratory Managers, Executive Directors and our Respiratory Therapy Medical Advisor meet quarterly and collaborate on zonal issues and clinical practice discussions. We were very pleased to welcome Jana Ambrogiano as our new Zone Respiratory Executive Director lead in the fall of 2016.

Staffing models vary across the zone with a mixture of clinicians, core ICU therapists and therapists who cross train and work across multiple service areas within Respiratory Therapy. Cross training therapists creates a workforce with a breadth of experience and skill, provides professional satisfaction and gives the department the ability to assign staff members to areas of need in response to changes in workload and patient needs. Cross site training for Respiratory Therapists is also supported for our part time and relief staff, where possible, to provide experience and perspective on the uniqueness of each site.

Respiratory Therapy is involved in education throughout the zone. Staff participates in Critical Care Simulation Levels 1 and 2 as well as provides education on topics such as mechanical ventilation and arterial blood gases for medical students and residents on a regular basis. Each Spring and Fall, RT's support the planning, set up, and facilitation of learning stations at the Difficult Airway Management Course.

Calgary Zone Respiratory Therapy is a clinical partner for the Southern Alberta Institute of Technology (SAIT) Respiratory Therapy Training Program. In the last year, 48 students in their third year practicum rotated through the ICU's in Calgary spending at least 10 weeks of their clinical training in the critical care environment. These students are supported by the frontline Respiratory Therapy staff during their clinical practicum. Students in their 1st and 2nd year of training also spend clinical hours at all sites and the ICU. All therapists' preceptor students and a focus on preceptor education is a joint effort between AHS and SAIT.

A priority for Respiratory Services at each site is to maintain a fleet of modern technology in invasive and non- invasive ventilators to meet our patients needs while actively preparing for pandemic events. Funding for such planning is a challenge with capital equipment dollars being limited across all sites.

4.7 Critical Care Follow-up Clinic

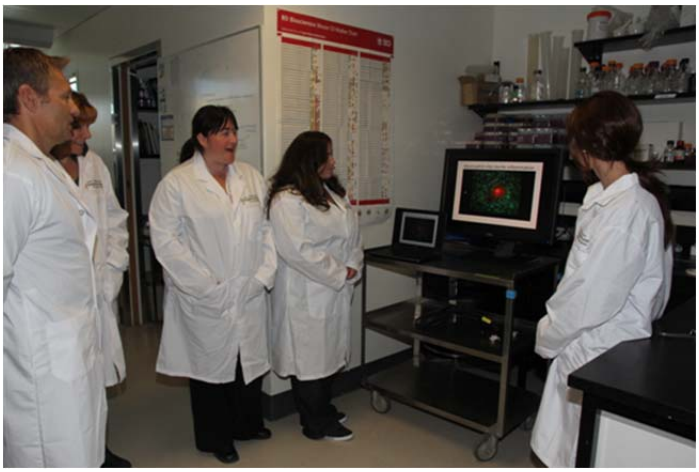
A follow-up clinic for critical care patients who were treated in the Foothills Medical Centre ICU's was established this year. Chris Grant (Physical Medicine & Rehabilitation) and Joanna Everson (nurse practitioner) have started a weekly outpatient critical care follow-up clinic in the Terrace Room at the Foothills Medical Centre. This is a unique outpatient initiative within the ICU that brings together the skills of rehabilitation medicine and critical care.

The Critical Care Follow-up Clinic is a rehabilitation assessment and triage clinic tailored specifically to critical care. In it, we follow patients one month after hospital discharge. We see patients who were in the ICU long enough to potentially experience adverse events sometimes associated with critical illness recovery but who typically would not be seen by rehabilitation medicine as part of their routine care. The clinic focuses on functional outcomes. We use standardized instruments to measure cognition, sleep, depression, anxiety and self-reported functional outcomes. Where needed, we refer to existing community rehabilitation resources.

This is a practical, low-cost, clinical initiative which is designed to improve our patient's medium-term recovery in the community.

4.8 Snyder Translational Laboratory in Critical Care Medicine

Over the past year, the Snyder Translational Laboratory in Critical Care Medicine has continued its mandate to provide cutting-edge research support and technical expertise to the department of Critical Care Medicine. This research support includes assay development, bio-banking, and biochemical analysis of patient samples. This year, the Snyder Lab has collaborated with department members and collaborators both nationally and internationally. These studies include the development of assays to analyze inflammatory mediators, immune effector molecules, markers of coagulopathy, damage associated molecular patterns (DAMPs) and the analysis of tissue pathology in sepsis, brain injury and trauma. These studies have included both human patient samples and the study of animal models such as mouse and pig. This research support has led to the submission and publication of six manuscripts in leading clinical journals such as the Annals of Surgery, Neurocritical Care, Journal of Cerebral Blood Flow & Metabolism, and Critical Care Medicine.



In addition to patient-based clinical research, the Snyder Lab also provides support to a number of new investigators within the department, helping these individuals establish their own, independent research programs in Critical Care Medicine. This support includes providing access to key pieces of core equipment and research staff, helping these new investigators to be competitive and to hit the ground running with their research programs. These investigators have developed a number of animal models of disease ranging from ARDS to cognitive impairment following sepsis to infection-associated coagulopathy. These new investigators have since been able to leverage the support provided by the Snyder Lab to secure independent, peer-reviewed grant support from a number of national and provincial funding agencies.

The Snyder Lab has also worked over the last year to successfully expand its education mandate. These education activities have included the support of an undergraduate summer student working on the role of specific pathogens in infection-induced coagulopathy, and two undergraduate honour's thesis student studying the role of DAMPs in severe trauma and coagulation in sepsis. The Snyder Lab also played a leading role in the Alberta Innovates Health Solutions summer school for high school teachers from across the province. This community outreach activity included seminars illustrating how research is conducted in the Snyder Lab and a hands-on tour of the lab facilities where the teachers were able to participate in simple experiments, gaining experiences that they could then convey back to their science classes in their home institutes.

4.9 DCCM Health Services Research

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

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

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

Sample ongoing projects:

1. How should we engage critically ill patients and their family members in care?
Integrating patient and family needs and values into patient care is a core component of high quality health care. Members of the DCCM are leading a program of research to establish best practices to support patient and family participation in ICU care including communication and shared decision-making.

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

3. How can we ensure provider wellbeing?

Healthcare providers that care for critically ill patients commonly experience psychologically challenging circumstances and can experience distress, which can impact their own well-being and ability to provide high quality patient care. Members of the DCCM are leading a program of research to measure and monitor provider distress, identify circumstances when providers may be at particularly high risk of distress and to develop strategies to mitigate against distress.

Objectives:

1) To enhance the culture of science and applied innovation within the DCCM.

2) Increase capacity for health services research within the DCCM.

3) To improve the health and healthcare delivered to critically ill patients through knowledge creation and knowledge translation.

4.10 NURSING EDUCATION AND DEVELOPMENT

ORIENTATION PROGRAM

Registered Nurses entering critical care within the Calgary Zone are provided a comprehensive six-week orientation program through the Orientation Program for Adult Critical Care Alberta (OPACCA). This course offers a system based introduction to critical care nursing, providing all new hires foundational knowledge to able to practice within ICU. Welcoming an average of 8 RN's per month, or 80 staff per year to Calgary, critical care nurses work with the Clinical Nurse Educator and Nurse Clinician teams to provide mentorship for new staff during clinical preceptored shifts.

ONGOING EDUCATION

Ongoing education is provided to registered nurses working within critical care in numerous ways every year. Educators provide an annual review of critical care skills and knowledge for every staff member, and as well offer a variety of professional workshops and advanced critical care certifications. These internally hosted courses and conferences focus on critical care topics such as CRRT, advanced neurocritical care, ethics, advanced ECG interpretation, advanced hemodynamic monitoring, and World Sepsis Day to name a few.

CANADIAN ASSOCIATION OF CRITICAL CARE NURSES

PARTNERSHIPS

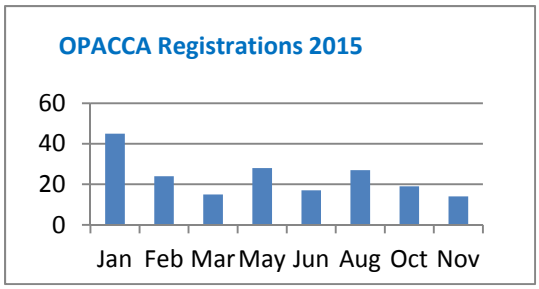
- As partners with Mount Royal University and the University of Calgary, student nurses are welcomed each semester for final practicums.
- Many critical care RNs within Calgary pursue post baccalaureate specialization through the Advanced Critical Care Nursing Program (ACCN) at Mount Royal University.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

2015 / 2016 Year in Review

Education Team: OPPACA

OPACCA (Orientation Program of Adult Critical Care in Alberta) was established in 2011 and since then, more than 1170 nurses registered in OPACCA. OPACCA is the starting point to prepare all Critical Care nurses in the province of Alberta before they start their ICU clinical practice.

OPPACA Statistics in 2015	
New hires registered for OPACCA in 2015:	188
New hires completed OPACCA in 2015:	181
Percentage of completion:	96.28%



Critical Care Accreditation

Successfully completed in May 2015

94% or 128/136 standards met

Delirium

Conducting Provincial current state assessment

Determining key priorities areas of focus to improve the assessment prevention treatment and management with patients with delirium in CC

Patient and Family Centred Care Collaborative

The Patient and Family Centred Care Collaborative Committee is working towards the development, implementation and evaluation of a provincial Family Presence Philosophy and Guidelines for adult and pediatric critical care units, including cardiovascular, and an evidence-informed Supportive Care Bundle for supporting patients and families within 24 hours of admission to an ICU. These developments are based on research conducted with patient and family members that identified 19 themes of areas of practice focusing on the aspects of admission, daily care and transitions of care.

Key Performance Indicators

Under the Adult Operations Liaison Subcommittee, consisting of provincial operational leads, the goal is to create the top key performance indicators provincially for supporting operational reporting, monitoring and evaluation of quality improvement initiatives. Currently available on Tableau, eCritical's TRACER web reports provide operational and quality dashboards for monitoring key areas of improvement and evaluating clinical practices.

Other Areas of Work have included;

- **Care Guidelines after death for the Ebola patient in Critical Care**
- **Supporting restraint policy development**
- **Clinical Content Development and Optimization committee standardizing practices in Metavision**
- **Development of Provincial Clinical Knowledge topics**
- **PRIUS**

For more information please feel free to email the CCSCN at CriticalCare.SCN@albertahealthservices.ca

5.0 Education

Since 1988, the University of Calgary has trained adult critical care physicians in what is generally recognized as an outstanding training program. The Royal College of Physicians and Surgeons survey (February 2015) again fully accredited our UofC Critical Care Medicine Training Program. Graduated physicians have gone on to practice academic and/or clinical critical care, and are working in a variety of both tertiary and secondary centers across the country. Currently, each year, we provide positions for four trainees with guaranteed two years of 'ministry' funding. Last year recruitment was again highly successful with four applicants choosing to pursue Critical Care training at the University of Calgary. The program has built a solid national reputation; if one trusts the fact that we have witnessed a growing number of external applicants and that we consistently match into all of our offered training positions.

In response to societal and academic needs, our department has created two additional Fellowship Training Programs. Our Academic and Clinical International Fellowship Program were developed in 2002 and continue to recruit foreign-trained intensivists wishing to pursue additional academic and clinical opportunities. Unfortunately, there are no candidates joining this fellowship program in July 2016. In an attempt to better support departmental academic activities, a Critical Care M.Sc./PhD graduate training program was developed within the University of Calgary Department of Medical Sciences. It offers Critical Care Medicine residents, fellows and graduate students an improved and more structured education environment for further academic pursuits. Currently, we have five students enrolled in this program (2 MSc and 3 PhD). Students have successfully presented their basic science and clinical research at local and national conferences and have been published in well-respected, peer-reviewed scientific journals.

DCCM supervised 255 months of Critical Care Medicine training for rotating residents this year. This number has remained stable over the past few years. These residents came from the following core programs: Internal Medicine, Respirology, Cardiology, Emergency Medicine, Anesthesia, General Surgery, Urban and Rural Family Medicine, Ears, Nose and Throat, Cardiac Surgery and Neurology. There is no national requirement for critical care rotations in Family Medicine, but given that many trainees subsequently practice in rural Alberta, a one-month rotation is offered for all trainees. In the absence of residents available for in-house coverage, DCCM has recruited a group of 'bedside physicians' (resident extenders) who provide in-house coverage for all four ICU's. Funding for this service is provided by Alberta Health Services, with DCCM responsible for the coordination of the call schedules. Our CCM ICU Outreach Program works collaboratively with the existing ICU resident on-call system to ensure prompt, experienced critical care coverage within all hospitals, twenty-four hours per day.

We are excited to report that our clinical rotation continues to be highly desired by the undergraduate medical students. For the fifth consecutive year, the number of medical students from the University of Calgary who have chosen Critical Care Medicine remains very high. This year, 52 students rotated within our critical care units. In addition to local students, we continue to attract national and international trainees wishing to pursue Critical Care Medicine as a medical elective. In the 2012 academic year we received 8 students from a variety of national and international medical schools. Based on current requests for the upcoming academic year, we expect the number of medical students interested in rotating through our training program to continue to rise.

In addition to our three graduate courses (the Fundamental Basis of Critical Illness (UofC course #623.02), Advanced/Applied Pulmonary Physiology (UofC courses #623.03 and #623.04)) our monthly Journal Club and our Core Content Curriculum, our didactic and hands-on course focusing on the application of Ultrasound and Echosonography in the ICU continues to expand. We have recently constructed an on-line educational module to augment the didactic and practical experiences related to this procedural skill. As well, we are nearing completion of an IT solution to enable us to further expand our opportunities for image acquisition and peer review. This year we purchased four hand-held ECHO/US machines to be integrated into this curriculum.

All departmental educational sessions are provided by a combination of departmental educators and local experts and are designed in a small-group, interactive format to maximize participation. Additionally, our residents participated in a variety of PGME-sponsored workshops, including sessions on Education Techniques, Biomedical Ethics and Financial Planning. Our students were also enrolled into a variety of clinical workshops during the year, including a session on Introduction to Bronchoscopy. The Difficult Airway Management course continues to run biannually in the spring and fall. This interprofessional collaboration targets approximately 50 learners per course from a number of disciplines including Critical Care Medicine, Emergency Medicine, Anesthesia, Otolaryngology and Respirology and includes involvement from the Regional Respiratory Therapists as well as our Critical Care Outreach physicians as well as the DCCM nurse practitioners and physician assistants.

NOTABLE HIGHLIGHTS

Dr. Jessica Wang received the Helios Scholarship (2015-2016) in the amount of $40,000.00. She will also receive additional funding from the Department as a condition of this award. This scholarship will support her as a clinical fellowship trainee to acquire additional skills at another institution and to enhance her specialty.

