Alberta Health Services

UNIVERSITY OF CALGARY
CUMMING SCHOOL OF MEDICINE

DEPARTMENT OF CRITICAL CARE MEDICINE

PHYSICIAN ANNUAL REPORT

January-December 2014

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 a few 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

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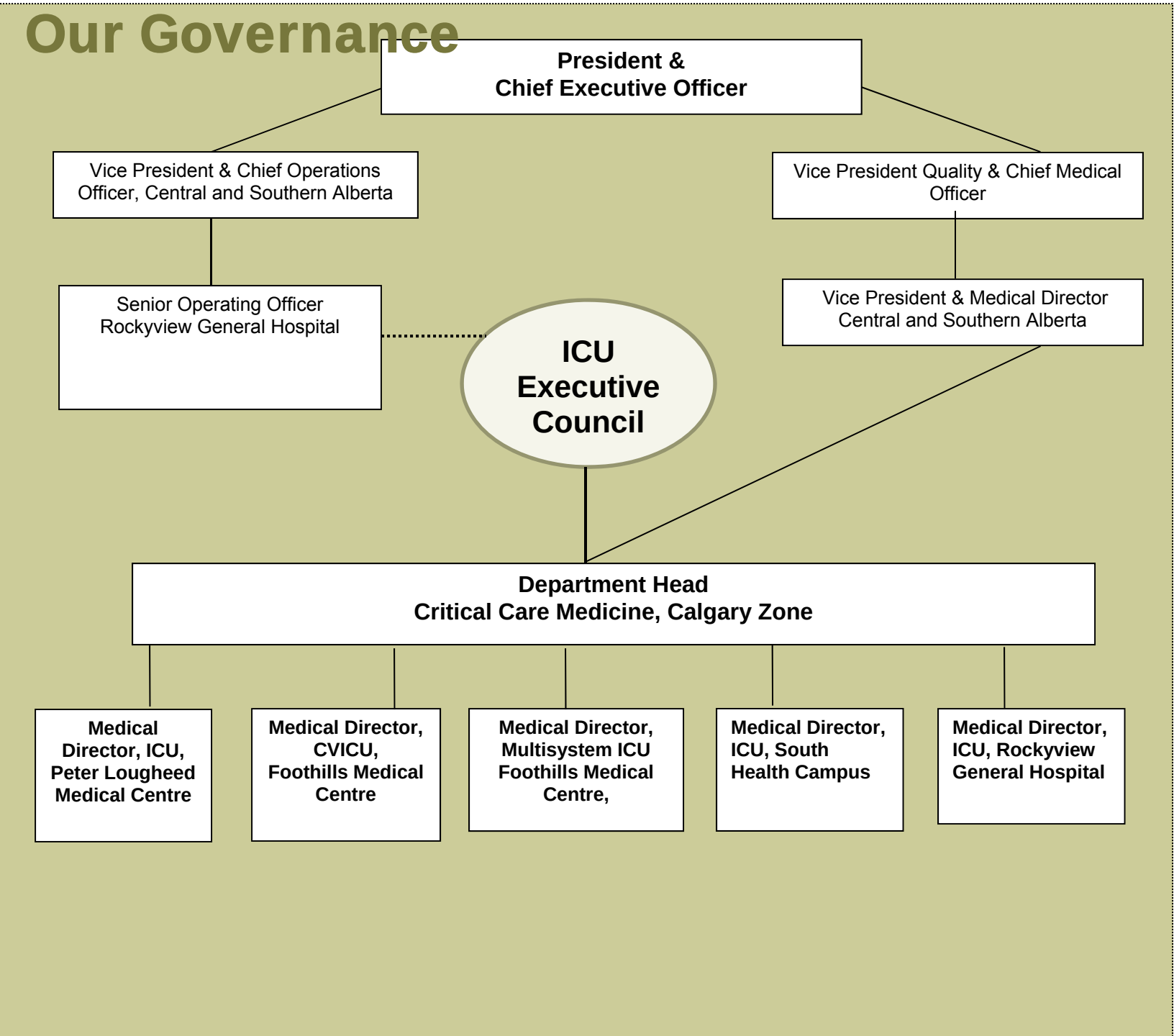
2.0 Department Structure and Organization

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 Quality and Safety Improvement Council, our Departmental Research Committee, 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 & Safety Improvement Council

2.3.3 Quality Assurance Committee

2.3.4 Zonal Resuscitation Council

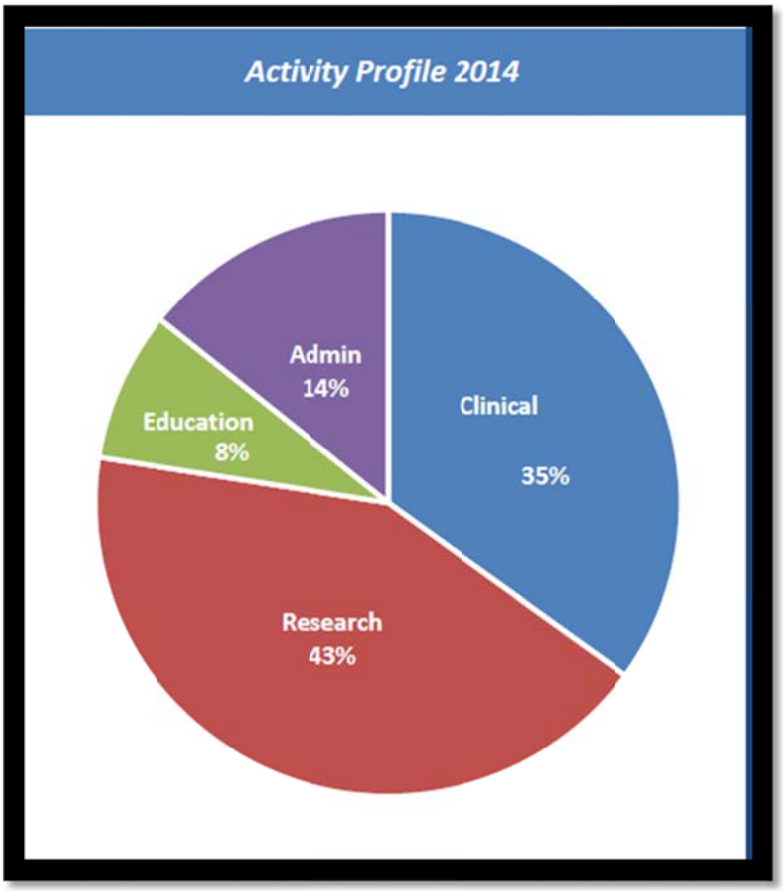
2.3.5 Research Executive Committee

2.3.6 Medical Executive Committee

2.3.7 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). 2 members of our Department retired in 2014.



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

Name	Clinical Service 2014	Administrative Responsibilities for 2014	Fellowship and Postgraduate Training	U of C Appt
George Alvarez	RGH-MSICU SHC-MSICU PLC-MSICU	Site Director, SHC ICU RGH Site Education Coordinator (until June 30, 2014)	Critical Care Medicine, Internal Medicine, M.Sc., Health Informatics	Clinical Assistant Professor (MPT)
Selena Au	RGH-MSICU SHC-MSICU		Critical Care Medicine	Clinical Lecturer (MPT)
Colin Bands	PLC-MSICU FMC-CVICU	Co-Chair, Quality & Safety Improvement Council	Critical Care Medicine, Anesthesia	Clinical Assistant Professor
Luc Berthiaume	PLC-MSICU FMC-CVICU	Co-Chair, Mechanical Ventilation Committee; PLC, Site Education Coordinator (until June 30, 2014) 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 (July 1, 2014-present)	Critical Care Medicine, Internal Medicine, M.Sc., Epidemiology	Clinical Assistant Professor (MPT)
Philippe Couillard	FMC-MSICU	FMC Deputy Site Education Coordinator	Critical Care Medicine, Internal Medicine	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	Member Staff Work Life Program, Zonal Director for ATLS Courses	Critical Care Medicine, General Surgery, Trauma Surgery	Clinical Assistant Professor
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 (July 2014-present)	Critical Care Medicine, Internal Medicine	Clinical Assistant Professor (MPT)
Tomas Godinez	FMC-MSICU FMC-CVICU	Co-Chair, CRRT Committee	Internal Medicine	Clinical Assistant Professor
Terry Hulme	RGH-MSICU PLC-MSICU SHC-MSICU	Leader, Pharmacy & Therapeutics Team; Member DCCM Web Site Committee	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	Medical Director, Zonal Trauma Service AHS	Critical Care Medicine, Trauma and General Surgery, M.H.Sc.	Professor (GFT)