This year we are pleased to include trainees from Cardiology and General Internal Medicine in our learner population. The full day course integrates didactic and hands-on skills stations and addresses strategies and techniques for dealing with difficult airway scenarios. In addition, our Department, under the guidance of Dr. Jason Lord, has continued integrate simulation as an educational tool into our curriculum. Critical Care medicine residents continue to receive monthly simulation sessions as part of their education curriculum. These sessions are precepted by DCCM faculty and supported by the provincial eSIM program. Citywide CCM Grand rounds occur weekly and are recorded and posted on our website: http://iweb.calgaryhealthregion.ca/clin/icu/education/index.html. As well, we have created a more formal mentorship process to provide our trainees with faculty mentors to help them deal with the various non-clinical issues that arise during their training.

To further expand and enhance our clinical and academic collaboration with our referring centers, our department continues to integrate a mandatory one-month community based rotation in the Red Deer Regional Hospital intensive care unit. This year two fellows participated in this rotation, supported by the Distributed Learning and Rural Initiative Program offered by the UofC.

6.0 Research

In 2015, the DCCM contributed to a total of 62 peer reviewed scholarly publications and 16 peer reviewed abstracts (presented at national and international conventions). Grant support remained strong with members receiving support from Alberta Innovates – Health Solutions, Canadian Cancer Society Research Institute (CCSRI), Canadian Institutes of Health Research (CIHR), the Critical Care Strategic Clinical Network, M.S.I. Foundation, Natural Sciences and Engineering Research Council of Canada (NSERC), National Health and Medical Research Council (NHMRC), Technology Evaluation in the Elderly (TVN) and the University of Calgary. Continuing support was provided by Alberta Innovates – Health Solutions, Brain Canada, Canadian Intensive Care Foundation, Canadian Institutes of Health Research, Centre Hopitalier Universitaire Sainte-Justine, the EMS Foundation, Hotchkiss Brain Institute, the Public Health Agency of Canada, Technology Evaluation in the Elderly (TVN), and Alberta Health Services along with the University of Calgary and the University of Alberta. These in combination with numerous ongoing clinical trials have led to a productive DCCM Research program.

The **Alberta Sepsis Network**, which was funded through a five million dollar Alberta Heritage Foundation for Medical Research (AHFMR) Interdisciplinary Team Grant, ended in March 2015. Under the leadership of Dr. Paul Kubes and Dr. Chip Doig, the Alberta Sepsis Network brought together 25 researchers, including immune experts, microbiologists, biochemists, infectious disease physicians, and intensive care physicians, at the University of Calgary, University of Alberta, University of Lethbridge, and University of Toronto with the ultimate goal to improve the health of patients with sepsis. Recruitment was strong with over 870 patients (FMC – 533, PLC – 267, CVICU – 70) enrolled into the study.

ASN Neuro enrolment ended; the definitive goal was to observe the role of low grade sepsis in relation to brain injury in patients discharged within 24 hours of infection. As part of her PhD Thesis, Brittany Scott, under the supervision of Dr. Shalina Ousman, Dr. Andreas Kramer, Dr. Brent Winston, Dr. Paul Kubes and Dr. David Zygun, extended the original work from her successful Master's program for continual support of the ASN Neuro investigation.

The **Translational Laboratory in Critical Care Medicine**, under the direction of Dr. Paul Kubes, continues to generate important collaborations by bringing clinicians and basic scientists closer together. In 2015, this partnership concluded the benchwork for Alberta Sepsis Network and a study of intraventricular tissue plasminogen activator (tPA) in the management of aneurysmal subarachnoid hemorrhage, a study led by DCCM member Dr. Andreas Kramer. Dr. Paul Kubes and Dr. Craig Jenne are perfecting novel in-house assays which will benefit future DCCM trials.

The **Yipp Lab**, created in 2014, is looking to discover how the lung defends against pathogens and how acute inflammation is generated by using in vivo imaging strategies. There are currently three projects ongoing at the Yipp Lab. Two of the projects examine Neutrophil recruitment in the lung and pulmonary inflammation. The final project investigates pulmonary intravascular host defense.

The **Academic Neurocritical Care (NCC)** program continues to expand. Dr. Andreas Kramer is acting Principal Investigator and has undertaken a program of research aimed at examining early determination of neurological prognosis in ICU patients with Severe Traumatic Brain Injury (TBI-Prognosis study). Dr. Kramer has also been working in conjunction with the Department of Clinical Neurosciences, to examine mean arterial pressure in spinal cord injury (MAPs) and minocycline in acute spinal cord injury (MASC). Dr. Philippe Couillard is co-investigator on two studies 1) through collaboration with Dr. Peter Stys (Department of Clinical Neurosciences) in developing a possible blood test for Alzheimer's disease and 2) to capture data on delirium in the CVICU (along with Dr. Andre Ferland).

NOTABLE HIGHLIGHTS

Dr. Daniel Niven was awarded Best Abstract and Best Oral Presentation at the 2015 Alberta Society of Intensive Care Physicians 27th annual general meeting.

Dr. Stelfox was awarded the Excellence in Health Services Research Award and was named Peak Scholar in Entrepreneurship, Innovation, and Knowledge Engagement.

Dr. Au was awarded the Society of Critical Care Medicine Start Research Achievement Award in 2015.

Dr. Andreas Kramer's ABLE trial results were published in New England Journal of Medicine. Calgary contributed 155 patients, making us the third highest enrolling site.

DCCM members continue to play a critical role in the operation of the **Canadian Critical Care Translational Biology Group (CCCTBG)**; a group led by Dr. Brent Winston and designed to embark on inter-centre basic science projects that will allow unparalleled cooperation between centres for basic science research in Critical Care.

Three new studies were undertaken in 2015. Death prediction and physiology after removal of therapy (DePPart) examines the development of a tool to help identify patients who are most likely to die within the organ donor time period by studying the natural history of cessation of physiological function after withdrawal of life sustaining therapy. The HAP VAP study is a phase 3 randomized double-blind study comparing TR -701 FA and Lenezolid in ventilated Gram-positive nonsocomial pneumonia to determine the all-cause mortality at 28 days in patients with HAP or VAP treated with TR – 701 FA compared with linezolid. The SSAIL study is a Multicenter, randomized, double-blind, parallel, placebo-controlled, Phase 2 study of LB1148 in patients with septic shock with the goal to increase the number of days alive without cardiovascular, renal or pulmonary organ support through Day 28.

In 2015 there were 2 research coordinators (2.0 FTE) who played a vital role in our translational and clinical research program. Stacy Ruddell (Foothills Medical Centre) and Joshua Booth (Peter Lougheed Centre) coordinated studies for the Department.

In 2015 the DCCM hired a second Departmental data analyst. This person will be the link to operational and research analysis of DIMER and eCritical data.

Research Revenue

Research Equivalents (***RE***)[3]

Department	2012-13	2013-14	2014-15[1]
Critical Care Medicine	**1.16**	**2.58**	**2.58**
Basic Sciences	68.65	68.50	68.51
Clinical Dept. w/ AARP	83.64	79.19	79.50
Clinical Dept. w/out AARP	**42.82**	**44.50**	**45.98**
CSM	195.11	192.19	193.99

Data from Dean's database
compiled by Dr. Richard Hawkes

	$ in million					
Total Research Revenue[4]	Department	Tot. Res. Rev.			Tot. Res. Rev. per RE		
		2012-13	2013-14	2014-15[1]	2012-13	2013-14	2014-15[1]
	Critical Care Medicine	**1.25**	**1.97**	**1.09**	**1.08**	**0.76**	**0.42**
	Basic Sciences	47.25	48.28	45.75	0.70	0.70	0.67
	Clinical Dept. w/ AARP	49.47	53.92	54.43	0.59	0.68	0.68
	Clinical Dept. w/out AARP	**22.85**	**27.24**	**25.88**	**0.53**	**0.61**	**0.56**
	CSM	168.04	158.58	172.71	0.86	0.83	0.89
CIHR Revenue[5]	Department	CIHR Rev.			CIHR Rev. per RE		
		2012-13	2013-14	2014-15[1]	2012-13	2013-14	2014-15[1]
	Critical Care Medicine	**0.33**	**0.23**	**0.12**	**0.28**	**0.09**	**0.05**
	Basic Sciences	16.04	15.35	15.27	0.18	0.22	0.22
	Clinical Dept. w/ AARP	6.99	7.12	10.50	0.08	0.09	0.13
	Clinical Dept. w/out AARP	**1.89**	**1.62**	**2.44**	**0.04**	**0.04**	**0.05**
	CSM	25.24	26.31	28.21	0.13	0.14	0.15
Clinical Research Revenue[6]	Department	Clin. Res .Rev.			Clin. Res. Rev. per RE		
		2012-13	2013-14	2014-15[1]	2012-13	2013-14	2014-15[1]
	Critical Care Medicine	**0.15**	**0.35**	**0.36**	**0.13**	**0.14**	**0.14**
	Basic Sciences	0.1	0.22	0.03	0.00	0.00	0.00
	Clinical Dept. w/ AARP	10.11	11.31	12.31	0.12	0.14	0.15
	Clinical Dept. w/out AARP	**1.83**	**2.84**	**2.42**	**0.04**	**0.06**	**0.05**
	CSM	12.05	14.36	14.77	0.06	0.07	0.08

Data from Dean's database
compiled by Dr. Richard Hawkes

7.0 Challenges

7.1 Response to Issues

Issue: Patient Safety

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

Issue: Recruitment of Physicians

Refer to Section 5.0, Workforce Planning

7.2 Ongoing Matters and Plan of Action

ICU Outreach

- Respond to the dynamic staffing environment in AHS. Nearly 50% of AHS staff stated that they had attended some type of ICU Outreach Team training. As a result of the survey, the ICU Outreach Program has been re-educating the staff at all three adult sites in Calgary in an effort to address the issue of staff turnover and movement within the organization.
- Continue process improvements across the Program including, but not limited to, debriefing after calls, maximizing the use of the ICU Outreach Database from the perspective of both the provider and service user by involving those who participate in Code 66 calls in decision making
- Continue to enhance the service delivery model for ICU Outreach through multiple means including increasing MD coverage on weekends and during the day at FMC and ensuring the best match between ICU Outreach Team member skill and patient need

Capacity

Short Term 1 – 3 Years:

The Critical Care leadership will continue to meet with AHS Executive to provide utilization data and justification to ensure the most important consideration is a patient centered system.

Longer Term 4 – 7 Years:

The ICU Functional Programming team for the South Health opened the ICU at end of February 2013 with 4 beds and the plan to grow to 10 beds by the end of 2013. Indeed, 10 beds were opened by December 2013.

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

7.3 Future Risks

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

This should include:

- The development of provincial programs of advanced competencies in critical care for allied health disciplines.

- The DCCM website has been hosted on the **FTP Server: iwebftp.calgaryhealthregion.ca**. However the source file for the whole website is housed on the drive**: Jeeves** which share the ICU files.
  Risks associated are:
  - ✓ Using a shared server, if any one site on the server is compromised, it could literally open a gateway for the attacker to gain access to the other sites hosted on the same server as well.
  - ✓ One of the disadvantages could be also the incapacity to harden the server, for example if you are on the shared hosting server, you would not have access to the PHP and Apache configuration of the server.
  - ✓ Secured and hard password to guess against multiple attempts thru SSH or mail server, brute force detection could prevent that.
  - ✓ Server protection against Botnet and Open Relay.
  - ✓ Cross Site scripting and Denial of Service are some of the server threats.
  - ✓ Securing the server with potential threats will mitigate the risks.

8.0 Workforce Planning

8.1 Summary of Recruitment

Department of Critical Care Medicine recruited two specialist's in 2015:

Dr. Paul McBeth:

Dr. McBeth's primary appointment is in the Department of Surgery, with cross appointment in Critical Care Medicine. He will be based from South Health Campus, with work in the ICU's across the zone as required. His clinical training is in Trauma / Acute Care Surgery and Critical Care Medicine.

Dr. McBeth's clinical skill set and interests include critical care ultrasonography and thromboelastography (TEG). He has obtained formal training and certification in perioperative transesophageal echocardiography and continues pursuing clinical and research activities related to TEG in patients with trauma induced coagulopathy. In addition to his clinical skills he has postgraduate training in Biomedical Engineering and experience with medical informatics and interest in quality improvement.

Dr. Christopher Grant:

Dr. Grant is appointed as a Clinical Assistant Professor in the Department of Clinical Neurosciences with cross appointment in Critical Care Medicine. Dr. Grant graduated from the PM&R residency training program at the University of British Columbia and he has been a staff Physiatrist at UBC. He has a unique and special interest in rehabilitation in the critical care and trauma settings. In collaborating with DCCM, he will be developing long term follow-up of ICU patients as part of the new PM&R program in Calgary. He will have clinical activity at PLC & FMC. In the future he will be available for consults at all sites.

There was one specialist departure from Critical Care Medicine in 2015.

- Dr. Ann Kirby: Dr. Kirby completed 14 years of service in Critical Care.

Following physicians were promoted in 2015:

Dr. Jason Waechter
Clinical Associate Professor

Dr. Selena Au
Clinical Assistant Professor

Dr. Ken Parhar
Clinical Assistant Professor

Dr. Amanda Roze des Ordons
Clinical Assistant Professor

The following vacant positions were continued to be advertised throughout the year:

- Clinician Scientist
- Intensivist/Clinical Implementation Scientist
- Intensivist/Academic Chronic Disease Epidemiologist
- Intensivsit/Neuro Critical Care

Recruitment will be predicated on one Intensivist being responsible for 10 patients (Canadian Critical Care Society) or at maximum 14 patients (ANZICS) and more humane working conditions to maximize patient safety and longevity of physician practice within Critical Care. Recruitment assumes the appropriate infrastructure support (office space and secretarial support) to accomplish the goals set out by both the Zone and the University. Currently the Department of Critical Care Medicine is strong administratively and clinically, but needs to continue building in the research arena.

8.2 Future Needs

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

The mean age of our workforce is 48.8 (33-63). A week of clinical service usually consists of over 100 hours. Currently certain members of our Department are working clinically the equivalent of 1.5 or more FTE. It is not infrequent for Intensivists to sleep in-house either because of volume/acuity of patients or because of a shortage of bedside physicians (many GPs elect to work as beside physicians in other departments where the acuity/workload is less for the same remuneration). We acknowledge that this pace is indeed not sustainable. Ideally, a workweek should consist of no more than 50 hours and every patient should receive critical care specialist oversight no matter what time of day. This can only be accomplished with an in-house service delivery model. A Committee has been struck to examine how to change medical service delivery for ICU in Calgary Zone. A Department retreat was held in the fall to discuss service delivery models for ICU.

Some principles were outlined:

1) Daytime work after night-time call is onerous and contributes to overall fatigue and dissatisfaction.

2) Continuity of care is important for our patients.

3) Any proposed change should not be made to be mandatory in an effort to respect those members with other commitments (other ICUs, services, research programs).

After a long discussion of options, the plan was to give 'decoupled' call nights a trial for 6 months at FMC only.

9.0 Quality Assurance, Quality & Safety Improvement

9.1 Department of Critical Care Quality Assurance

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

Since 2010 the DCCM QAC has completed 6 quality assurance reviews, with the last one completed in fiscal 2014-15. A seventh review is currently underway. A total of 22 recommendations were made from the 6 completed reviews. Of these 22 recommendations from the QA reviews 11 have been implemented in the critical care units in response to these events, 1 recommendation is currently in the process of being implemented, 4 have not been started or updated in the last 12 months and 6 have no current operational owners assigned to implement the accepted recommendations. QAC intake criteria have been developed to guide and encourage staff in reporting events for review.

Critical Care Morbidity and Mortality Committees exist as subcommittees of DCCM QAC. These committees review all deaths occurring in ICU or within 72 hours of ICU transfer or discharge, and any unexpected morbidity where concerns arise about system safety. The QAC is currently developing a process to combine the site-based Morbidity and Mortality rounds into a zonal multi-disciplinary process to promote dissemination of patient safety learnings.

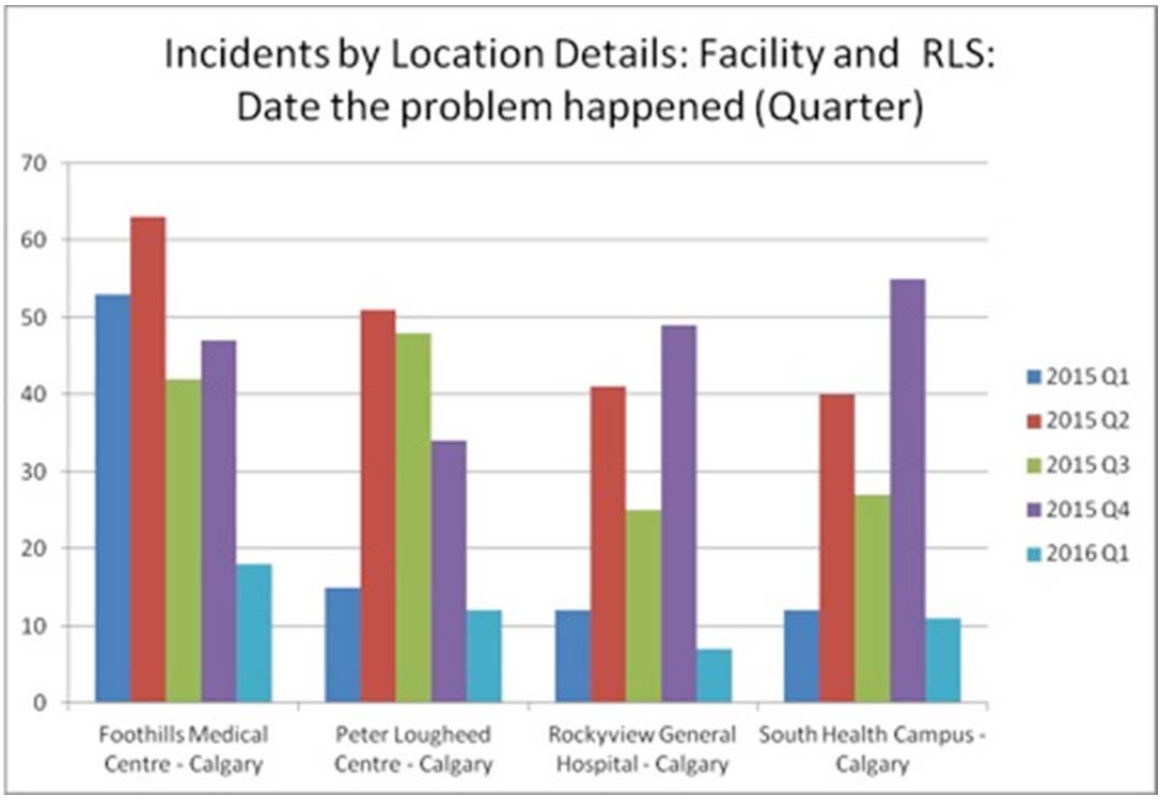
DCCM QAC and Critical Care Morbidity and Mortality reviews at all Calgary Adult sites are protected under section 9 of the Alberta Evidence Act.

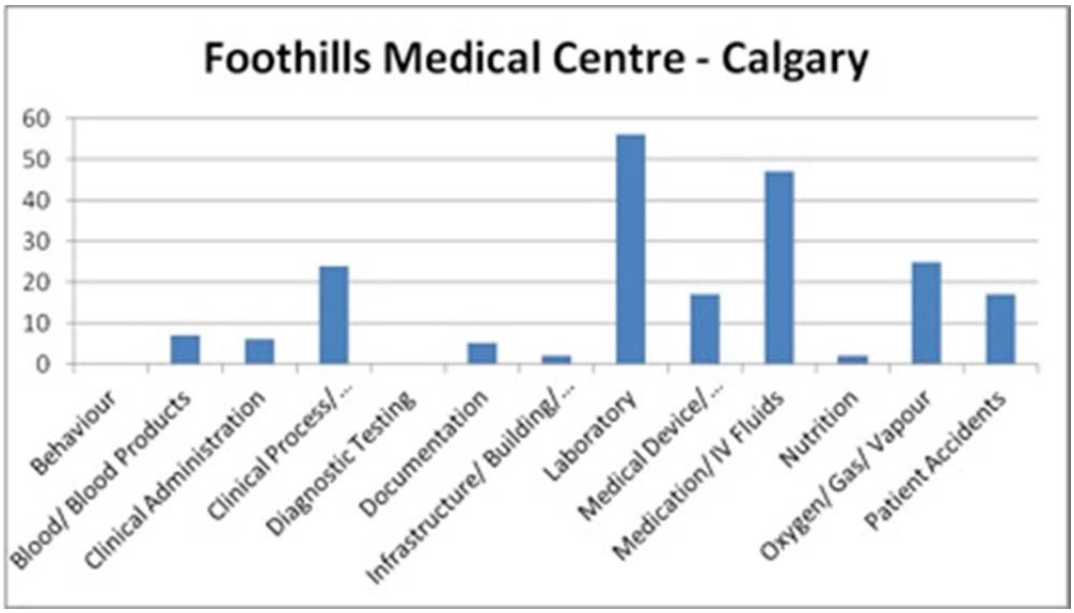
A strong safety culture within the ICU promotes reporting any safety concerns directly to management and the Patient Safety office via the AHS Reporting & Learning System (RLS). All RLS reports are reviewed by management and/or medical leadership and appropriate follow-up occurs. Reports submitted confidentially are reviewed by the Patient Safety office and QAC as required. QA reviews are completed on specific events that offer opportunities to improve system safety.

The AHS RLS is a voluntary reporting system that provides an opportunity for staff/physicians to report hazards, close calls and adverse events with varying degrees of harm. As the RLS is a voluntary reporting system, it does not provide a complete

picture of all risks, hazards or system vulnerabilities within a clinical area. Other sources of information should also be used to complement RLS data when reviewing the system to improve patient safety. RLS reports need to be viewed in the context of all factors that influence what individuals choose to report.

For the fiscal year of March 1 2015 to February 1 2016, 662 reports related to patients in the ICUs were submitted by staff and physicians. This number does not include reports that were submitted confidentially, or reports submitted by ICU staff/physicians related to patients outside the ICU. The number of reports received by each unit in each quarter is shown in the first figure. The second figure displays the trends in event types reported in all 4 adult ICUs from March 1, 2015 to February 1, 2016. The subsequent figures show the trends in event types for each of the 4 adult intensive care units in the Calgary zone.




Foothills Medical Centre - Calgary
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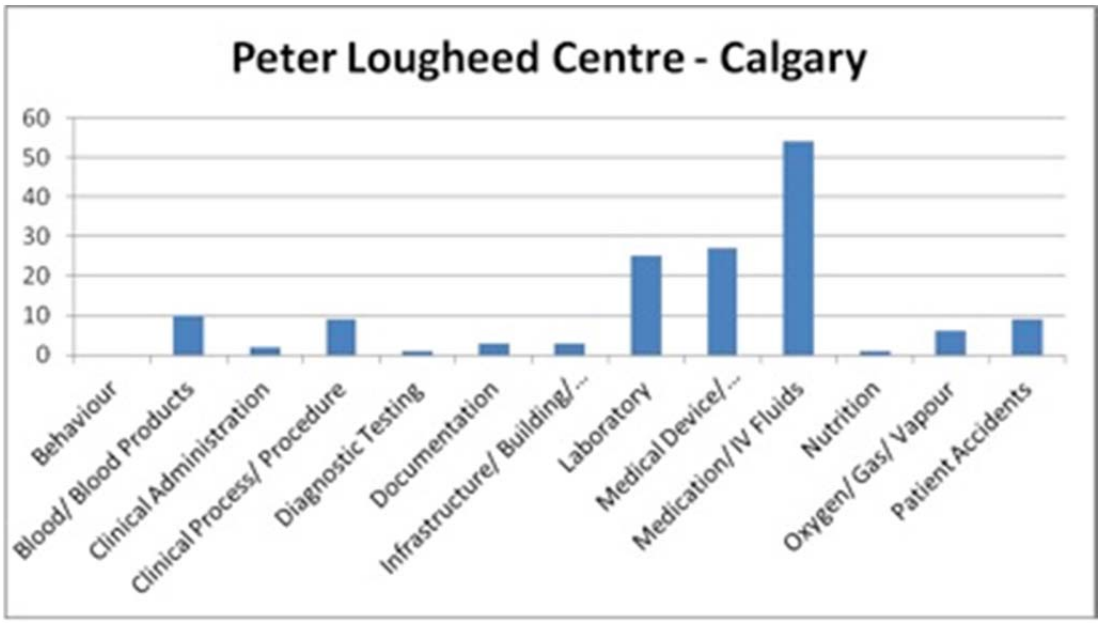
Behaviour
Blood/ Blood Products
Clinical Administration
Clinical Process/...
Diagnostic Testing
Documentation
Infrastructure/ Building/...
Laboratory
Medical Device/...
Medication/ IV Fluids
Nutrition
Oxygen/ Gas/ Vapour
Patient Accidents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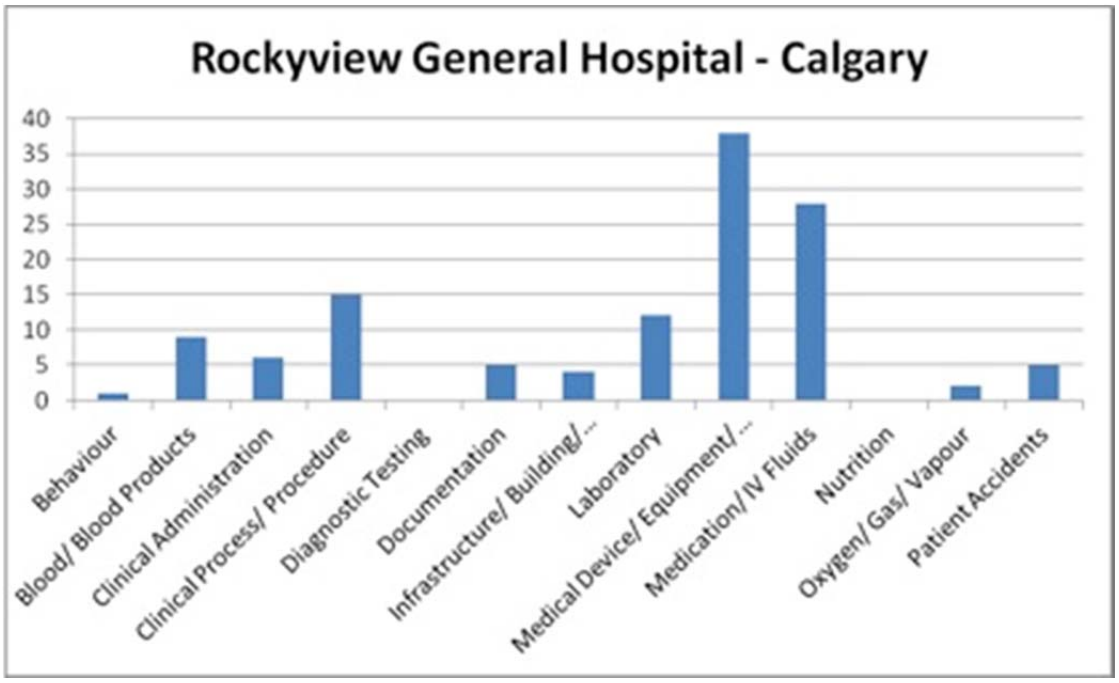
Laboratory
Medical Device/...
Medication/ IV Fluids
Nutrition
Oxygen/ Gas/ Vapour
Patient Accidents


Rockyview General Hospital - Calgary
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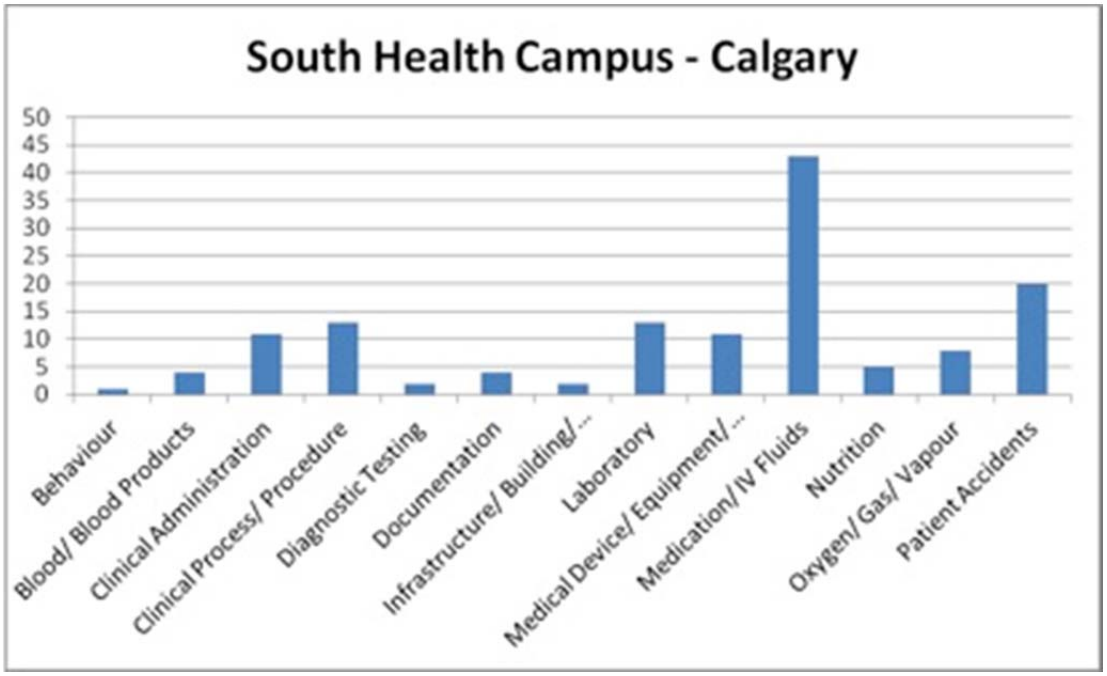
Medical Device/ Equipment/...
Medication/ IV Fluids
Nutrition
Oxygen/ Gas/ Vapour
Patient Accidents


South Health Campus - Calgary
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Clinical Administration
Clinical Process/ Procedure
Diagnostic Testing
Documentation
Infrastructure/ Building/...
Laboratory
Medical Device/ Equipment/...
Medication/ IV Fluids
Nutrition
Oxygen/ Gas/ Vapour
Patient Accidents

9.2 Quality Improvement on a National Level

The Alberta Health Services - Calgary Zone and the Department of Critical Care Medicine is committed to excellence in patient care and supports initiatives aimed at quality improvement including information sharing with not only the community it serves but with other health care jurisdictions within and outside of Canada. This information sharing allows health care providers to more openly question their current practices as well as offer opportunities to learn from others and potentially emulate better practices.