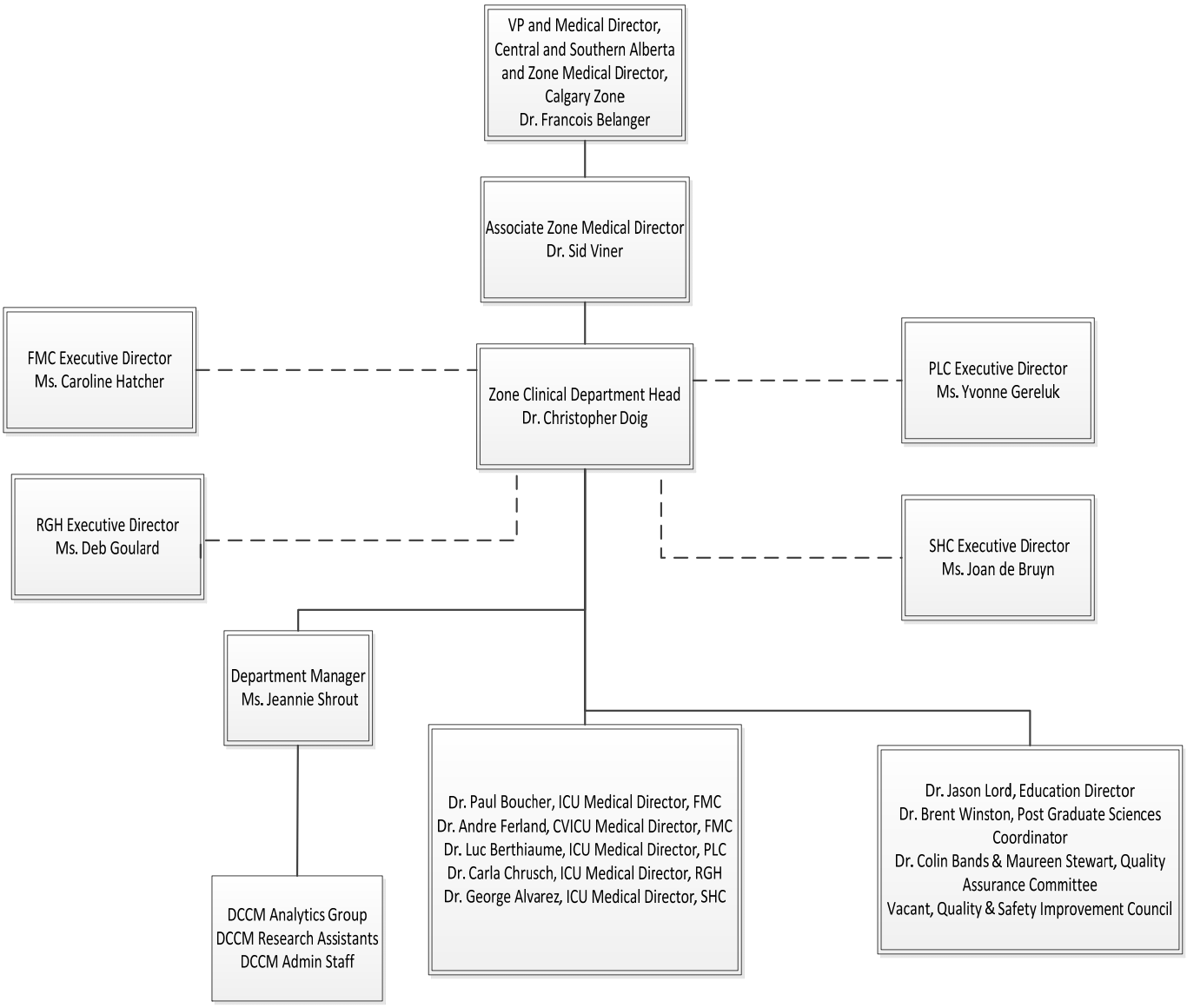
John Kortbeek*	RGH-MSICU SHC-MSICU	Department Head, Surgery; Member Leadership Forum, Faculty of Medicine; International Chair, ATLS, American College of Surgeons	Critical Care Medicine, Trauma Surgery, General Surgery	Professor (GFT)
Andreas Kramer	FMC-MSICU	Medical Director, SAOTDP Chair, DCD Working 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)
Daniel Niven	PLC-MSICU		Critical Care Medicine, Internal Medicine	Clinical Scholar
Juan Posadas-Calleja	PLC-MSICU RGH-MSICU SHC-MSICU		Critical Care Medicine, Internal Medicine	Clinical Assistant Professor (MPT)
Ken Parhar	FMC-MSICU FMC-CVICU		Critical Care Medicine, Internal Medicine, Cardiothoracic Fellowship	Clinical Lecturer (MPT)
Amanda Roze Des Ordons	RGH-MSICU SHC-MSICU FMC-MSICU	DCCM CME Coordinator SHC Site Education Coordinator	Critical Care Medicine, Anaesthesiology, Palliative Care, Master'f of Medical Education	Clinical Lecturer (MPT)
Tom Stelfox	FMC_MSICU	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)	Critical Care Medicine, Internal Medicine, Ph.D., Health Policy - Statistics & Evaluative Sciences	Associate Professor (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 Assistant 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 (after July); 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 Associate 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

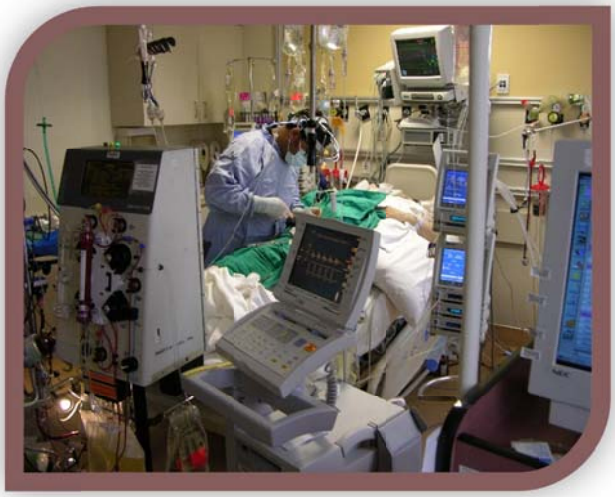
\# Primary appointment is with the Department of Physiology & Biophysics, University of Calgary

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


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. George Alvarez, ICU Medical Director, SHC
Dr. Jason Lord, Education Director
Dr. Brent Winston, Post Graduate Sciences Coordinator
Dr. Colin Bands & Maureen Stewart, Quality Assurance Committee
Vacant, 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 brand new state of the art (2011) 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 a new (2009) 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

http://iweb.calgaryhealthregion.ca/clin/icu/policies_protocols/admin/a200_icu_admission_transfer_discharge.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 Department of Critical Care Medicine through RAAPID. The RAAPID dispatcher engages in a conversation with the most appropriate site **I**ntensivist 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 past few 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 4092 admissions from January to December 2014 in the Departmental ICUs with 1251 admissions at the FMC-MSICU, 1242 at the FMC CVICU, 726 admissions at the PLC-MSICU, 467 at the RGH-MSICU and 406 at the SHC_MSICU. Of the 1242 admissions to the FMC-ICU, ~40% are medical patients, ~20% were surgical, ~19% are trauma with or without head-injury, and ~20% are neurocritical care patients (primarily intracranial hemorrhage including SAH, status epilepticus, stroke syndromes or isolated close head injuries).

Of the 726 admissions to the PLC-MSICU, ~74 % are medical patients, ~24% are surgical patients and ~2% are either trauma or neurocritical. Of the 467 admissions at the RGH-MSICU, ~72% are medical patients, ~24% are surgical patients and ~4% are trauma or neurological. Of the 406 admissions to the SHC-MSICU, ~79% are medical patients, ~16% are surgical patients and ~5% are trauma or neurological patients.

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, 2014 to December 31, 2014, our ICU Outreach Teams have responded to 1757 calls which translate to approximately 146.5

calls per month. The vast majority of patients remain on their respective nursing units with 343 or about 19.5% requiring transfer to one of our ICUs. The rate of transfer to the ICU following activation of a code 66 varies considerably between units with 36 at FMC (Internal Medicine) having the highest rate of 7.5%. The commonest reason for Team activation is a decrease in patient level of consciousness (50%) followed by respiratory distress (35%) and hemodynamic instability (31%).

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 sections 4, 6 and 8.

Thanks to the leadership of Dr. Dan Zuege and Ms. Laurie Harding, the Department supported the successful implementation of *e*Critical Alberta Project in the 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

http://htmldb.oracle.com/pls/otn/f?p=33705:1

Our department has developed and is housing and maintaining the web-based Canadian Critical Care Score-card application which is used by 24 ICUs in 7 Canadian cities to submit data for 23 quality indicators for benchmarking by peer groups. The application generates on-line benchmark and individual reports using statistical control charts which should assist the leadership of individual Intensive Care Units (ICUs) for purposes of quality improvement and administration. Continuous development and enhancements on our departmental web site have 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.

http://calgaryhealthregion.ca/ccm/family/

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 Education

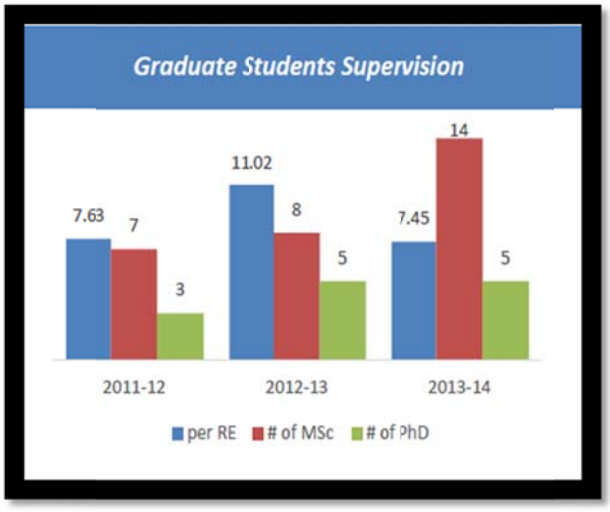
Since 1988, the University of Calgary has trained adult critical care physicians in what is generally recognized as an outstanding training program. The Royal College of Physicians and Surgeons survey (February 2015) again fully accredited our UofC Critical Care Medicine Training Program. Graduated physicians 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.