9.3 Quality Improvement at a Local Level

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

The five quality improvement priorities defined for 2015 are the following:

9.3.1 Critical Care Accreditation (May, 2015)

A Calgary Critical Care Accreditation Team (CCCAT) was created at the zonal level with the aim to work collaboratively across all adult ICU's to aid in the preparation for the 2015 Accreditation survey. The team consisted of team leaders representing all disciplines and sites within adult critical care and was chaired by the DCCM QI Lead and the FMC Critical Care portfolio manager. The Calgary Critical Care Accreditation Team (CCCAT) planned, supported, and coordinated the site specific spread of the Accreditation Canada Standards and Required Organizational Practices (ROPs) as developed by the Service Excellence Teams (SETs) and ROP teams. The CCCAT determined DCCM priority standards beyond ROP work, guided by the June 2014 self-assessment portal results and discussions amongst the team. As the process to help DCCM prepare for the Accreditation Canada survey was being developed, the team promoted a culture of quality and safety, recognizing that accreditation is a key component of day to day work and ongoing quality improvement.

Every adult ICU in Alberta was visited during the Accreditation survey and Critical Care successfully completed Accreditation. Critical Care met 97% of all high priority criteria and overall met 94% of total criteria.

9.3.2 OR-ICU Handover Project: Pilot Implementation at FMC ICU

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

The project went live at the FMC site in November 2014, with successful implementation of all project elements (indicated by compliance measures) in September 2015. This project is led by Dr. Paul Boucher, Jennifer Coulthard and the DCCM QI lead. The project formalizes the process of consultation and acceptance of the patient by the ICU team. In addition, this process optimizes and streamlines handover process from the OR to the ICU. This process is utilized by the OR and PACU team (nursing staff, unit clerks, surgeons, surgery residents, surgery fellows, anesthetists, anesthesia residents, anesthesia Fellows, Anesthetic RT's) and the ICU team (Intensivist, residents, fellows, unit clerks, RN's, nurse clinicians, LPN's, Respiratory Therapists, nursing attendants).

As of December 31st 2015, the project is moving towards a sustainability phase at the FMC site with concurrent plans to move the project zonally in 2016.

9.3.3 Delirium Screening, Management and Prevention

A successful implementation of the ICDSC (Intensive Care Delirium Screening Checklist) was exemplified in 2015 with a zonal screening compliance of 89%. Work around integrating delirium prevention and management strategies at the bedside continues to move forward and is lead by the zonal multidisciplinary team representing all adult sites. This group is chaired and led by the DCCM QI Lead and is co-led by Melissa Redlich, Barry Kushner and Dr. Terry Hulme. Accomplishments for the 2015 year include:

- Establishing, collecting and discussing data around preliminary process measures in relation to daily rounds discussion as it relates to delirium care. (audit implemented, results analyzed and disseminated at the site and zonal level)
- Development of the delirium practice guidelines that support the existing guidelines of (Analgesia and Sedation, Wake Up and Breathe and Non-Pharmacological Guidelines). The intent is to explicitly outline the roles and responsibilities of each discipline as it relates to the delirium care in the ICU. The SCCM (Society of Critical Care Medicine) has proposed "bundling" all delirium care interventions as "ABCDEF". As such, the DCCM has adapted the delirium practice guidelines to reflect this bundled approach.
- Establishing in depth process and outcome measures as it relates to the "B" portion of the bundle (representing both awakening and breathing trials). Data request in E-Critical placed in late November 2015. The aim of collecting this data is to ensure important practices such as early spontaneous awakening trials, early breathing trials and extubations are operationalized consistently by providers.

- As measures were being defined, concurrent work done by the DCCM zonal team focused on establishing consensus around the operational definition and expectations around Spontaneous Awakening Trials (SATs). Thus, helping to inform and create a standardized method in charting this into Meta-Vision (in the form of an event button). Official implementation of such charting is slated for Spring 2016.

9.3.4 Medication Reconciliation on Admission

The DCCM continues to participate in the Medication Reconciliation initiative as led by the Calgary Zone Med-Rec team. Monthly audits are completed at each site and the DCCM Lead sorts, and trends the data by site and zone.

9.3.5 Calgary Zone Patient and Family Centered Committee

The DCCM PFCC continues to meet on a monthly basis with team membership comprising family advisors and members of the ICU team that represent multiple disciplines and leaders from all of the adult ICU's. This forum is chaired by Rachel Taylor and Dr. Paul Boucher. The following was accomplished in 2015

- PFFC held an End of Life Care education day consisting of multiple speakers and was attended very well with representatives from across the DCCM
- A formalized curriculum was built to help support the EOLC champion program. The aim of this program is to create peer champions amongst staff across DCCM to help strengthen practice around end of life care in the ICU. The first orientation day is slated for February 2016 with the hopes that this will be offered twice a year anyone interested.
- Amidst work around a standardized brochure for ICU families, it was identified that specific information is required by families within 24 hours of their loved ones admission to ICU. As a result, the committee constructed and finalized content of the "First 24 Hours" information sheet for families. This sheet was piloted at both the SHC and RGH ICU in mid-2015 and is slated for formal implementation in 2016.

9.5 ICU Outreach Team

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

During the reporting period of January 01, 2015 to December 31, 2015, our ICU Outreach Teams have responded to 1823 Code 66 calls which translate to approximately 152 calls per month. The vast majority of patients remain on their respective nursing units with about 20% requiring transfer to one of our ICUs. The most common reason for the team activation is a decrease in patient level of consciousness (53%) followed by respiratory distress (40%). They also completed 5,197 follow-up visits with patients after being discharged from ICU, experiencing a code 66 or a code blue.

Program Objectives:

- **Reduce cardiac arrest rate** through early recognition of changes in patient's physiology and clinical status
- **Promote continuity of care for patients discharged from ICU** through risk assessment for ICU readmission, and provision of specific follow-up visits for patients deemed at high risk of readmission
- Ensure **optimal use of Critical Care resources**
- **Improve care delivery** to patients by sharing critical care skills and expertise through an educational partnership with non-critical care unit staff.
- Facilitate appropriate **Goal of Care determination** for select patients
- Facilitate **positive relationships** between health care teams

System Improvement:

Last year the ICU Executive Council endorsed the plan to transition from a physician led model to a RN/RT led, physician supported model of delivery for Outreach services. This model of delivery involves the RN/RT attending all code 66 calls with intensivist (or delegate) called upon as needed. Over the year presentations were made about the proposed model to each of the four Site Medical Directors, the four Site Councils, and ZMAC. Discussed were the reasons and impetus behind the changes, the new mechanics of a Code 66 call, and a re-newed emphasis on the primacy of continuity of care and the role of the Most Responsible Health Provider (MRHP). The concept was well-received in all quarters but it was noted, several times, that a large culture change will need to be accommodated for this model to succeed. A working group has been convened to oversee a review of current processes, to map out the new processes, to understand the impacts of change, and to envision how such a transition might be engineered. In the meantime a Calgary zone Outreach Educator has been engaged to review current Calgary zone practices of orientation to Outreach, certification practices, ongoing education, and skills enhancement for RN and RRT Outreach team members. An evaluation of the different approaches to education and skills enhancement necessary to operationalize the new model is underway.

Quality improvement:

Quality improvement work continues, identifying development opportunities in the areas of:

- Clarity around ICU Outreach roles
- Consistent practice between sites
- Target continuing education specific to ICU Outreach roles
- Building and sustaining a high performing ICU Outreach Team
- Communication between ICU Outreach and the referring wards/most responsible physicians
- Workload management, especially at FMC site, and need for future planning

Alberta Health Services

Code 66 Interventions

eCritical ALBERTA

Site All Department All Unit All

01-Jan-15 to 31-Dec-15

Airway

Suctioning	163	8.72%
Oral or nasal airway	97	5.19%
Intubation	95	5.08%
Trach change/reinsertion	7	0.37%

Breathing

Supplemental O2	1,184	63.35%
Nebulized treatment	228	12.20%
Bag-value mask	97	5.19%
Non-invasive ventilation	91	4.87%
Invasive Ventilation	66	3.53%
Chest Tube Insertion	5	0.27%

Circulation

IV fluid bolus	666	35.63%
Peripheral IV inserted	594	31.78%
IV antiarrythmics	150	8.03%
IV diuretics	139	7.44%
RBC transfusion	78	4.17%
Nitroglycerin (IV, sl,or patch)	69	3.69%
IV vasopressors	66	3.53%
Cardiac arrest called	52	2.78%
Other blood product transfusion	36	1.93%
Central line inserted	30	1.61%
Cardiversion	12	0.64%
Intraosseous Vascular Access	6	0.32%

Neurologic

IV sedative	137	7.33%
IV naloxone	103	5.51%
IV narcotics	101	5.40%
IV anticonvulsant	53	2.84%
IV glucose	44	2.35%

Other

Foley catheter	170	9.10%
IV Antibiotics	165	8.83%
Ng/Og tube	39	2.09%

Investigation

ECG	983	52.59%
ABG's	843	45.10%
CxR	732	39.17%
Lytes	566	30.28%
CBCD	548	29.32%
Culture	233	12.47%
CT - Head	126	6.74%
CT - Others	125	6.69%
CT - Abdo	26	1.39%
CT - P.E.	23	1.23%
CT - Chest	22	1.18%

3/30/2016 11:11:30

Alberta Health Services

Code 66 Operational Indicators

eCritical ALBERTA

Site All

Department Multiple Values

01-Jan-15 to 31-Dec-15

	Calls	ICU Transfers	Change in GOC	Died During Call	Code Blue	MD Notified	MD Present	MD Present Day Time
FMC - Medicine PCU 61 PULMONARY/THORACIC	65	27.69%	4.62%	1.54%	0.00%	89.23%	78.46%	85.19%
FMC - Medicine PCU 36 MEDICAL TEACHING	56	33.93%	16.07%	0.00%	1.79%	80.36%	83.93%	85.71%
RGH - Medicine UNIT 93 INTERNAL MEDICINE/PULMONARY	51	23.53%	3.92%	5.88%	7.84%	86.27%	78.43%	85.71%
FMC - Surgery PCU 102 ONCOLOGY SURGERY	47	48.94%	4.26%	0.00%	2.13%	74.47%	74.47%	88.24%
FMC - Clinical Neurosciences PCU 112 NEUROSURGERY	47	53.19%	2.13%	2.13%	0.00%	91.49%	80.85%	77.78%
PLC - Medicine UNIT 39 - MTU/PULMONARY	42	40.48%	4.76%	2.38%	11.90%	100.00%	64.29%	86.67%
SHC - Surgery ACU 78 ORTHOPEDICS	46	6.52%	8.70%	0.00%	2.17%	84.78%	54.35%	46.15%
SHC - Cardiology/GIM ACU 66 CARDIOLOGY/GIM	42	7.14%	2.38%	4.76%	7.14%	92.86%	71.43%	84.62%
PLC - Cardiac Sciences UNIT 49 - MEDICAL TEACHING/CARDIOLOGY	43	11.63%	4.65%	2.33%	2.33%	100.00%	72.09%	69.23%
PLC - Surgery UNIT 53 - VASCULAR/PODIATRY	41	29.27%	12.20%	7.32%	7.32%	97.56%	56.10%	72.22%
RGH - Medicine UNIT 94 INTERNAL MEDICINE/PULMONARY	39	35.90%	5.13%	0.00%	10.26%	84.62%	76.92%	81.25%
RGH - Surgery UNIT 82 GENERAL SURGERY/UROLOGY	40	17.50%	2.50%	0.00%	7.50%	95.00%	45.00%	42.86%
PLC - Medicine UNIT 38 - MTU/HEME/ONC	38	31.58%	7.89%	2.63%	7.89%	92.11%	52.63%	57.89%
FMC - Medicine PCU 62 MEDICINE	37	16.22%	8.11%	0.00%	0.00%	100.00%	78.38%	80.00%
RGH - Medicine UNIT 47 GENERAL MEDICINE	37	2.70%	8.11%	10.81%	0.00%	94.59%	70.27%	72.22%
FMC - Medicine PCU 57 HEMATOLOGY/ONCOLOGY	35	20.00%	0.00%	5.71%	2.86%	88.57%	88.57%	100.00%
PLC - Surgery UNIT 29 - GENERAL SURGERY/ENT	33	27.27%	3.03%	0.00%	3.03%	93.94%	75.76%	66.67%
FMC - Cardiac Sciences PCU 82 MEDICAL CARDIOLOGY	32	25.00%	3.13%	3.13%	3.13%	100.00%	71.88%	63.64%
FMC - SARP PCU 37A RENAL	33	24.24%	6.06%	0.00%	0.00%	96.97%	84.85%	100.00%
RGH - Cardiac Sciences UNIT 71 MEDICAL CARDIOLOGY	28	17.86%	3.57%	0.00%	14.29%	92.86%	67.86%	64.29%

3/30/2016 10:41:18

Code 66 Team Activity Summary

Site All | Department Multiple Values | Unit Multiple Values

01-Jan-15 to 31-Dec-15

Goals of Care Before

Resuscitative	1,273	69.83%
Medical	525	28.80%
Comfort	5	0.27%
N/A	20	1.10%
Grand Total	1,823	

Unit

PCU 61 PULMONARY/THOR..	65
PCU 36 MEDICAL TEACHING	56
UNIT 93 INTERNAL MEDICI..	51
PCU 102 ONCOLOGY SURG..	47
PCU 112 NEUROSURGERY	47

Change Goals of Care

R -> M	47	2.58%
R -> C	8	0.44%
M -> R	7	0.38%

Shift

0701 - 1600	799	43.83%
1601 - 2300	552	30.28%
2301 - 0700	472	25.89%

Age

Median	25 Percentile	75 Percentile
68	55	81

Sex

Male	1,025	54.67%
Female	850	45.33%

Trigger

Decrease LOC	587	37.65%
Respiratory Distress	403	25.85%
Tachycardia/Hypotension	398	25.53%
Seizures	82	5.26%
Airway	49	3.14%
Failure to Respond to Treatment	22	1.41%
Unable to Obtain MD Assistance	17	1.09%
Urine Output	1	0.06%