Teaching	# of students		
Graduate Students Supervision[9]	10	13	19
# of MSc	7	8	14
# of PhD	3	5	5
per RE	7.63	11.02	7.45

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

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. One new recruit will join this fellowship program in July 2015. Our Clinical Scholar Program allows Royal College of Canada specialists with certification in Critical Care Medicine an opportunity to gain further sub-specialty training for an academic career. Currently, there is one individual enrolled in this program, pursuing advanced education in research design methodology and clinical outcomes. 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 eight students enrolled in this program (5 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.



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

DCCM supervised 276 months of Critical Care Medicine training for rotating residents this year. Nearly twenty learners from last year increase this number. 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, Neurology, Neurosurgery and Plastic Surgery. As well, this year we proudly approved all requests for electives from students from other Canadian universities. 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, 54 students rotated within our critical care units. In addition to local students, we continue to attract national and international trainees wishing to pursue Critical Care Medicine as a medical elective. Based on 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.

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. 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. City wide 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.

3.3 Research

In 2014, the DCCM contributed to a total of 62 peer reviewed scholarly publications and 30 peer reviewed abstracts (presented at national and international conventions). Grant support remained strong with members receiving support from Alberta Innovates – Health Solutions, the Canadian Institutes of Health Research, Canadian Intensive Care Foundation, the Critical Care Strategic Clinical Network and Technology Evaluation in the Elderly (TVN). Continuing support was provided by Alberta Innovates – Health Solutions, the Canadian Intensive Care Foundation, the Canadian Institutes of Health Research, Centre Hopitalier Universitaire Sainte-Justine, Crohn's Colitis Foundation of Canada, the EMS Foundation, Hotchkiss Brain Institute, the M.S.I. Foundation, the Public Health Agency of Canada, the Snyder Chair in Critical Care Research, the University of Cambridge, 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 is funded through a five million dollar Alberta Heritage Foundation for Medical Research (AHFMR) Interdisciplinary Team Grant, continued in 2014. Under the leadership of Dr. Paul Kubes and Dr. Chip Doig, the Alberta Sepsis Network brings 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 remains strong with over 870 patients (FMC – 533, PLC – 267, CVICU – 70) enrolled into the study. March 2015 marks the end of the Alberta Sepsis Network within the DCCM.

ASN Neuro enrolment continues; the definitive goal is 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, has extended the original work from her successful Master's program for continual support of the ASN Neuro investigation.

Research	# of RE			Rank / 19		Rank / 20
Research Equivalents (*RE*)[5]	1.31	1.18	2.55	19	19	17
	$ in million			Rank / 19		Rank / 20
Total Research Revenue[6]	1.57	1.25	1.97	15	15	13
per RE	1.20	1.06	0.77	3	3	7
CIHR Revenue[7]	0.24	0.33	0.23	13	12	13
per RE	0.19	0.28	0.09	6	3	8
Clinical Trial Revenue[8]	0.20	0.15	0.35	7	8	6
per RE	0.15	0.12	0.14	2	4	5

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

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 2014, 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.

On September 13, 2014 the Translational Laboratory or Snyder Laboratory hosted Alberta Sepsis Day, as part of the World Sepsis Day. There were tours which provided hands on demonstrations to ICU nurses as well as lectures from Dr. Paul Kubes and Dr. Chip Doig. Interactive booths were set up at the Telus Spark where participants of all ages could engage themselves in sepsis related activities. Some of these activities included "What's faster than a Race Car and Fits Inside Your Head", "Germ CSI" and "Human Patient Simulation, KidSIM in action on site".

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 joined the Research Executive Committee and 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).

In 2014, DCCM's continual involvement through the **Canadian Critical Care Trials Group** (**CCCTG**), a group involved in the design and implementation of clinical trials across Canada, involved participation in multi-centre studies of a trial of the effect of age of blood for transfusion (ABLE) in critical care (lead locally by Dr. Andreas Kramer), and survival of 80+ year olds admitted to intensive care units (lead locally by Dr. Tom Stelfox).

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-center basic science projects that will allow unparalleled cooperation between centers for basic science research in Critical Care.

In 2014 there were 4 research coordinators (3.0 FTE) who played a vital role in our translational and clinical research program. Stacy Ruddell and Dan Lane supported research based out of the Foothills Medical Centre while Joshua Booth, who replaced Rafael Sibrian, coordinated studies located at the Peter Lougheed Centre. 2014 saw Dan Lane and Rafael Sibrian leave to pursue other avenues. Currently, there are 2 research coordinators employed through the Department of Critical Care Medicine.

In 2014 the DCCM hired a Departmental data analyst. This person will be the link to operational and research analysis of DIMR and eCritical data.

NOTABLE HIGHLIGHTS

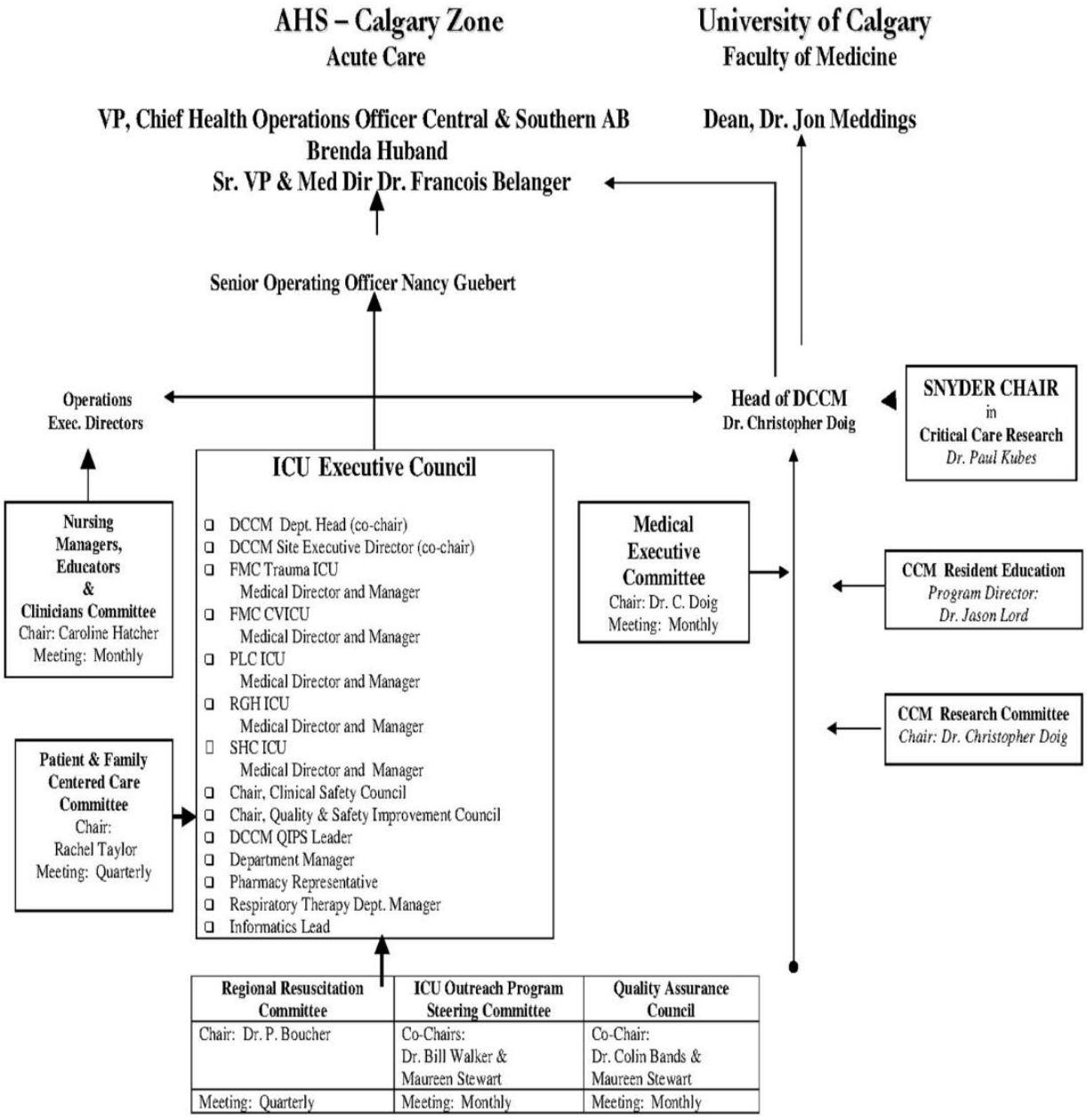
Dr. Amanda Roze des Ordons completing her Master's of Medical Education with the University of Dundee in Scotland.

Dr. Richard Novick completed five year term as national chair of the Cardiac Surgery Examination Committee of the Royal College of Physicians and Surgeons of Canada.

Dr. Daniel Niven received recognition for exceptional work. He was awarded the J.B. Hyne Research Innovation Award for excellence in research at the graduate level. He additionally received the 2014 CHEST Alfred Soffer Research Award, as a Semi-finalist he was nominated on the basis of outstanding original scientific research.

3.4 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.



4.0 Challenges

4.1 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

4.2 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.

4.3 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.
- Policies and procedures to govern the transfer of stable ICU patients between provincial secondary/tertiary ICUs when the above strategies have made it impossible to continue caring for a critically ill patient in any given jurisdiction.

5.0 Workforce Planning

5.1 Summary of Recruitment

Four specialists in Critical Care Medicine were recruited in 2014:

Dr. Richard Novick:

Following completion of residency training in general surgery and cardiothoracic surgery at McGill University, Dr. Novick undertook a fellowship in cardiac surgery, critical care and transplantation at Stanford University Medical Center. He subsequently accepted an academic position at Western University's Schulich School of Medicine, where he served as Professor and Chair of the Division of Cardiac Surgery, as well as Chief of Cardiac Surgery at the London Health Sciences Centre, from 2000 to 2010. Over the years, he has engaged in a busy clinical practice of both cardiac surgery and critical care, while maintaining a strong academic commitment, including grant-supported laboratory research and completion of a graduate certificate in Clinical Epidemiology and Biostatistics. His bibliography includes 145 peer-reviewed papers, a 181 page monograph Surfactant in Lung Injury and Lung Transplantation, 15 book chapters and 125 published abstracts and invited commentaries. He was recruited to fill clinical and academic needs.

Dr. Ken Parhar:

Dr. Parhar graduated (MD) from Queen's University in 2007, and completed Internal Medicine at the University of Calgary in 2011. His training in Internal Medicine included appointment as the Chief Resident, and completion of the full 4th year prior to entry into a subspecialty program. He subsequently completed subspecialty training in Critical Care Medicine at the University of Calgary in 2013: this training included training in echocardiography. He then completed a subspecialty fellowship in Cardiothoracic Critical Care with a focus on extra-corporeal life support at Papworth Hospital at the University of Cambridge in 2014. Dr. Parhar also has a Master's of Science degree in Experimental Medicine from UBC (2003). Dr. Parhar has a total of 17 peer-reviewed publications, and 2 book chapters.

Dr. Amanda Roze des Ordons:

Amanda graduated from the University of Alberta with her MD in 2006, completed Anesthesiology specialty training at the University of Alberta in 2011, and completed her fellowship in Critical Care Medicine at the University of Ottawa in 2013. Amanda has

received 3 grants in 2014 for a total of just below 80K. One grant is a TVN Catalyst grant (national competitive grant); 2 grants are local. Amanda has 4 publications to date. She has 4 publications in various stages of submission/submitted.

Dr. Selena Au:

Dr. Au graduated (MD) from UBC in 2007, completed Internal Medicine in 2011, and completed her fellowship in Critical Care Medicine at the University of Calgary in 2012. She has submitted 2 grants including as a co-investigator on a CIHR Team grant. She has post graduate training in Quality Improvement and patient safety which is relatively unique in our faculty in CSM.

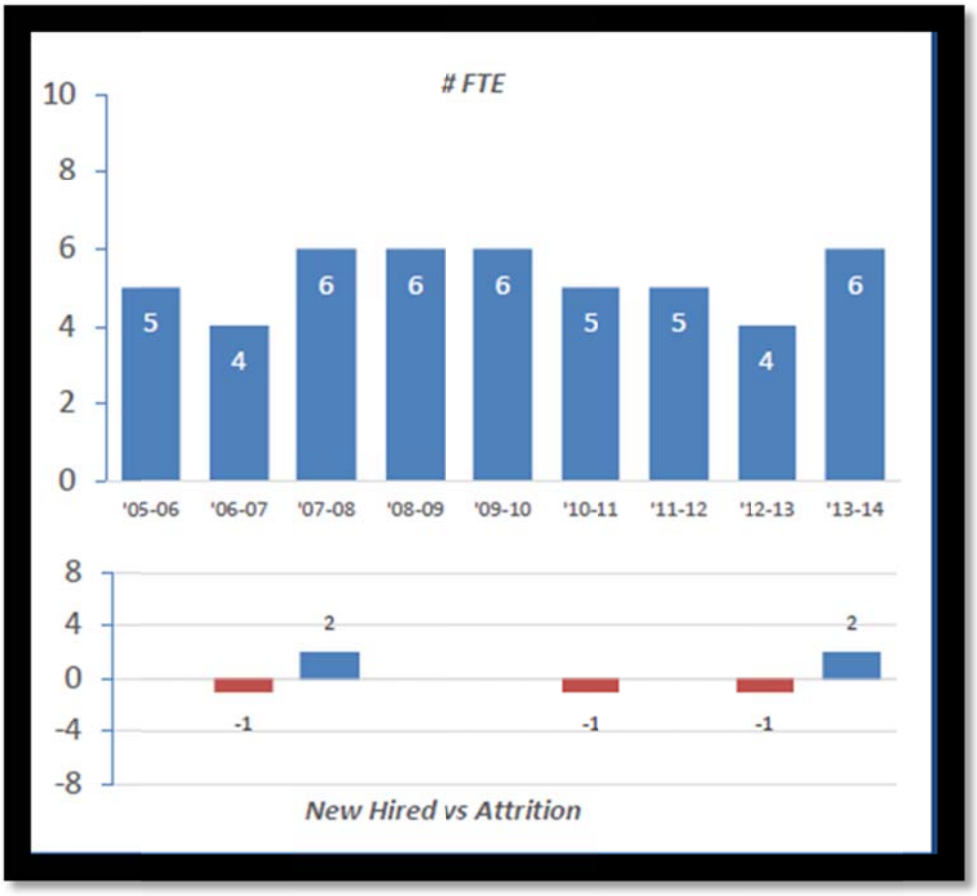
There were two specialist departures from Critical Care Medicine in 2014.

- Dr. Andrew Kirkpatrick: Dr. Kirkpatrick completed 13 years of service in Critical Care. He continues to practice Trauma Surgery and is very involved in research endeavors.
- Dr. Colin Bands: Dr. Bands completed 17 years of service in Critical Care. He continues to work in Anesthesia.

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

- Clinician Scientist
- Intensivist/TEE expertise
- Intensivist/Medical Education
- Intensivist/Medical Informatics
- Intensivist/Bioethics
- 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.



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

5.2 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 48.5 (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.

6.0 Quality Assurance, Quality & Safety Improvement

6.1 Department of Critical Care Quality Assurance

The DCCM QAC operates as a zonal committee within the AHS QAC structure. The committee 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 one of these completed in fiscal 2014-15. A total of 22 recommendations were made from the 6 completed reviews. Of these 22 recommendations from the QA reviews 9 have been implemented in the critical care units in response to these events, 2 recommendations are 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.

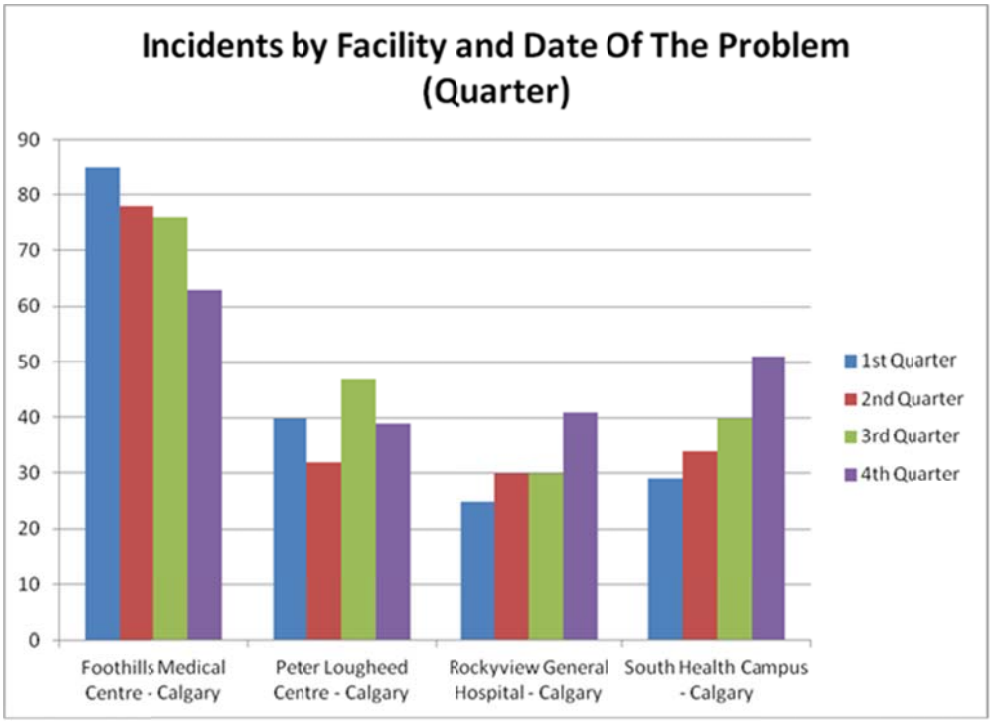
Site based Critical Care Morbidity and Mortality Committees exist as subcommittees of DCCM QAC. These committees review all deaths occurring in ICU or within 72 hours of ICU transfer or discharge, and any unexpected morbidity where concerns arise about system safety.