Criteria

Decrease LOC	887	53.40%
Respiratory Distress	668	40.22%
Tachycardia/Hypotension	582	35.04%
Airway	114	6.86%
Seizures	99	5.96%
Failure to Respond to Treatment	92	5.54%
Unable to Obtain MD Assistance	47	2.83%
Urine Output	31	1.87%

Worry

Others	361	79.69%
Peripheral Signs of Shock	71	15.67%
Peripheral Signs of Respiratory Distress	28	6.18%
Change in Vitals That Don't Meet Criteria	15	3.31%
Goals of Care Issue	15	3.31%

Outcomes

Remained on Floor	1,189	65.22%
Admitted to ICU	358	19.64%
Transferred to Other Unit	230	12.62%
Code Blue Called	52	2.85%
Died During the Call	46	2.52%

Length of Time Spent by Outreach Team

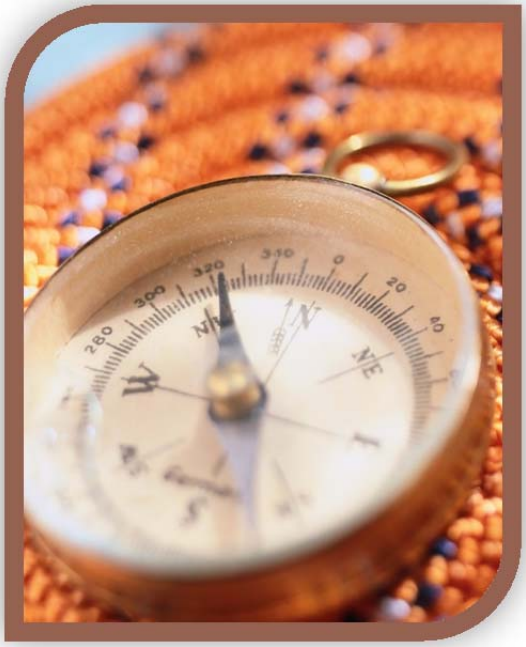
Median	25 Percentile	75 Percentile
45	26	73

3/30/2016 11:16:09

10.0 Future Directions and Initiative

- Despite the move by AHS towards independent tertiary level care facilities, we continue to refine the concept of “ICU without walls” by achieving clarity as to the expectations of attending physicians and delegates for patients in distress and strengthening the implementation strategies of our ICU Outreach Program at each of the Calgary acute care sites.

- Continue to support Zonal Patient Safety Initiatives while participating in National ICU related Patient Safety Forums “Safer Healthcare Now” campaign by the Canadian Patient Safety Institute (i.e. MED REC).



- Continue to support the reorganization of our Quality and Safety Improvement efforts through a structured programmatic approach that is aligned with the deliverables expected by the CCHSA.

- Explore different models of critical care service delivery.

- Continue working with the Critical Care Strategic Clinical Network for optimal care of critically ill patients from larger rural communities (Lethbridge, Medicine Hat, Red Deer, Grand Prairie). The CC SCN helps physician and clinical leaders in AHS develop and implement evidenced-based, team-delivered health improvement strategies across Alberta. The aim is to support clinically-led, system-wide quality improvements for our Critical Care environments. We provide timely, appropriate, safe, and compassionate patient care and we participate in patient and family centered care philosophies, teaching, education and research.

11.0 Awards and Recognitions

DR. LUC BERTHIAUME

LUC BERTHIAUME WAS AWARDED THE 2015 PLC PHYSICIAN OF MERIT AWARD FROM THE PLC/CGH MEDICAL STAFF ASSOCIATION. THIS RECOGNIZES EXCELLENCE AS A CLINICIAN, ADVOCATE FOR THE PLC, AND EDUCATIONAL ACCOMPLISHMENTS.

DR. JASON LORD

JASON LORD WAS AWARDED THE 2015 PLC CLINICAL TEACHING AWARD FROM THE PLC/CGH MEDICAL STAFF ASSOCIATION.
THIS IN PARTICULAR RECOGNIZES HIS ROLE AS THE LEADER OF OUR RESIDENCY EDUCATION PROGRAM IN CRITICAL CARE, AND HIS COMMITMENT TO THE DEVELOPMENT AND GROWTH IN SIMULATION.
JASON IS WELL KNOWN AT PLC AS AN EXCELLENT BEDSIDE EDUCATOR TOO.

11.1 UME Teaching Awards

Associate Dean's Letter of Excellence For Teaching

Silver Award

Dr. Luc Berthiaume & Dr. Jason Waechter

Bronze Award

Dr. Chip Doig, Dr. Dan Zuege

&

Dr. Jonathan Gaudet

11.2 Other Achievements

Dr. Luc Berthiaume was elected as the President of the Alberta Society of Intensive Care Physicians and the Critical Care Section within the AMA.

Dr. Dan Niven was successful in the defense of his dissertation and (with submission and acceptance of minor revisions) will have completed the requirements for his PhD. His external examiner was Dr. Derek Angus.

Pam Hruska had 2 important publications from our department. This work was part of the body of work performed by Pam as part of her graduate degree in medical education. This was complicated, difficult work and has resulted in 2 extremely important publications.

1. Hruska P, Krigolson O, Coderre S, McLaughlin K, Cortese F, Doig C, Beran T, Wright B, Hecker KG. Working memory, reasoning, and expertise in medicine—insights into their relationship using functional Neuroimaging. Advances in Health Sciences Education. 25 October 2015. DOI 10.1007/s10459-015-9649-2.

2. Hruska P, Hecker KG, Coderre S, McLaughlin K, Cortese F, Doig C, Beran T, Wright B, Krigolson O, Hemispheric activation differences in novice and expert clinicians during clinical decision making. Advances in Health Sciences Education. 25 October 2015. DOI: 10.1007/s10459-015-9648-3.

Dr. Ingrid Slaba's paper Platelet Role in Sterile Inflammation by Slaba, Wong, Kolaczkovwska, McDonald, Lee and Kubes has just completed the publication process and is available online in Hepatology.

In the recent CMO competition, a critical care team led by **Dr. Ken Parhar** and **Karolina Zjadewicz** were successful in obtaining funding for a project on ARDS management. There were over 90 submissions and approximately 1/6 funded so this is excellent that they were successful.

2015 Calgary Zone Department of Critical Care Medicine Awards

The Department of Critical Care Medicine has 5 annual awards:

1. Bow Award (early career achievements)
2. Crowsnest Award (caring for colleagues)
3. Mount Alberta Award (commitment to personal well being and health)
4. Mount Assiniboine Award (outstanding clinician)
5. Mount Robson Award (outstanding patient/family centered care)

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

Bow Award:

Evelyn Yu-administrative assistant (FMC-ICU/ICU Administration)

Katie McCaffery RN (FMC-CVICU)

Melissa Kent RN (PLC-ICU)

Catherine McIntyre RN (RGH-ICU)and (Zone Winner)

Chelsea McCabe RN (SHC-ICU)

Crowsnest Award:

Rob Morrow-administrative assistant (FMC-ICU/ICU Administration)

Marcella Murray RN (FMC-ICU)

Sunil Pouloose RN (FMC-CVICU)

Meghan Engel RN (PLC-ICU)

Alyse Andrews RN (RGH-ICU) and (Zone Winner)

Mount Alberta Award:

Carolyn Spence RN (FMC-ICU) and (Zone Winner)

Mount Assiniboine Award:

Pam Hruska RN (FMC-ICU/Zonal CNS)

Kristin Ferguson RN (FMC-CVICU)

Stephanie Oviat RN (SHC-ICU) and (Zone Winner)

Michelle Parsons RN (SHC-ICU) and (Zone Winner)

Mount Robson Award:

Amrutha Devaraj RN (FMC-CVICU)

Mila Strouhalova NA (RGH-ICU) and (Zone Winner)

This year, 360 feedback evaluations from allied health professionals were initiated on all ICU physicians. Summative evaluations were provided to each physician as feedback. The ICU medical executive gave the authority to the department head to recognize the clinician who achieves the most outstanding evaluation. The inaugural recipient was :

2015 Outstanding Clinician of the Year Award: Dr. Andre Ferland

12.0 Appendices

12.1 Department of Critical Care Medicine Research Grants

Granting Agency	Title of Project	Period of Support	Funds Received
University of Cambridge Dr. David Zygun Role: Principal Investigator	Randomized Evaluation of Surgery with Craniotomy for the Uncontrollable Elevation of ICP	2005 - 2100	$4,139
Canadian Intensive Care Foundation (CICF) Dr. Andrew Kirkpatrick Role: Principal Investigator	Prospective Randomized Trial of the Management of Occult Pneumothoraces in Mechanically Ventilated Patients (Calgary Pilot Study)	2006 - 2015	$16,000
Alberta Heritage Foundation for Medical Research (AHFMR) New Investigator and Establishment Grant Dr. David Zygun Role: Principal Investigator	Proteomics of severe traumatic brain injury: Matrix metalloproteinase expression	2008 - 2015	$1,250,000
Centre Hopitalier Universitaire Sainte-Justine Dr. Andreas Kramer Role: Co-Investigator	Age of Blood Evaluation Trial in the Resuscitation of Critically Ill Patients (ABLE)	2009 - 2015	$48,900
Alberta Heritage Foundation for Medical Research (AHFMR) Interdisciplinary Team Grant Dr. Paul Kubes & Dr. Chip Doig Role: Principal Investigators Dr. Brent Winston Role: Co-Investigators	Alberta Sepsis Network	2009 - 2015	$5,000,000 over 5 years
Hotchkiss Brain Institute Dr. Andreas Kramer Role: Principal Investigator	Intracranial blood clearance in aneurysmal subarachnoid hemorrhage	2009 - 2015	$13,000
University of Calgary Starter Grant Dr. Andreas Kramer Role: Principal Investigator	Intracranial blood clearance in aneurysmal subarachnoid hemorrhage	2009 - 2015	$17,252
Canadian Institutes of Health Research (CIHR), Training Grant Dr. Tom Stelfox Role: Principal Investigator	Knowledge Translation Canada: A CIHR Strategic Training Initiative in Health Research	2009 - 2015	$1,778,626

Granting Agency	Title of Project	Period of Support	Funds Received
Alberta Science and Research Authority (ASRA), Canadian Foundation for Innovation (CFI), University of Calgary Dr. Dan Zuege Role: Co-Investigator	Critical care epidemiologic and biologic tissue bank resource (CCEPTR) for infection and inflammation in the ICU	2009 - present	$0
Canadian Institutes of Health Research (CIHR) Dr. Paul Kubes Role: Principal Investigator	Chemokines and chemoattractants: a hierarchy of signals to allow neutrophil chemotaxis to sites of infection	2010 - 2015	$194,164 /year (rank #4 of 63 grants, score 4.43)
Canadian Institutes of Health Research (CIHR) Dr. Brent Winston Role: Co-Investigator	DYNAMICS – DNA As a Prognostic Marker in ICU Patients Study	2010 - 2015	$794,086 over 5 years
Canadian Institutes of Health Research (CIHR) Dr. Paul Kubes Role: Principal Investigator	Molecular mechanisms of leukocyte recruitment in liver microcirculation compared to other vascular beds	2010 - 2015	$193,407 (rank #1 of 49 grants, score 4.74)
Alberta Innovates - Health Solutions (AIHS), Edmonton, Alberta Dr. Tom Stelfox Role: Principal Investigator	Developing quality indicators to measure the quality and safety of trauma care	2010 - 2017	$1,175,000
Alberta Health Services – Calgary Health Region Dr. Chip Doig Role: Principal Investigator	Survivors of Intensive Care (Follow Up Clinic)	2010 - 2100	$82,521
GlaxoSmithKline Dr. Dan Zuege Role: Principal Investigator Site: Peter Lougheed Centre	A Phase III international, multi-center, randomized, double-blind, double-dummy study to evaluate the efficacy and safety of 300 mg or 600 mg of intravenous zanamivir twice daily compared to 150 mg of oral oseltamivir twice daily in the treatment of hospitalized adults and adolescents with influenza	2010 - present	~$70,000
SAGE Products Inc Dr. Dan Zuege Role: Principal Investigator	Implementation and evaluation of revised protocols for oral hygiene for mechanically ventilated patients in Alberta Health Services Calgary	2010 - Present	$49,836

Granting Agency	Title of Project	Period of Support	Funds Received
University of Alberta, Edmonton, Alberta. Dr. Tom Stelfox Role: Co-Investigator	A prospective multi-centre observational study of frailty in critically illness (ICU FRAILTY Study)	2011 - 2015	$35,000
Hotchkiss Brain Institute-Head Injured Relearning Society Dr. David Zygun Role: Investigator	Brain Injury Research and Development Initiative	2011 - 2015	$200,000
Canadian Institutes of Health Research (CIHR) Dr. Tom Stelfox Role: Principal Investigator Dr. Andrew Kirkpatrick Role: Co-Investigator	Developing a patient and family-centered approach for measuring the quality of trauma care.	2011 - 2015	$628,692
GlaxoSmithKline Dr. David Zygun & Dr. Brent Winston Role: Principal Investigators Site: Foothills Medical Centre	A Phase III international, randomized, double-blind, double-dummy study evaluate the efficacy and safety of 300 mg or 600 mg or intravenous zanamivir twice daily compared to 75 mg or oral oseltamivir twice daily in the treatment of hospitalized adults and adolescents with influenza	2011 - 2100	$9000-12,000 per patient
GlaxoSmithKline Dr. Brent Winston & Dr. Dan Zuege Role: Site Principal Investigators	A Phase III international, randomized, double-blind, double dummy study to evaluate the efficacy and safety of 300 mg or 600 mg of intravenous zanamivir twice daily compared to 75 mg of oral oseltamivir twice daily in the treatment of hospitalized adults and adolescents with influenza (Relenza Trial)	2012 - 2015	$12,718 per patient
McMaster University Dr. Brent Winston Role: Principal Investigator	DNA as a prognostic marker in ICU patients	2012 - 2015	$9,694
Heart and Stroke Foundation of Canada Dr. Paul Kubes Role: Principal Investigator	Role of NKT cells in altered immune status following cerebral ischemia-reperfusion injury	2012 - 2015	$57,000 per year

Granting Agency	Title of Project	Period of Support	Funds Received
Canadian Institutes of Health Research (CIHR) Dr. Paul Kubes Role: Principal Investigator	Role of endothelial, platelet, parenchymal and leukocyte TLRs in vascular dysfunction	2012 - 2017	$154,132 per year
NVIDA Academic Partnership Program – Equipment Donation Dr. Chip Doig Role: Principal Investigator	Automated Epidemiological Analysis Utilizing Nvidia Telsa Technology	2012 - present	$5,000.00
Spectral Diagnostics (US), Inc. Dr. Brent Winston Role: Principal Investigator Dr. Paul Boucher Role: Co-Investigator	Evaluating the Use of Polymyxin B Hemoperfusion in a Randomized Controlled Trial of Adults Treated for Endotoxemia and Septic Shock (Euphrates Trial)	2012 - present	$18,512 per patient
Allocure Inc. Dr. Andre Ferland & Dr. Paul Boucher Role: Co-Investigator	A Randomized, Multicenter, Double-Blind, Placebo-Controlled Study of AC607 for the Treatment of Acute Kidney Injury in Cardiac Surgery Subjects	2013 - 2015	$17,500 per patient (USD)
Departments of Medicine and Surgery Research Development Fund Competition 2012-2013 Dr. Tom Stelfox Role: Principal Investigator Dr. Andrew Kirkpatrick Role: Co-Investigator	Iterative Development of an Electronic Intensive Care Unit Discharge Tool	2013 - 2015	$21,520
The University of Alberta Dr. Tom Stelfox Role: Co-Investigator	Optimal Selection for and Timing to Start Renal Replacement Therapy in Critically Ill Older Patients with Acute Kidney Injury (Optimal AKI)	2013 - 2015	$400 per patient
EMS Foundation Dr. Chip Doig Role: Principal Investigator	EMS Systems and Paramedic Care: Because you never know…	2013 - 2016	$100,000
Alberta Innovates - Health Solutions (AIHS) Dr. Paul Kubes Role: Principal Investigator	Invariant NKT cells as the link between brain injury and susceptibility to infections	2013 - 2016	$250,000 per year
Alberta Innovates - Health Solutions (AIHS) Dr. Brent Winston Role: Co-Principal Investigator	Treatment of cholesterol-dependent pulmonary surfactant dysfunction	2013 - 2016	$699,000 over 3 years

Granting Agency	Title of Project	Period of Support	Funds Received
Public Health Agency of Canada (PHAC) Dr. Tom Stelfox Role: Co-Investigator	A Pilot Study to Ascertain the Use of Intensive Care Units as an Option for the Surveillance of Severe Respiratory Illness (SRI) in Canada	2013 - 2017	$12,000
GlaxoSimthKline Dr. Chip Doig, Dr. Tom Stelfox & Dr. Juan Posadas Role: Site Principal Investigators Dr. Dan Zuege & Dr. Brent Winston Role: Co-Investigator	Nutritional adequacy therapeutic enhancement in the critically ill: A randomized double blind, placebo-controlled trial of the motilin receptor agonist GSK962040. The NUTRIATE Study	2013 - 2017	$154,270
Sunnybrook Health Sciences Centre Dr. Tom Stelfox Role: Co-Investigator	Optimizing Duration of Antibiotic Therapy For Bloodstream Infections in Critically Ill Patients	2013 - 2017	$8,000
Asahi Kasei Pharma America Corp. Dr. Chip Doig & Dr. Luc Berthiaume Role: Site Principal Investigators Dr. Dan Zuege & Dr. Paul Boucher Role: Co-Investigator	A randomized, double-blind. Placebo-controlled, phase 3 study to assess the safety and efficacy of ART-123 in subjects with severe sepsis and coagulopathy	2013 - 2018	$12,000 per patient
Canadian Institutes of Health Research (CIHR) Café Scientifique Program Dr. Tom Stelfox Role: Principal Investigator	Engaging the Public to Establish Priorities for Research and Innovation in Critical Care Medicine	2013 - 2018	$5,583
Alberta Innovates – Health Solutions Dr. Tom Stelfox Role: Co-lead	W21C: Interdisciplinary Research and Innovation for Health System Quality and Safety	2013 - 2018	$4,679,601
Calgary Health Trust Dr. Craig Jenne Role: Principal Investigator	Start-up Funding	2013 - 2020	$300,000
Cubist Pharmaceuticals Inc. Dr. Paul Boucher & Dr. Dan Zuege Role: Principle Investigator Dr. Brent Winston Role: Co-Investigator	A phase 3 randomized double-blind study comparing TR -701 FA and Lenezolid in ventilated Gram-positive nonsocomial pneumonia	2013 - present	$12,000 per patient

Granting Agency	Title of Project	Period of Support	Funds Received
Canadian Institutes of Health Research (CIHR) Dr. Andreas Kramer Role: Site Investigator	Early Determination of Neurological Prognosis in ICU patients with Severe Traumatic Brain Injury: TBI-Prognosis Multicenter Prospective Study	2013 - present	$2,100 per patient
Critical Care Strategic Clinical Network New Investigator Seed Funding Competition Dr. Craig Jenne Role: Collaborator	Identification of a bioprofile in children with appendicitis who have severe disease requiring PICU	2014 - 2015	$8,000
Alberta Innovates - Health Solutions Partnership for Research and Innovation in the Health System (PRIHS) Dr. Tom Stelfox Role: Co-Principal Investigator Dr. Chip Doig, Dr. Luc Berthiaume, Dr. Paul Boucher & Dr. Dan Zuege Role: Co-Investigator	Identifying and Evaluating Intensive Care Unit Capacity Strain in Alberta	2014 - 2016	$743,818
Alberta Innovates - Health Solutions Partnership for Research and Innovation in the Health System (PRIHS) Dr. Tom Stelfox Role: Principal Investigator Dr. Chip Doig, Dr. Dan Zuege, Dr. Daniel Niven & Dr. Paul Boucher Role: Co-Investigator	Reassessing Practices in the Daily Care of Critically Ill Patients: Building Capacity and Methodology to Identify and Close Evidence Care Gaps	2014 - 2016	$748,790
Technology Evaluation in the Elderly (TVN) 2013 Core Grant Program Dr. Tom Stelfox Role: Principal Investigator Dr. Dan Zuege & Dr. Daniel Niven Role: Co-Investigator	Reengineering the Discharge of Elderly Patients from Intensive Care	2014 - 2016	$589,573
Canadian Institutes of Health Research (CIHR) Dr. Tom Stelfox Role: Co-Investigator	Scoping Review: Conduct and reporting of scoping reviews	2014 - 2015	$49,764

Granting Agency	Title of Project	Period of Support	Funds Received
MedImmune Dr. Craig Jenne Role: Principal Investigator	Support to track immune complex clearance by liver macrophage using intravital microscopy	2014 - 2015	$3,000
Critical Care Strategic Clinical Network New Investigator Seed Funding Competition Dr. Daniel Niven Role: Principal Investigator Dr. Tom Stelfox Role: Co-Investigator	The Adoption and De-adoption of Intensive Insulin Therapy Among Critically Ill Adults (Award declined due to budgetary overlap with another operating grant)	2014 - 2015	$5,000
Critical Care Strategic Clinical Network New Investigator Seed Funding Competition Dr. Craig Jenne Role: Principal Investigator	The Role of Platelets and Neutrophil Extracellular Traps (NETs) in Disseminated Intravascular Coagulation (DIC)	2014 - 2015	$20,000
Canadian Intensive Care Foundation Dr. Daniel Niven Role: Principal Investigator Dr. Tom Stelfox Role: Co-Investigator	The Adoption and De-adoption of Intensive Insulin Therapy Among Critically Ill Adults	2014 - 2016	$14,675
Brain Canada Technology and platform grant Dr. Brent Winston Role: Co-Investigator	A National biobank and database for patients with traumatic brain injury	2014 - 2017	~1.5 million $980,000 + matched funds
Canadian Institutes of Health Research (CIHR) Dr. Chip Doig Role: Site Investigator	Death Prediction and Physiology after removal of therapy (DePPaRT)	2014 - 2017	$16,594
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co-Investigator	STandard versus Accelerated initiation of Renal Replacement Therapy in Acute Kidney Injury (STARRT-AKI)	2014 - 2018	$220,996
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Paul Kubes Role: Principal Investigator	Intravascular immunity in chronic inflammatory lung disease	2014 - 2019	$500,000 per year

Granting Agency	Title of Project	Period of Support	Funds Received
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Paul Kubes Role: Principal Investigator	Neutrophil and monocyte roles in sterile inflammation and repair of vessels and tissue	2014 - 2019	$199,805 per year
Self Funded Dr. Dan Zuege Role: Principal Investigator	Wants, Needs and the 80/20 Rule in Physician Satisfaction with Electronic Medical Records	2014 - present	Self Funded
NVIDA Academic Partnership Program – Equipment Donation Dr. Chip Doig Role: Principal Investigator	Automated Epidemiological Analysis Utilizing Nvidia Telsa Technology	2015 - 2016	$3,500 USD
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co-Investigator	Bacteremia Antibiotic Length Actually Needed for Clinical Effectiveness (BALANCE): A Randomized Controlled Trial.	2015 - 2016	$100,000
2015 CCSCN New Investigator Seed Grant Dr. Selena Au Role: Principal Investigator Dr. Amanda Roze des Ordons & Dr. Tom Stelfox Role: Co-Investigator	Determining best practices for family participation in Intensive Care Unit rounds	2015 - 2016	$22,400
2015 MSI Foundation Grant Dr. Selena Au Role: Principal Investigator Dr. Amanda Roze des Ordons & Dr. Tom Stelfox Role: Co-Investigator	Determining best practices for patient and family participation in Intensive Care Unit rounds	2015 - 2016	$98,000
2015 University of Calgary Teaching and Learning Grant Dr. Amanda Roze des Ordons Role: Co-Investigator	Evaluation of a faculty development program to cultivate capability and capacity in educating for humanism and professionalism	2015 - 2016	$13,950
Canadian Institutes of Health Research (CIHR) Industry-partnered Collaborative Research Grant Dr. Craig Jenne Role: Co-Applicant	Pathogenesis of Hepatitis B Virus Infection in Non-Alcoholic Fatty Liver Disease	2015 - 2016	$228,747 + $240,00 (from GSK)

Granting Agency	Title of Project	Period of Support	Funds Received
Technology Evaluation in the Elderly (TVN) Dr. Dan Zuege Role: Principal Investigator Dr. Tom Stelfox Role: Co-Investigator	Province-Wide Implementation of the Clinical Frailty Scale in a Electronic Medical Record System (eCritical) in Alberta	2015 - 2016	$99,999.79
Critical Care Strategic Clinical Network New Investigator Seed Funding Competition (with matching funds from Department of Critical Care Medicine, University of Calgary) Dr. Daniel Niven Role: Principal Investigator Dr. Tom Stelfox Role: Co-Investigator	The Reversal of Clinical Practice in Critical Care Medicine: A Systematic Review.	2015 - 2016	$19,205.60
Canadian Institutes of Health Research (CIHR) Dr. Chip Doig Role: Co-Investigator	▪ Death Prediction and Physiology after removal of therapy (DePPaRT) (Site PI)	2015 - 2017	$201.36 per patient
Heart and Stroke Foundation of Canada Dr. Paul Kubes Role: Principal Investigator	Neutrophil Extravascular Traps (NETs) in Blood Vessel	2015 - 2017	$199,950
Canadian Cancer Society Research Institute (CCSRI) Innovate Grant Dr. Craig Jenne Role: Co-Principal Investigator	Understanding oncolytic virus delivery using intravital imaging	2015 - 2017	$200,000
Alberta Innovates – Health Solutions, Partnership for Research and Innovation in the Health System (PRIHS) Dr. Tom Stelfox Role: Co-Investigator	Family Integrated Care (FICare) in Level II NICUs: An Innovative Program for Alberta	2015 - 2018	$750,000
Leading Biosciences Inc. Dr. Dan Zuege and Dr. Chip Doig Role: Principal Investigator	Treatment of Septic Shock by Inhibiting Auto-digestion and Preserving Gut Integrity with Enteric LB1148 (SSAIL Study)	2015 - 2018	$10,000 per patient

Granting Agency	Title of Project	Period of Support	Funds Received
NHMRC Partnership Grant APP1092499 Dr. Tom Stelfox Role: Co-Investigator	Evidence to change policy and improve outcomes in children suffering major injury	2015 - 2019	$501,694 AUS
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co-Investigator	STandard versus Accelerated Renal Replacement Therapy for Acute Kidney Injury	2015 - 2019	$1,608,568
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co-Investigator	Standard versus Accelerated initiation of Renal Replacement Therapy in Acute Kidney Injury (STARRT-AKI)	2015 - 2019	$1,104,971
Canadian Institutes of Health Research (CIHR) Foundation Scheme Dr. Tom Stelfox Role: Co-Investigator	Better Prediction and Decision Support Tools to Improve Care and Outcomes for Patients with Acute Kidney Injury (AKI)	2015 - 2020	$855,842
NSERC Discovery Grant Dr. Craig Jenne Role: Principal Investigator	Development of Imaging Approaches to Study Coagulation In Vivo	2015 - 2020	$160,000
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Tom Stelfox Role: Co-Investigator	A RandomizEd trial of ENtERal Glutamine to minimize thermal injury: (The RE-ENERGIZE Study)	2015 - 2020	$5,659,300
Canadian Institutes of Health Research (CIHR) Dr. Paul Kubes Role: Principal Investigator	The interplay between subtypes of neutrophils, monocytes, (July) macrophage, iNKT cells and platelets in infection, sterile injury and metastasis in the liver and other organs	2015 - 2022	$4,397,112
Technology Value Network (Centres of Excellence of Canada) Dr. Dan Zuege Role: Principal Investigator	Measuring Clinical Frailty in an Electronic Medical Record System: a Tool to Guide Clinical Care, Quality Improvement and Research	2015 - present	$100,000.00
Genetech Dr. Dan Zuege Role: Co-Investigator	Phase 2 randomized, double-blind placebo-controlled trial of MHAA4549A, a monoclonal antibody in combination with oseltamivir versus oseltamivir for treatment of severe influenza infection	2015 - present	$122,732

Peer Reviewed Manuscripts

January 2015

1. Mickiewicz B, Tam P, **Jenne CN**, Leger C, Wong J, **Winston BW**, **Doig C**, **Kubes P**, Vogel HJ for the Alberta Sepsis Network (ASN). Integration of metabolic and inflammatory mediator profiles as a potential prognostic approach for septic shock in the intensive care unit. Crit Care. 2015 Jan 15;19:11. doi: 10.1186/s13054-014-0729-0.
2. Thornton KG, **Couillard P**. Ovarian hyperstimulation syndrome and arterial stroke. Stroke. 2015 Jan;46(1):e6-8.

February 2015

1. Archambault PM, Turgeon AF, Witteman HO, Lauzier F, Moore L, Lamontagne F, Horsley T, Gagnon MP, Droit A, Weiss M, Tremblay S, Lachaine J, Le Sage N, Émond M, Berthelot S, Plaisance A, Lapointe J, Razek T, van de Belt TH, Brand K, Bérubé M, Clément J, Grajales Iii FJ, Eysenbach G, Kuziemsky C, Friedman D, Lang E, Muscedere J, Rizoli S, Roberts DJ, Scales DC, Sinuff T, **Stelfox HT**, Gagnon I, Chabot C, Grenier R, Légaré F; Canadian Critical Care Trials Group. Implementation and Evaluation of a Wiki Involving Multiple Stakeholders Including Patients in the Promotion of Best Practices in Trauma Care: The WikiTrauma Interrupted Time Series Protocol. JMIR Res Protoc. 2015 Feb 19;4(1):e21. doi: 10.2196/resprot.4024.
2. **Stelfox HT**, Lane D, Boyd JM, Taylor S, Perrier L, Straus S, Zygun D, **Zuege DJ**. A scoping review of patient discharge from intensive care: opportunities and tools to improve care. Chest. 2015 Feb;147(2):317-27. doi: 10.1378/chest.13-2965. Review.