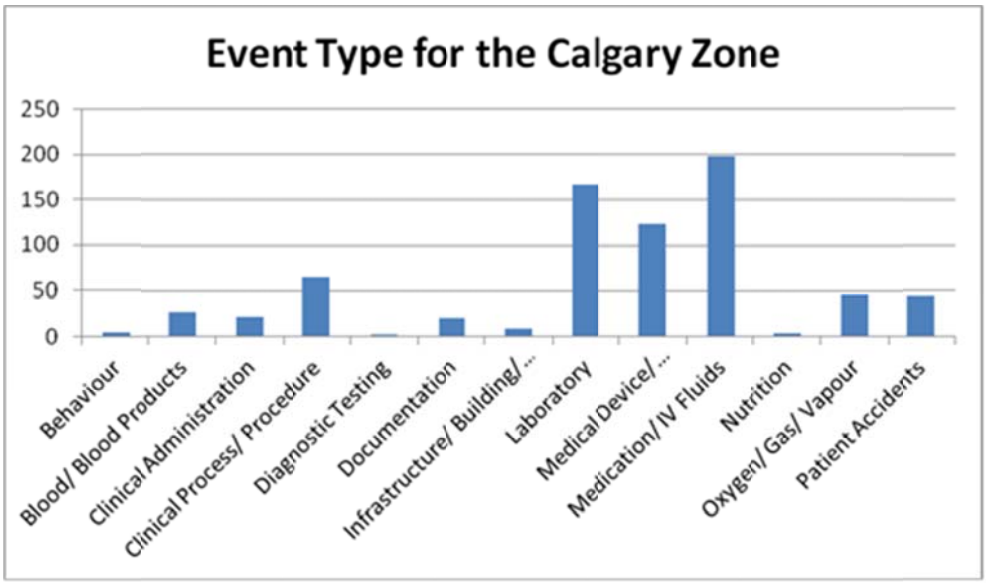
DCCM QAC and Critical Care Morbidity and Mortality reviews at all Calgary Adult sites are protected under section 9 of the Alberta Evidence Act.

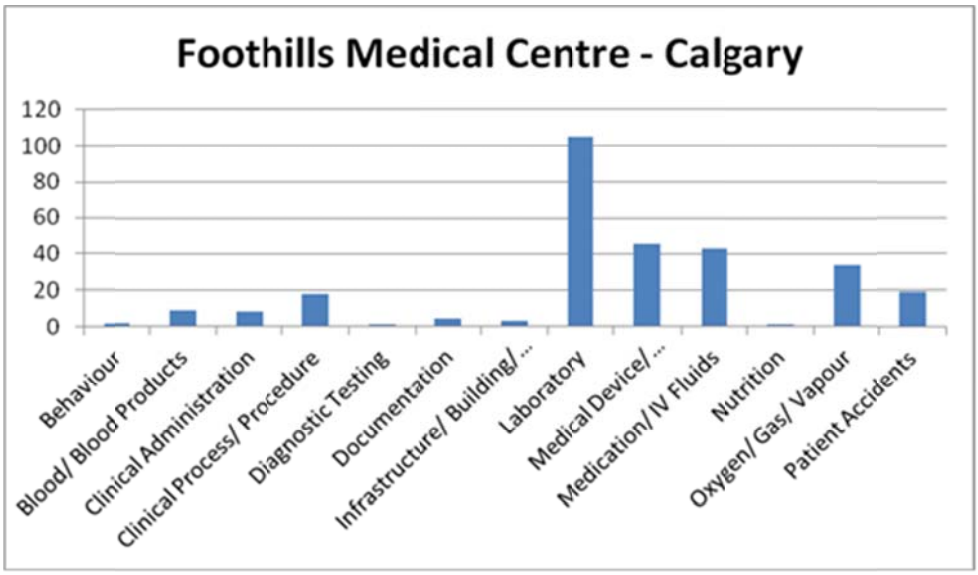
A strong safety culture within the ICU promotes reporting any safety concerns directly to management and the Patient Safety office via the AHS Reporting & Learning System (RLS). All RLS reports are reviewed by management and/or medical leadership and appropriate follow-up occurs. Reports submitted confidentially 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.

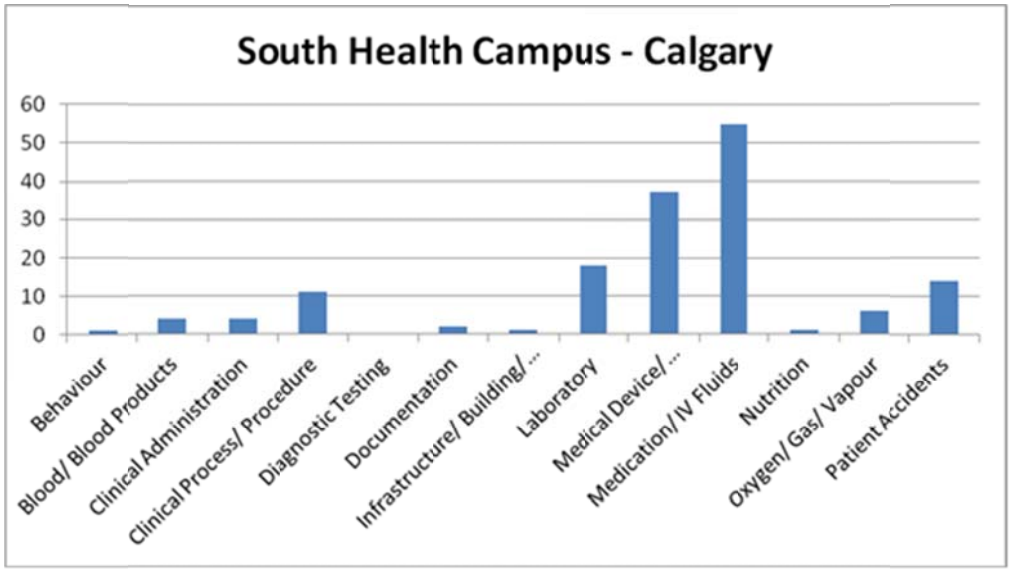
The AHS RLS is a voluntary reporting system that provides an opportunity for staff/physicians to report hazards, close calls and adverse events with varying degrees of harm. As the RLS is a voluntary reporting system, it does not provide a complete picture of all risks, hazards or system vulnerabilities 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 2014 to March 1, 2015, 740 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, 2014 to March 1, 2015. 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
120
100
80
60
40
20
0
Behaviour
Blood/ Blood Products
Clinical Administration
Clinical Process/ Procedure
Diagnostic Testing
Documentation
Infrastructure/ Building/...
Laboratory
Medical Device/...
Medication/IV Fluids
Nutrition
Oxygen/ Gas/ Vapour
Patient Accidents


South Health Campus - Calgary
60
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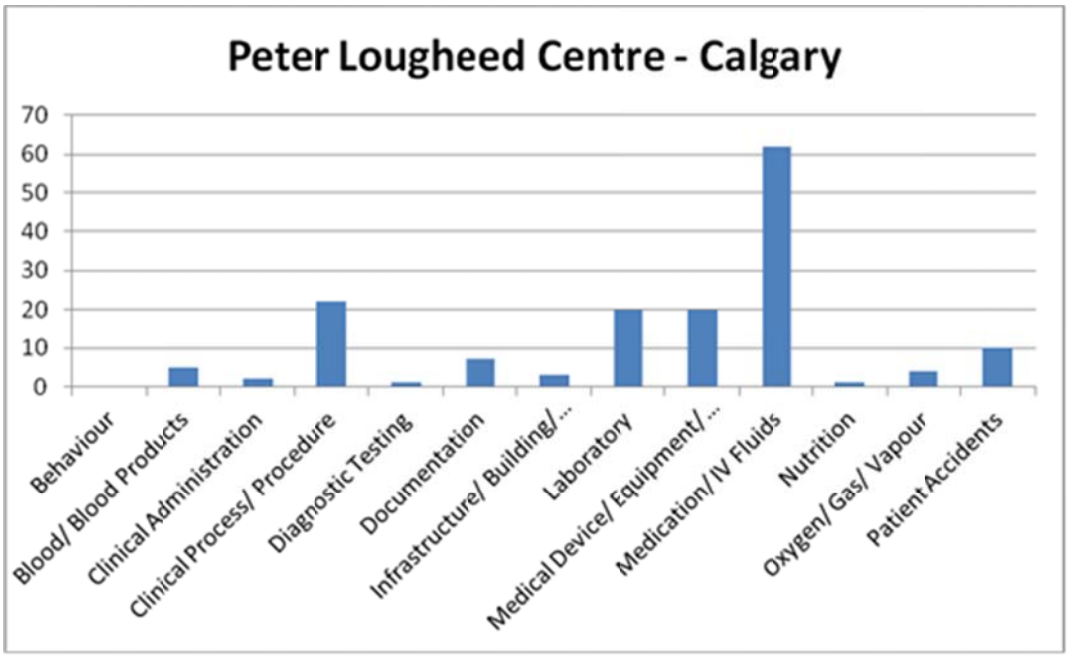
Behaviour
Blood/ Blood Products
Clinical Administration
Clinical Process/ Procedure
Diagnostic Testing
Documentation
Infrastructure/ Building/...
Laboratory
Medical Device/...
Medication/IV Fluids
Nutrition
Oxygen/ Gas/ Vapour
Patient Accidents