March 2015

1. Berthelot S, Lang ES, Quan H, **Stelfox HT**. What are emergency-sensitive conditions? A survey of Canadian emergency physicians and nurses. CJEM. 2015 Mar;17(2):154-60.
2. Burns DJ, Swinamer SA, Fox SA, Romso J, Vezina W, Akincioglu C, Warrington J, Guo LR, Chu MW, Quantz MA, Novick RJ, Kiaii B. Long term patency of endoscopically harvested radial arteries: from a randomized controlled trial. Innovations (Phila). 2015 Mar-Apr;10(2):77-84.
3. Kolaczkowska E, **Jenne CN**, Surewaard BG, Thanabalasuriar A, Lee WY, Sanz M, Mowen K, Opdenakker G and **Kubes** P. Molecular mechanisms of NET formation and degradation revealed by intravital imaging in the liver vasculature. Nature Communications. 2015 Mar; 26(6):6673
4. **Kramer AH**, **Jenne C**, Holodinsky J, Todd S, Roberts DJ, **Kubes P,** Zygun DA, Hill MD, Leger C, Wong JH. Pharmacokinetics and pharmacodynamics of Tissue

Plasminogen Activator Administered Through an External Ventricular Drain. Neurocrit Care. 2015 Mar 5. [Epub ahead of print]

5. **Novick RJ**, Lingard L, Cristancho SM. The call, the save, and the threat: understanding expert help- seeking behavior during non-routine operative scenarios. J Surg Educ. 2015 Mar-Apr;72(2):302-9. doi: 10.1016/j.jsurg.2014.09.009. Epub 2014 Nov 11.
6. ESCAPE Trial Investigators (**Couillard P** - Collaborator). Randomized assessment of rapid endovascular treatment of ischemic stroke. N Engl J Med. 2015 Mar 12;372(11):1019-30.

April 2015

1. Dal-Secco D, Wang J, Zeng Z, Kolaczkowska E, Wong CHY, Petri B, Ransohoff RM, Charo IF, **Jenne CN**, **Kubes P**. A Dynamic Spectrum of Monocytes Arising from the In Situ Reprogramming of CCR2+ Monocytes at a Site of Sterile Injury. J. Exp. Med. 2015 Apr 6: 212:447-56, 2015
2. Daneman N, Rishu AH, Xiong W, Bagshaw SM, Cook DJ, Dodek P, Hall R, Kumar A, Lamontagne F, Lauzier F, Marshall JC, Martin CM, McIntyre L, Muscedere J, Reynolds S, **Stelfox HT**, Fowler RA on behalf of the Canadian Critical Care Trials Group. Bacteremia Antibiotic Length Actually Needed for Clinical Effectiveness (BALANCE): Study Protocol for a Pilot Randomized Controlled Trial. Trials. 2015 Apr 18;16(1):173. doi: 10.1186/s13063-015-0688-z.
3. Ferri M, Zygun DA, Harrison A, **Stelfox HT**. Evidence-based design in an intensive care unit: End-user perceptions. BMC Anesthesiol. 2015 Apr 25;15(1):57.
4. Fowler RA, Abdelmalik P, Wood G, Foster D, Gibney N, Bandrauk N, Turgeon AF, Lamontagne F, Kumar A, Zarychanski R, Green R, Bagshaw SM, **Stelfox HT**, Foster R, Dodek P, Shaw S, Granton J, Lawless B, Hill A, Rose L, Adhikari NK, Scales DC, Cook DJ, Marshall JC, Martin C, Jouvet P; Canadian Critical Care Trials Group and The Canadian ICU Capacity Group. Critical Care capacity in Canada: results of a national cross-sectional study. Crit Care. 2015 Apr 1;19(1):133.
5. Heyland D, Cook D, Bagshaw SM, Garland A, **Stelfox HT**, Mehta S, Dodek P, Kutsogiannis J, Burns K, Muscedere J, Turgeon AF, Fowler R, Jiang X, Day AG, on behalf of the Canadian Critical Care Trials Group and the Canadian Researchers at the End of Life Network (CARENET). The Very Elderly Admitted to Intensive Care Unit: A Quality Finish? Crit Care Med. 2015 July;43(7):1352-60. Epub 2015 Apr 21.
6. Heyland DK, Dodek P, Mehta S, Cook D, Garland A, **Stelfox HT**, Bagshaw SM, Kutsogiannis DJ, Burns K, Muscedere J, Turgeon AF, Fowler R, Jiang X, Day AG; on behalf of the Canadian Critical Care Trials Group and the Canadian Researchers at the End of Life Network (CARENET). Admission of the very elderly to the intensive care unit: Family members' perspectives on clinical decision-making from a multicenter cohort study. Palliat Med. 2015 Apr;29(4):324-35. Epub 2015 Feb 2.
7. James MT, Pannu N, Barry R, Karsanji D, Tonelli M, Hemmelgarn BR, Manns BJ, Bagshaw SM, **Stelfox HT**, Dixon E. A Modified Delphi Process to Identify Process of Care Indicators for the Identification, Prevention and Management of Acute Kidney Injury after Major Surgery. Can J Kidney Health Dis. 2015 Apr 9;2:11. doi: 10.1186/s40697-015-0047-8. eCollection 2015. Jolley RJ*, Sawka KJ, Yergens DW, Quan H, Jetté N, Doig CJ. Validity of administrative data in

recording sepsis: a systematic review. Critical Care 2015 Apr 6;19:139. Impact Factor 5.04. Cited by 5.

8. Kiaii B, Fox S, Chase L, Fernandes M, Stitt LW, Guo R, Quantz M, Chu MW, Koka P, McClure RS, Mckenzie FN, Klein GJ, **Novick RJ**, Skanes AC. Postoperative atrial fibrillation is not pulmonary vein dependent: Results from a randomized trial. Heart Rhythm. 2015 Apr;12(4):699-705.Epub 2015 Jan 13.
9. **Kramer AH**, **Jenne C**, Zygun DA, Roberts D, Hill MD, Holodinsky J, Todd S, **Kubes P**, Wong J. Intraventricular fibrinolysis with tissue plasminogen activator is associated with transient cerebrospinal fluid inflammation: a randomized controlled trial. J Cereb Blood Flow Metab. Epub 2015 April 8.
10. **Kramer AH**. Ancillary testing in brain death. Semin Neurol. 2015 Apr; 35(2): 125-38 Epub 2015 April 3.
11. You JJ, Downar J, Fowler RA, Lamontagne F, Ma IW, Jayaraman D, Kryworuchko J, Strachan PH, Ilan R, Nijjar AP, Neary J, Shik J, Brazil K, Patel A, Wiebe K, Albert M, Palepu A, Nouvet E, **Roze des Ordons AL**, Sharma N, Abdul-Razzak A, Jiang X, Day A, Heyland DK; for the Canadian Researchers at the End of Life Network (CARENET). Barriers to goals of care discussions with seriously ill hospitalized patients and their families: a multicenter survey of clinicians. JAMA Intern Med. 2015 Apr;175(4):549-56.

May 2015

1. Bagshaw SM, **Stelfox HT**, Johnson JA, McDermid RC, Rolfson D, Tsuyuki RT, Ibrahim Q, Majumdar SR. Long-Term Association Between Frailty and Health-Related Quality-of-Life Among Survivors of Critical Illness: A Prospective Multi-Centre Cohort Study. Crit Care Med. 2015 May;43(5):973-982. Epub 2015 Jan 30.
2. **Niven DJ**, Rubenfeld GD, **Kramer AA**, **Stelfox HT**. The Effect of Published Scientific Evidence on Glycemic Control in Adult Intensive Care Units. JAMA Intern Med. 2015 May;175(5):801-9.
3. Pagani-Estévez GL, **Couillard P**, Lanzino G, Wijdicks EF, Rabinstein AA. Acutely Trapped Ventricle: Clinical Significance and Benefit from Surgical Decompression. Neurocrit Care. 2015 May 1.

June 2015

1. Roberts DJ, Bobrovitz N, Zygun DA, Ball CG, Kirkpatrick AW, Faris PD, **Stelfox HT**. Indications for use of damage control surgery and damage control interventions in civilian trauma patients: A scoping review. J Trauma Acute Care Surg. 2015 Jun;78(6):1187-96.
2. Roberts D, Leigh-Smith S, Kortbeek J, Faris P, Kirkpatrick A, James M, Blackmore C, Ball C, Robertson HL, Dixon E, James M, **Stelfox HT**. Clinical Presentation of Patients with Tension Pneumothorax: A Systematic Review. Ann Surg. 2015 Jun;261(6):1068-78. doi: 10.1097/SLA.0000000000001073. 2015 Jan 5. Epub 2015 Jan 5.
3. Sinuff T, Dodek P, You JJ, Barwich D, Tayler C, Downar J, Hartwick M, Frank C, **Stelfox HT**, Heyland DK. Improving End-of-Life Communication and Decision-Making: The Development of a Conceptual Framework and Quality Indicators. J Pain Symptom Manage. 2015 Jun;49(6):1070-80. Epub 2015 Jan 24.

4. **Stelfox HT**, Bagshaw SM, Gao S. A retrospective cohort study of age-based differences in the care of hospitalized patients with sudden clinical deterioration. J Crit Care. 2015 Jun 1. pii: S0883-9441(15)00326-3. doi: 10.1016/j.jcrc.2015.05.018. [Epub ahead of print]
5. **Stelfox HT**, Straus SE, Sackett DL. Clinician-trialist rounds: 27. Sabbaticals. Part 2: I'm taking a sabbatical! How should I prepare for it? Clin Trials. 2015 Jun;12(3):287-90.Epub 2015 Jan 29.

July 2015

1. Buchner DL, Bagshaw SM, Dodek P, Forster AJ, Fowler RA, Lamontagne F, Turgeon AF, Potestio M, **Stelfox HT**. Prospective cohort study protocol to describe the transfer of patients from intensive care units to hospital wards. BMJ Open. 2015 Jul 8;5(7):e007913.
2. **Kirkpatrick AW**, Roberts DJ, Faris PD, Ball CG, **Kubes P**, Tiruta C, Xiao Z, Holodinsky JK, **McBeth PB**, **Doig CJ**, Jenne CN. Active Negative Pressure Peritoneal Therapy After Abbreviated Laparotomy: The Intraperitoneal Vacuum Randomized Controlled Trial. Ann Surg. 2015 Jul;262(1):38-46. Impact Factor 7.18. Cited by 5.
3. Mirsaeidi M, Banoei MM, **Winston BW**, Schraufnagel DE. Metabolomics: Applications and Promise in Mycobacterial Disease. Ann Am Thorac Soc. 2015 Jul 21. [Epub ahead of print].
4. Moore L, Cisse B, Batomen Kuimi BL, **Stelfox HT**, Turgeon AF, Lauzier F, Clément J, Bourgeois G. Impact of Socio-economic Status on Hospital Length of Stay Following Injury: A Multicenter Cohort Study. BMC Health Serv Res. 2015 Jul 25;15:285.
5. Rewa O, Villeneuve PM, Eurich DT, **Stelfox HT**, Gibney RT, Hartling L, Featherstone R, Bagshaw SM. Quality indicators in continuous renal replacement therapy (CRRT) care in critically ill patients: protocol for a systematic review. Syst Rev. 2015 Jul 30;4:102. doi: 10.1186/s13643-015-0088-1.

August 2015

1. **Kramer AH**, Jenne CN, **Zygun DA**, Roberts DJ, Hill MD, Holodinsky JK, Todd S, **Kubes P**, Wong JH. Intraventricular fibrinolysis with tissue plasminogen activator is associated with transient cerebrospinal fluid inflammation: a randomized controlled trial. J Cereb Blood Flow Metab. 2015 Aug; 35(8):1241-8
2. **Roze des Ordons AL**, Sharma N, Heyland DK, You JJ. Strategies for effective goals of care discussions and decisionmaking: perspectives from a multi-centre survey of Canadian hospital-based healthcare providers. BMC Palliat Care. 2015 Aug 19;14:38. doi: 10.1186/s12904-015-0035-x.
3. Bobrovitz N, Santana MJ, Kline T, **Kortbeek J**, **Stelfox HT**. The use of cognitive interviews to revise the Quality of Trauma Care Patient-Reported Experience Measure (QTAC-PREM). Qual Life Res. 2015 Aug;24(8):1911-9. doi: 10.1007/s11136-015-0919-5. Epub 2015 Jan 15.

September 2015

1. Azevedo LC, de Souza IA, **Zygun DA**, **Stelfox HT**, Bagshaw SM. Association Between Nighttime Discharge from the Intensive Care Unit and Hospital Mortality: A Multi-Center Retrospective Cohort Study. BMC Health Serv Res. 2015 Sep 14;15(1):378.
2. Mickiewicz B, Thompson G, Blackwood J, **Jenne CN**, Winston BW, Vogel HJ, Joffe AR for the Alberta Sepsis Network. Development of metabolic and inflammatory mediator biomarker phenotyping for early diagnosis and triage of pediatric sepsis. Crit Care. 2015 Sep 9;19:320.
3. Mourad AA, Banoei MM, Donnelly SJ, **Winston BW**. Predicting the mortality of pneumonia-induced direct lung injury using serum metabolomics. Extended abstract, Journal of Undergraduate Research in Alberta (JURA)¬, Vol. 5, 2015.
4. Wong H, Kaufman J, Baylis B, Conly JM, Hogan DB, **Stelfox HT**, Southern DA, Ghali WA, Ho CH. Efficacy of a pressure-sensing mattress cover system on reducing interface pressure: study protocol for a randomized controlled trial. Trials. 2015 Sep 29;16(1):434.

October 2015

1. Berthelot S, Lang ES, Quan H, **Stelfox HT**. Development of a Hospital Standardized Mortality Ratio for Emergency Department Care. Ann Emerg Med. 2015 Oct 3. pii: S0196-0644(15)01159-2.
2. Daneman N, Rishu AH, Xiong W, Bagshaw SM, Dodek P, Hall R, Kumar A, Lamontagne F, Lauzier F, Marshall J, Martin CM, McIntyre L, Muscedere J, Reynolds S, **Stelfox HT**, Cook DJ, Fowler RA; Canadian Critical Care Trials Group. Duration of Antimicrobial Treatment for Bacteremia in Canadian Critically Ill Patients. Crit Care Med. 2015 Oct 22. [Epub ahead of print]
3. Hruska P^, Hecker KG, Coderre S, McLaughlin K, Cortese F, **Doig C**, Beran T, Wright B, Krigolson O, Hemispheric activation differences in novice and expert clinicians during clinical decision making. Advances in Health Sciences Education. 25 October 2015.
4. Hruska P^, Krigolson O, Coderre S, McLaughlin K, Cortese F, **Doig C**, Beran T, Wright B, Hecker KG. Working memory, reasoning, and expertise in medicine—insights into their relationship using functional Neuroimaging. Advances in Health Sciences Education. 25 October 2015.
5. **Niven DJ**, McCormick JT, Straus SE, Hemmelgarn BR, Jeffs LP, **Stelfox HT**. Identifying low value clinical practices in critical care medicine: *protocol for a scoping review. BMJ* Open. 2015 Oct 28;5(10):e008244.
6. **Niven DJ**, Mrklas KM, Holodinsky JK, Straus SE, Hemmelgarn BR, Jeffs LP, **Stelfox HT**. Towards Understanding the De-adoption of Low-value Clinical Practices: A Scoping Review. BMC Med. 2015 Oct 6;13:255. doi: 10.1186/s12916-015-0488-z.
7. Roberts DJ, Bobrovitz N, **Zygun DA**, Ball CG, **Kirkpatrick AW**, Faris PD, Parry N, Nicol AJ, Navsaria PH, Moore EE, Leppäniemi AK, Inaba K, Fabian TC, D'Amours S, Brohi K, Stelfox HT. Indications for use of thoracic, abdominal, pelvic, and vascular damage control interventions in trauma patients: a content analysis and expert appropriateness rating study. J Trauma Acute Care Surg. 2015 Oct;79(4):568-79.
8. Roberts DJ, Bobrovitz N, **Zygun DA**, Ball CG, **Kirkpatrick AW**, Faris PD, Brohi K, D'Amours S, Fabian TC, Inaba K, Leppäniemi AK, Moore EE, Navsaria PH, Nicol AJ, Parry N, **Stelfox HT**. Indications for Use of Damage Control Surgery in

Civilian Trauma Patients: A Content Analysis and Expert Appropriateness Rating Study. Ann Surg. 2015 Oct 1. [Epub ahead of print]

9. **Stelfox HT**, **Niven DJ**, Clement FM, Bagshaw SM, Cook DJ, McKenzie E, Potestio ML, **Doig CJ**, O'Neill B, **Zygun D**; Critical Care Strategic Clinical Network, Alberta Health Services. Stakeholder engagement to identify priorities for improving the quality and value of critical care. PLoS One. 2015 Oct 22;10(10):e0140141.
10. Yergens DW*, Ghali W A, Faris P, Quan H, Jolley RJ and **Doig CJ**. Assessing the Association between Occupancy and Outcome in Critically Ill Hospitalized Patients with Sepsis. BMC Emergency Medicine. October 2015, 15:31.
11. Xiao Z, Wilson C, Robertson HL, Roberts DJ, Ball CG, Jenne CN, **Kirkpatrick AW**. Inflammatory mediators in intra-abdominal sepsis or injury - a scoping review. Critical Care. 2015 Oct 27;19:373. doi: 10.1186/s13054-015-1093-4.

November 2015

1. Heyland DK, Garland A, Bagshaw SM, Cook D, Rockwood K, **Stelfox HT**, Dodek P, Fowler RA, Turgeon AF, Burns K, Muscedere J, Kutsogiannis J, Albert M, Mehta S, Jiang X, Day AG. Recovery after critical illness in patients aged 80 years or older: a multi-centre prospective observational cohort study. Intensive Care Med. 2015 Nov;41(11):1911-20. doi: 10.1007/s00134-015-4028-2. Epub 2015 Aug 26.
2. **Niven DJ**, Gaudet JE, Laupland KB, Mrklas KJ, Roberts DJ, **Stelfox HT**. Accuracy of Peripheral Thermometers for Estimating Temperature: A Systematic Review and Meta-analysis. Ann Intern Med. 2015 Nov 17;163(10):768-77. doi: 10.7326/M15-1150.
3. Potestio M, Boyd J, Bagshaw SM, Heyland D, Oxland P, **Doig CJ**, **Zygun D**, **Stelfox HT**. Engaging the public to identify opportunities to improve critical care: A qualitative analysis of an open community forum. PLoS One. 2015 Nov 18;10(11):e0143088.
4. Soltani SA, Ingolfsson A, **Zygun DA**, **Stelfox HT**, Hartling L, Featherstone R, Bagshaw SM. Quality and performance measures of strain on intensive care capacity: a protocol for a systematic review. Syst Rev. 2015 Nov 12;4(1):158. doi: 10.1186/s13643-015-0145-9.
5. **Stelfox HT**, Potestio M, Boyd J, Bagshaw SM, Oxland P, **Doig C**, **Zygun** . Engaging the public to identify opportunities to improve critical care: A qualitative analysis of an open community forum. PLoS One. Nov 18, 2015. PONE-D-15-27522R1.
6. **Yipp BG**, **Winston BW**. Sepsis without SIRS is still sepsis. Ann Transl Med. 2015 Nov;3(19):294.

December 2015

1. Holodinsky JK, Hebert MA, **Zygun DA**, Rigal R, Berthelot B, Cook DJ, **Stelfox HT**. A Survey of rounding practices in Canadian adult intensive care units. PLoS One. 2015 Dec 23;10(12):e0145408. doi: 10.1371/journal.pone.0145408. eCollection 2015.
2. Jolley RJ*, Quam H, Jette N, Sawka KJ, Diep L, Goliath J, Roberts DJ, **Yipp BG**, **Doig CJ**. Development and validation of an ICD-10 coded case definition for sepsis using administrative health data, BMJ Open. Dec 23, 2015;5(12):e009487

3. **Kramer AH**, Jenne C, Holodinsky JK, Todd S, Roberts DJ, **Kubes P**, Zygun Hill MD, Leger C, Wong JH Pharmacokinetics and Pharmacodynamics of Tissue Plasminogen Activator Administered Through an External Ventricular Drain. Neurocritical Care. 2015 Dec, 23(3):386-93
4. **Stelfox HT**, **Bastos J**, **Niven DJ**, Bagshaw SM, Turin TC, Gao S. Critical care transition programs and the risk of readmission or death after discharge from ICU. Intensive Care Med. 2015 Dec 22. [Epub ahead of print]

Abstracts

March 2015

1. **Stelfox HT**, McKenzie E, Bagshaw S, Gill M, Oxland P, Boulton D, Oswell D, Potestio M,
2. **Niven DJ**. A Novel Patient and Community Engagement Research Method to Understand Patient and Family Experiences with Critical Care. Abstract presented as a poster (presented by lead author) at 2015 BMJ International Forum on Quality & Safety in Healthcare.
3. **Stelfox HT**, McKenzie E, Bagshaw SM, Gill M, Oxland P, Boulton D, Oswell D, Potestio M, **Niven D**. Using patient researchers to understand patient and family experiences in intensive care units. Crit Care. 2015;19(Suppl 1):P575.
4. **Stelfox HT**, **Niven DJ**, Bagshaw S, McKenzie E, Potestio M, Clement F, Zygun D. Integrated Knowledge Translation to Develop Priorities for Improving Care of Critically Ill Patients. Abstract presented as a poster (presented by lead author) at 2015 BMJ International Forum on Quality & Safety in Healthcare.
5. **Stelfox HT**, **Niven D**, Bagshaw SM, McKenzie E, Potestio M, Clement F, Zygun D. Stakeholder engagement to identify priorities for improving the quality and value of care provided to critically ill patients. Crit Care. 2015;19(Suppl 1):P574.

May 2015

1. Ahmed M, Banoei MM, Donnelly S, Vogel HJ, **Winston BW**. Differentiating Direct Lung Injury-Induced Acute Respiratory Distress Syndrome (ARDS) from Ventilated Intensive Care Unit (ICU) Controls Using Serum Metabolomics, Presented at the winter meeting of the CCCTBG, Lake Louise, May 2015.
2. Donnelly SJ, Banoei MM, Vogel HJ, **Winston BW**. Differentiating Sepsis-Induced Acute Lung Injury (ALI) and Acute Respiratory Distress Syndrome (ARDS) from Ventilated Intensive Care Unit (ICU) Controls Using Serum Metabolomics. Poster presentation at the American Thoracic Society Annual Meeting, Denver, CO. May 2015.
3. Donnelly SJ, Banoei MM, Mourad A, Vogel HJ, **Winston BW**. Differentiating Sepsis-Induced Acute Lung Injury (ALI) and Acute Respiratory Distress Syndrome (ARDS) from Ventilated Intensive Care Unit (ICU) Controls Using Serum Metabolomics. Presented at the winter meeting of the CCCTBG, Lake Louise, May 2015.
4. Sullivan KJ, McIntyre L, Lalu M, Mei S, Moher D, Fergusson D, Marshall J, **Winston B**, Walley K, Jazi M, Stewart D. A systematic review of the reporting of mesenchymal stromal cell (MSC) manufacturing and characterization in pre-

clinical, MSC treated, models of sepsis. Submitted to the ISCT Sepsis conference, May 2015.

5. Berthelot S, Lang E, Quan H, **Stelfox HT**. Development of a Hospital Standardized Mortality Ratio for Emergency Department Sensitive Conditions. Academic Emergency Medicine. 2015 May;22(S1):S92.

June 2015

1. Banoei MM, Vogel HJ, Weljie AM, Sachin Y, Angus D, **Winston BW**. Comparison of three analytical platforms capacity for prognosis of mortality: A metabolomics exploration in community acquired pneumonia. Presented to the Metabolomics Society Annual Meeting, San Francisco, June 2015.
2. Mourad A, Banoei M, Donnelly S, **Winston B**. Predicting the mortality of pneumonia-induced direct lung injury using serum metabolomics. Extended abstract accepted by Journal of Undergraduate Research in Alberta¬, June 2015.
3. **Winston BW**, Mickiewicz B, Hutchison J, Fraser D, Vogel H. CSF metabolomics of severe TBI in pediatrics; a pilot study. Presented at the Canadian Critical Care Translational Biology Group Meeting, Montabello, PQ. June 2015.

October 2015

1. Bagshaw S, Wang X, Zygun D, **Zuege D**, Zygun D, Dodeck P, Garland A, Scales D, **Berthiaume L**, Yergens D, Faris P, Chen G, **Stelfox HT**. Capacity Strain Increases Mortality Risk among Patients Admitted to Intensive Care Units – A Two-Stage Modeling Strategy. Presented at Canadian Critical Care Forum, Toronto, Oct 2015.
2. Bagshaw SM, Majumdar S, Rolfson DB, Ibrahim, Q, McDermid RC, **Stelfox HT**. Frailty in Critically Ill Non-Elderly Patients: Prevalence, Correlates, and Outcomes. Critical Care Canada Forum. Toronto, Ontario. October 2015.
3. Opgenorth D, **Stelfox HT**, Potestio M, Wickson P, Zygun DA, Gilfoyle E, Gibney RTN, Meier M, Boucher P, McKinlay D, Bagshaw S. Health Care Provider Perceptions of Sources and Impact of Strain on Intensive Care Unit Capacity: A Qualitative Study. Critical Care Canada Forum. Toronto, Ontario. October 2015.
4. Sullivan KJ, Strauss A, Lalu M, Moher D, Mei S, Fergusson D, Stewart D, Marshall J, McLeod M, Walley K, **Winston B**, Hutton B, Jazi M, McIntyre L. Mesenchymal Stromal Cell Therapy for Systemic Sepsis in Preclinical Animal Models: A Systematic Review. Presented at the Canadian Critical Care Forum Meeting, October 2015.

Annual Report 2014-15 - Critical Care Medicine

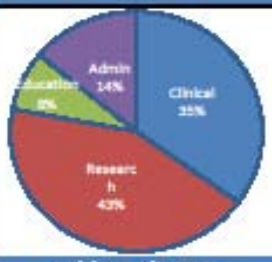
Prepared by CMA - October 2015

FTE of Professors, Associate Professors and Assistant Professors

FTE[2]

Department	2012-13	2013-14	2014-15[1]
Critical Care Medicine	**4**	**6**	**6**
Basic Sciences	129.8	125.8	126.3
Clinical Dept. w/ AARP	237	228.8	224.8
Clinical Dept. w/out AARP	**147**	**153**	**155**
CSM	513.8	507.6	506.1

Activity Profile 2015 - Critical Care Medicine



Research Revenue

Research Equivalents (*RE*)[3]

Department	2012-13	2013-14	2014-15[1]
Critical Care Medicine	**1.16**	**2.58**	**2.58**
Basic Sciences	68.65	68.50	68.51
Clinical Dept. w/ AARP	83.64	79.19	79.50
Clinical Dept. w/out AARP	**42.82**	**44.50**	**45.98**
CSM	195.11	192.19	193.99

Activity Profile 2015 - Clinical Departments without AARP

$ in million

Total Research Revenue[4]

Department	Tot. Res. Rev.			Tot. Res. Rev. per RE		
	2012-13	2013-14	2014-15[1]	2012-13	2013-14	2014-15[1]
Critical Care Medicine	**1.25**	**1.97**	**1.09**	**1.08**	**0.76**	**0.42**
Basic Sciences	47.25	48.28	45.75	0.70	0.70	0.67
Clinical Dept. w/ AARP	49.47	53.92	54.43	0.59	0.68	0.68
Clinical Dept. w/out AARP	**22.85**	**27.24**	**25.88**	**0.53**	**0.61**	**0.56**
CSM	168.04	158.58	172.71	0.86	0.83	0.89

CIHR Revenue[5]

Department	CIHR Rev.			CIHR Rev. per RE		
	2012-13	2013-14	2014-15[1]	2012-13	2013-14	2014-15[1]
Critical Care Medicine	**0.33**	**0.23**	**0.12**	**0.28**	**0.09**	**0.05**
Basic Sciences	16.04	15.35	15.27	0.18	0.22	0.22
Clinical Dept. w/ AARP	6.99	7.12	10.50	0.08	0.09	0.13
Clinical Dept. w/out AARP	**1.89**	**1.62**	**2.44**	**0.04**	**0.04**	**0.05**
CSM	25.24	26.31	28.21	0.13	0.14	0.15

Clinical Research Revenue[6]

Department	Clin. Res .Rev.			Clin. Res. Rev. per RE		
	2012-13	2013-14	2014-15[1]	2012-13	2013-14	2014-15[1]
Critical Care Medicine	**0.15**	**0.35**	**0.36**	**0.13**	**0.14**	**0.14**
Basic Sciences	0.1	0.22	0.03	0.00	0.00	0.00
Clinical Dept. w/ AARP	10.11	11.31	12.31	0.12	0.14	0.15
Clinical Dept. w/out AARP	**1.83**	**2.84**	**2.42**	**0.04**	**0.06**	**0.05**
CSM	12.05	14.36	14.77	0.06	0.07	0.08