Peter Lougheed Centre - Calgary
70
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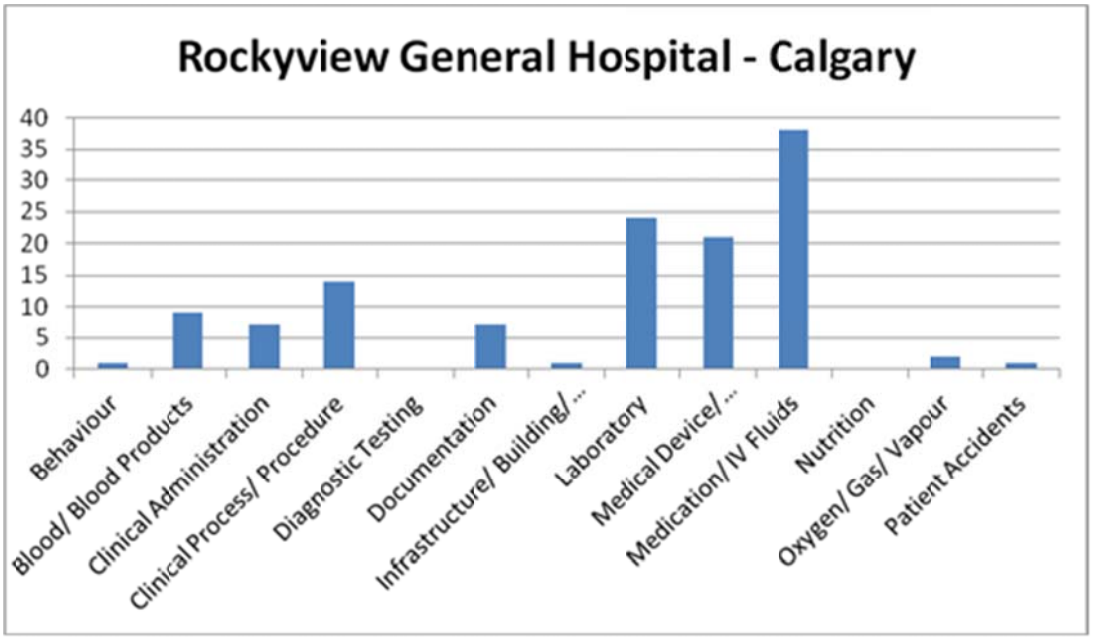
Behaviour
Blood/ Blood Products
Clinical Administration
Clinical Process/ Procedure
Diagnostic Testing
Documentation
Infrastructure/ Building/...
Laboratory
Medical Device/ Equipment/...
Medication/IV Fluids
Nutrition
Oxygen/ Gas/ Vapour
Patient Accidents


Rockyview General Hospital - Calgary
40
35
30
25
20
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10
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Behaviour
Blood/ Blood Products
Clinical Administration
Clinical Process/ Procedure
Diagnostic Testing
Documentation
Infrastructure/ Building/...
Laboratory
Medical Device/...
Medication/IV Fluids
Nutrition
Oxygen/ Gas/ Vapour
Patient Accidents

6.2 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.

6.3 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 may 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.

(http://www.acktionnet.ca/)

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

1. Accreditation Preparation (Critical Care Cycle, May 2015)
2. ICU Delirium Screening, Prevention and Management
3. OR-ICU Handover Project
4. Medication Reconciliation
5. Patient and Family Centered Care

6.4 aC^{3}KTion Net

The Department of Critical Care Medicine has supported the contribution of de-identified patient data to a national data base as part of a knowledge translation and quality improvement project by the name of *aC^{3}KTion Net*. This project is an observational audit of baseline critical care clinical practices/therapies in critically ill patients in intensive care units across Canada. Starting in Spring/Summer 2014, baseline information is collected including ICU and hospital demographics and characteristics of critically ill adult patients (e.g. age, reason for admission, APACHE II score, weight, and height). Patient level data will also be collected on a daily basis from ICU admission onwards, for a maximum of 28 days, or ICU discharge, whichever event occurs first. Data on clinical outcomes (e.g. duration of mechanical ventilation, ICU stay, hospital stay, vital status) will be collected. These data elements are collected as part of routine care and data collection will

be done prospectively from chart abstraction and entered online via a secure web portal on our website.

This participation would not have been made possible without the collaborative efforts between MetaVision (E-Critical) and *aC^{3}KTion Net*. This helped to create a process where data is pulled seamlessly from the electronic charting records to the REDCAP data system that is used for this project.

6.7 ICU Outreach Team

The ICU Outreach Program is embedded as a physician-led ramp-up model within the Critical Care Programs at all 4 adult acute care sites: Foothills Medical Centre, Peter Lougheed Centre, Rockyview General Hospital and South Health Campus.

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 ICU resources**
- **I**mprove **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:

A systematic review of the CZ ICU Outreach Program has been undertaken by the ICU Outreach Steering Committee over the last 24 months. The aim of working towards a physician-*supported* 'ramp-up' model of delivery has recently been endorsed by the ICU Executive Council. With this model providing a first-line response by RN and RRT team members with enhanced skills and responsibilities, supported by an MD/NP response only as indicated, there remains much yet to be defined before any change can be initiated, and a working group tasked with this assignment has been established. Moving to this model will require development of an educational program to train and educate staff; definition of RN/RRT-initiated protocols; as well as further work to define and resolve issues around medico-legal responsibilities.

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
- CZ ICU Outreach has played a leadership role in the development of a provincial eCritical Outreach/MET/RRT database.

CALGARY ZONE ICU OUTREACH TEAM ACTIVITY
01-APR-2014 to 31-MAR-2015

	Code 66 calls		ICU Live Discharges		Follow-
	2008-09	2014-15	2008-09	2014-15	2008-09
FMC	720	843	855	1046	3227
PLC	281	340	565	601	859
RGH	411	437	334	429	1534
SHC	N/A	176	N/A	329	N/A
Zone	1412	1796	1754	2405	5620

REASONS FOR CODE 66 CALLS
01-APR-2014 to 31-MAR-2015

Reason for Calls	Number of Calls	Percent (%)
Decrease LOC	927	51.61
Respiratory distress	653	36.36
Tachycardia/hypotension	561	31.24
Worried	470	26.17
Airway	118	6.57
Seizures	77	4.29
Unavailable Medical Staff	75	4.18
Not responding to treatment	44	2.45
Urine Output	32	1.78

CODE 66 CALLS INTERVENTIONS
01-APR-2014 to 31-MAR-2015

Interventions	Number of Calls	Percent (%)
Supplemental Oxygen	1148	63.92
Radiographic Test	882	49.11
Fluid bolus	583	32.46
IV Start	549	30.57
Ventilation	337	18.76
Cardiac Meds	319	17.76
Suctioning	155	8.63
Intubation	95	5.29
Blood Tx	86	4.79
Airway	85	4.73
Central Line	22	1.22

Calgary Zone "TOP 20" Code 66 Operational Indicators

01-APR-2014 to 31-MAR-2015

Hospital	Unit	# of calls	% ICU Transfers	% with change in LOC	% died during call	% MD(s) notified	% MD(s) present	% MD(s) present during day time
FMC Surgery	PCU 102 GENERAL SURG	50	52.00	2.00	2.00	96.00	82.00	75.00
FMC Medicine	PCU 36	45	33.33	4.44	0.00	88.89	80.00	93.33
FMC SARP - Renal	PCU 37 A&B RENAL	39	30.77	7.69	0.00	92.31	84.62	100.00
FMC Medicine	PCU 57 ONC/BONE MARROW	35	40.00	0.00	0.00	80.00	74.29	78.57
FMC Medicine	PCU 47 MED/PALLIATIVE CARE	31	3.23	9.68	0.00	90.32	74.19	76.92
FMC Medicine	PCU 61 ACUTE MEDICINE	30	30.00	3.33	3.33	86.67	66.67	72.73
FMC SARP - Renal	PCU 46 MED/CHRONIC RENAL	30	16.67	20.00	6.67	86.67	86.67	83.33
FMC Clinical Neurosciences	PCU 112 NEURO	28	53.57	0.00	3.57	96.43	85.71	81.82
PLC	38 MTU/ONCOLOGY	28	42.86	7.14	0.00	82.14	64.29	86.67
FMC Cardiac Sciences	PCU 91 CARDIAC SURGERY	27	11.11	7.41	0.00	96.30	81.48	80.00
FMC Medicine	PCU 32 MEDICINE	25	8.00	12.00	0.00	96.00	88.00	85.71
RGH	UNIT 71 MEDICAL CARDIOLOGY	24	8.33	8.33	0.00	91.67	79.17	76.92
PLC	39 PULMONARY/MTU	23	43.48	8.70	0.00	100.00	73.91	80.00
PLC Surgery	53 SURGERY/VASCULAR	21	28.57	19.05	0.00	85.71	71.43	83.33
FMC	PCU 61 PULMONARY/THORACIC	21	23.81	9.52	0.00	76.19	66.67	77.78
FMC	Other-UNIT 44	20	40.00	0.00	0.00	80.00	75.00	88.89
RGH	UNIT 94 INTERNAL MEDICINE/PULMONARY	20	15.00	5.00	0.00	95.00	75.00	42.86
FMC Cardiac Sciences	PCU 82 CARDIAC	19	21.05	10.53	0.00	84.21	78.95	72.73
FMC	PCU 36 MEDICAL TEACHING	19	57.89	15.79	0.00	78.95	73.68	75.00
PLC	49 CARDIOLOGY/ MTU	19	26.32	5.26	5.26	94.74	84.21	83.33

7.0 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 maintaining/leading National ICU related Patient Safety Forums including the ongoing "Safer Healthcare Now" campaign by the Canadian Patient Safety Institute.

- 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.

8.0 Appendices

8.1 Department of Critical Care Medicine Research Grants

Granting Agency	Title of Project	Period of Support	Funds Received
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 - 2014	$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 - 2014	$5,000,000 over 5 years
Canadian Institutes of Health Research (CIHR), New Investigator Award Competition Dr. Tom Stelfox Role: Principal Investigator	Assessing care of patients with major traumatic injuries: A template for developing quality indicators.	2009 - 2014	$60,000/ year
Hotchkiss Brain Institute Dr. Andreas Kramer Role: Principal Investigator	Intracranial blood clearance in aneurysmal subarachnoid hemorrhage	2009 - 2014	$13,000
University of Calgary Starter Grant Dr. Andreas Kramer Role: Principal Investigator	Intracranial blood clearance in aneurysmal subarachnoid hemorrhage	2009 - 2014	$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
Hotchkiss Brain Institute Dr. Andreas Kramer Role: Principal Investigator	Simplifying use of continuous electroencephalography in neurocritical care patients	2010 - 2014	$15,000

Granting Agency	Title of Project	Period of Support	Funds Received
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	~$70,000.00
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
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 - 2014	$628,692
Canadian Institutes of Health Research (CIHR) Dr. Tom Stelfox Role: Co-Investigator	Developing trauma center performance indicators for non-fatal outcomes	2011 - 2014	$193,816
Faculty of Medicine, U of C and Alberta Health Services Emerging Team Grant Dr. Brent Winston Role: Co-Investigator	Near point of care metabolomics analysis for diagnosis and prognosis of CAP	2011 - 2014	$300,000

Granting Agency	Title of Project	Period of Support	Funds Received
Snyder Chair in Critical Care Research Dr. Andreas Kramer Role: Principal Investigator	Overcoming barriers to the use of continuous electroencephalography in neurocritical care patients	2011 - 2014	$7,500
Department of Critical Care Medicine 2010 Research Competition Dr. Andreas Kramer Role: Principle Investigator	Overcoming barriers in the use of continuous electroencephalography in neurocritical care patients: prospective assessment of a limited montage	2011 - 2014	$7,500
Hotchkiss Brain Institute-Head Injured Relearning Society Dr. David Zygun Role: Investigator	Brain Injury Research and Development Initiative	2011 - 2015	$200,000
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
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
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
M.S.I. Foundation Dr. Tom Stelfox Role: Co-Investigator	A prospective multicentre observational study of frailty in cardiac surgery in Alberta	2012 - 2014	$88,000
Canadian Institutes of Health Research (CIHR) Dr. Richard Novick Role: Co-Investigator	Development of core competencies for advanced surgical practice: understanding surgical judgment and decision making during challenging surgical situations	2012 - 2014	$117,000
Royal College of Physicians and Surgeons of Canada Dr. Richard Novick Role: Co- Investigator	Evolving competencies for advanced surgical practice: Decision-making during challenging surgical situations	2012 - 2014	$49,136
Calgary Orthopaedic Research and Development Fund (COREF) Dr. Tom Stelfox Role: Co-Investigator	Quality indicators in the management of Supracondylar Humeral Fractures in children: A family centered analysis of care.	2012 - 2014	$3,925

Granting Agency	Title of Project	Period of Support	Funds Received
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
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
Cubist Pharmaceuticals Inc. Dr. Paul Boucher & Dr. Dan Zuege Role: Principle Investigator	A phase 3 randomized double-blind study comparing TR -701 FA and Lenezolid in ventilated Gram-positive nonsocomial pneumonia	2013 – present	$12,000 per patient
Canadian Institutes of Health Research (CIHR) Dr. Andreas Kramer Role: Site Investigator	Early Determination of Neurological Prognosis in ICU patients with Severe Traumatic Brain Injury: TBI-Prognosis Multicenter Prospective Study	2013 - present	$2,100 per patient
Canadian Institutes of Health Research (CIHR) Catalyst Grant: eHealth Innovations Dr. Tom Stelfox Role: Principal Investigator	Developing an Electronic Decision Support and Communication Tool for Intensive Care Unit Discharge	2013 - 2014	$108,000
Canadian Intensive Care Foundation Dr. Brent Winston Role: Principal Investigator	Differentiating ALI and ARDS from ventilated ICU controls using serum metabolomics	2013 - 2014	$28,500
Alberta Innovates - Health Solutions (Alberta Sepsis Network) Dr. Dan Zuege Role: Co-Investigator	Use of a smart phone application to improve antimicrobial stewardship practices in Calgary intensive care units	2013 - 2014	$37,000
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)

Granting Agency	Title of Project	Period of Support	Funds Received
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 Dr. Paul Kubes Role: Principal Investigator	Invariant NKT cells as the link between brain injury and susceptibility to infections	2013 - 2016	$250,000 per year
Alberta Innovates - Health Solutions (AIHS) Dr. Brent Winston Role: Co-Principal Investigator	Treatment of cholesterol-dependent pulmonary surfactant dysfunction	2013 - 2016	$699,000 over 3 years
Public Health Agency of Canada (PHAC) Dr. Tom Stelfox Role: Co-Investigator	A Pilot Study to Ascertain the Use of Intensive Care Units as an Option for the Surveillance of Severe Respiratory Illness (SRI) in Canada	2013 - 2017	$12,000
GlaxoSimthKline Dr. Chip Doig, Dr. Tom Stelfox & Dr. Juan Posadas Role: Site Principal Investigators Dr. Dan Zuege 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

Granting Agency	Title of Project	Period of Support	Funds Received
University of Calgary Teaching and Learning Grant Dr. Amanda Roze des Ordons Role: Principal Investigator Dr. Chip Doig, Dr. Paul Boucher and Dr. Jason Lord Role: Co-Investigator	Communication teaching and learning in critical care medicine: curriculum development and implementation	2014	$4,768
Epilepsy Foundation of America Dr. Andreas Kramer Role: Site Investigator	Critical Care EEG Monitoring Research Consortium	2014	$50,000
Dr. Jocelyn Lockyer Continuing Medical Education and Professional Development Research Grant Dr. Amanda Roze des Ordons Role: Principal Investigator	Debriefing and feedback on medical trainee communication skills: a faculty development intervention	2014	$5,000
Technology Evaluation in the Elderly Network (TVN) 2013 Catalyst Grant Dr. Amanda Roze des Ordons Role: Co-Investigator	Decision-making about goals of care for hospitalized medical patients II: a communication intervention: patient data collection and feedback pilot	2014	$79,675
Canadian Institutes of Health Research (CIHR) Dr. Tom Stelfox Role: Co-Investigator	Development and planning of a theory-based implementation of a national wiki-based reminder system promoting best practices in trauma care	2014	$24,956
Canadian Institutes of Health Research (CIHR) Dr. Tom Stelfox Role: Co-Applicant	Structuring Patient-Oriented Research – Developing a National Agenda in Patient Care Research and Evaluation	2014	$25,000
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
Canadian Institutes of Health Research (CIHR) Dr. Tom Stelfox Role: Co-Investigator	Scoping Review: Conduct and reporting of scoping reviews	2014-2015	$49,764
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

Granting Agency	Title of Project	Period of Support	Funds Received
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
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
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

Granting Agency	Title of Project	Period of Support	Funds Received
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Paul Kubes Role: Principal Investigator	Intravascular immunity in chronic inflammatory lung disease	2014 - 2019	$500,000 per year
Canadian Institutes of Health Research (CIHR) Operating Grant Dr. Paul Kubes Role: Principal Investigator	Neutrophil and monocyte roles in sterile inflammation and repair of vessels and tissue	2014 - 2019	$199,805 per year

Peer Reviewed Manuscripts

January 2014

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3. **Niven D**, Bastos J, **Stelfox HT**. Critical Care Transition Programs and the Risk of Readmission or Death after Discharge From an ICU: A Systematic Review and Meta-Analysis. Crit Care Med. 2014 Jan;42(1): 1-9. Epub 2013 Aug 28.
4. Roberts DJ, Leigh-Smith S, Faris PD, Ball CG, Robertson HL, Blackmore C, Dixon E, **Kirkpatrick AW**, Kortbeek JB, **Stelfox HT**. Clinical manifestations of tension pneumothorax: protocol for a systematic review and meta-analysis. Syst Rev. 2014 Jan 4;3(1):3. doi: 10.1186/2046-4053-3-3.
5. **Kirkpatrick AW**, Vis C, Dubé M, Biesbroek S, Ball CG, Laberge J, Shultz J, Rea K, Sadler D, Holcomb JB, Kortbeek J. The evolution of a purpose designed hybrid trauma operating room from the trauma service perspective: The RAPTOR (resuscitation with angiography percutaneous treatments and operative resuscitations). Injury. 2014 Jan 31.
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10. **Kramer AH**, Zygun DA. Donation after Circulatory Determination of Death: We Need to Respect and Protect Brain-injured Patients. Am J Respir Crit Care Med. 2014 Feb 15;189(4):504-5.
11. **Kramer AH**, Zygun DA. Neurocritical care: why does it make a difference? Curr Opin Crit Care. 2014 Feb 17.
12. Moore L, **Stelfox HT**, Turgeon AF, Nathens A, Le Sage N, Émond M, Bourgeois G, Lapointe J, Gagné M. Rates, Patterns, and Determinants of Unplanned Readmission After Traumatic Injury: A Multicentre Cohort Study. Ann Surg. 2014 Feb;259(2):374-80.
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14. **Niven DJ**, **Stelfox HT**. Inhaled Nitric Oxide in Patients with Acute Respiratory Distress Syndrome: An End to the Debate? Crit Care Med. 2014 Feb;42(2):472-3.

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15. Holcomb JB, Fox EE, Scalea TM, Napolitano LM, Albarado R, Gill B, Dunkin BJ, **Kirkpatrick AW**, Cotton BA, Inaba K, Dubose JJ, Cohen AM, Azizzadeh A, Brenner M, Cohen MJ, Wade CE, Lumsden AB, Andrassy R, Rhee PM, Bass BL, Mattox KL, Britt LD, Eastman AB, Hoyt DB, Rasmussen TE; Catheter-Based Hemorrhage Control Study Group. Current opinion on catheter-based hemorrhage control in trauma patients. J Trauma Acute Care Surg. 2014 Mar;76(3):888-93.
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17. Moore L, **Stelfox HT**, Turgeon AF, Nathens A, Bourgeois G, Lapointe J, Gagné M, Lavoie A. Hospital Length of Stay After Admission for Traumatic Injury in Canada: A Multicenter Cohort Study. Ann Surg. 2014 Mar 18.
18. Roberts DJ, **Niven DJ**, James MT, Ball CG, Kirkpatrick AW. Thoracic Ultrasonography Versus Chest Radiography for Detection of Pneumothoraces: Challenges in Deriving and Interpreting Summary Diagnostic Accuracy Estimates. Crit Care. 2014 Mar 6; 18:416 (Letter to the Editor).
19. Smailys A, Mitchell J, **Doig CJ**, Tyberg J and Belenkie I. High Frequency Oscillatory Ventilation versus Conventional Ventilation: Hemodynamkic Effects on Lung and Heart. Physiol Rep. 2014 Mar 27;2(3):e00259. doi: 10.1002/phy2.259.

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20. **Couillard P**, Wijdicks EF. Flaccid quadriplegia due to thyrotoxic myopathy. Neurocrit Care. 2014 Apr;20(2):296-7. doi: 10.1007/s12028-013-9940-0.
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23. Mickiewicz B, Duggan GE, **Winston BW**, **Doig C**, **Kubes P**, Vogel HJ; Alberta Sepsis Network. Metabolic profiling of serum samples by 1H nuclear magnetic resonance spectroscopy as a potential diagnostic approach for septic shock. Crit Care Med. 2014 May;42(5):1140-9.
24. Moore L, **Stelfox HT**, Turgeon-Fournier, Nathens A, Lavoie A, Marcel E, Bourgeois G, Lapointe J, Neveu X. Derivation and Validation of a Quality Indicator of Acute Care Length of Stay to Evaluate Trauma Care. J Trauma Acute Care Surg. 2014 May;76(5):1310-6. doi: 10.1097/TA.0000000000000202. Epub 2014 Apr 16.
25. Moore L, **Stelfox HT**, Turgeon-Fournier, Nathens A, Lavoie A, Marcel E, Bourgeois G, Neveu X. Derivation and Validation of a Quality Indicator for 30-Day Unplanned Hospital Readmission to Evaluate Trauma Care. J Trauma Acute Care Surg. 2014 May;76(5):1310-6. doi: 10.1097/TA.0000000000000202.

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27. Cook D, Duffett M, Lauzier F, Ye C, Dodek PE, Paunovic B, Fowler R, Kho ME, Foster D, **Stelfox T**, Sinuff T, Zytaruk N, Clarke F, Wood G, Cox M, Kutsiogiannis J, Jacka M, Roussos M, Kumar H, Guyatt GH for the CONECCKT-T (Co-operative Network of Critical Care Knowledge Translation for Thromboprophylaxis) Investigators and the Canadian Critical Care Trials Group. Barriers and Facilitators of Thromboprophylaxis for Medical-Surgical ICU Patients: A Multicenter Survey. J Crit Care. 2014 Jun;29(3):471.e1-9. doi: 10.1016/j.jcrc.2014.01.017. Epub 2014 Feb 5.
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September 2014

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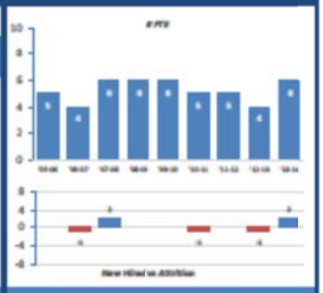
Department of Critical Care Medicine - Annual Report 2014

Year[1]	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
FTE	# of FTE					
FTE[2]	5	4	6			
New Hired[3]	0	0	2			
Attrition[4]	0	1	0			
Research	# of RE			Rank / 19		Rank / 20
Research Equivalents (*RE*)[5]	1.31	1.18	2.55	19	19	17
	$ in million			Rank / 19		Rank / 20
Total Research Revenue[6]	1.57	1.25	1.97	15	15	13
per RE	1.20	1.06	0.77	3	3	7
CIHR Revenue[7]	0.24	0.33	0.23	13	12	13
per RE	0.19	0.28	0.09	6	3	8
Clinical Trial Revenue[8]	0.20	0.15	0.35	7	8	6
per RE	0.15	0.12	0.14	2	4	5
Teaching	# of students					
Graduate Students Supervision[9]	10	13	19			
# of MSc	7	8	14			
# of PhD	3	5	5			
per RE	7.63	11.02	7.45			



Activity Profile 2014

Graduate Students Supervision

Term	Description	Year of measurement	Source of data
1. Year	Academic Year: 1 July to 30 June; Grad Studies Year: 1 May to 30 April; Fiscal Year: 1 April to 31 March.		
2. FTE	Full Time Equivalent of Academic Staff including Professor, Associate Professor, Assistant Professor, Lecturer/Instructor, reported by Primary Department	Academic Year	Dean's Database
3. New Hired	Academic Staff who joined the Faculty of Medicine or persons who became Academic Staff during the Academic Year.	Academic Year	Dean's Database
4. Attrition	Academic Staff who left the Faculty of Medicine or Academic Staff who became non-Academic Staff during the Academic Year.	Academic Year	Dean's Database
5. Research Equivalent (RE)	Sum of all FTE's % of time committed to research / 100	Academic Year	Academic Report Online; Dean's Database
6. Research Revenue	Defined according to AFMC guidelines for Fiscal Year 2013, reported by Project Department	Fiscal Year	Enterprise Reporting\Research & Trust Accounting datamart
7. CIHR Revenue	Research revenue (see Note 6) received from CIHR.	Fiscal Year	Enterprise Reporting\Research & Trust Accounting datamart
8. Clinical Trial Revenue	Research revenue (see Note 6) with Purpose of Funds Desc = "Clinical Trials"	Fiscal Year	Enterprise Reporting\Research & Trust Accounting datamart
9. Graduate Student Supervision	Reported by Supervisor's primary Academic Department	Academic Year	Enterprise Reporting datamart
*	denotes ties in Ranking		

9.0 Annual Profile

DCCM ANNUAL PROFILE
DR. MICHAEL DUNHAM

Dr. Michael Dunham is happiest when he is with his family and watching his children accomplish something new. His motto is "work hard, play hard".

Dr. Michael Dunham was born and raised in Calgary. He travelled to Provo, Utah to complete his undergraduate program in zoology at Brigham Young University. After obtaining his medical degree through the University of Alberta in Edmonton (1999), Dr. Dunham did his fellowship with the University of Miami, Jackson Memorial Hospital in trauma surgery (2005-2006) and critical care medicine (2004-2005). He returned to Calgary where he completed his critical care medicine certification (2010). He states that Calgary is his home. He has family that lives in Calgary and he loves the mountains in both summer and winter. He believes that it is a great place to raise a family.

It is lucky for the Department of Critical Care Medicine that Dr. Dunham was drawn to medicine because of his father's example and did not stick with landscaping as a profession. His passion would be treating acutely ill or injured patients and seeing immediate results with interventions. Dr. Michael Dunham holds many roles including Site Lead, General Surgery at South Health Campus, Alberta Health Services; Director, Advanced Trauma Life Support, University of Calgary; Clinical Assistant Professor, Surgery, University of Calgary and Recruitment Committee member, Department of Surgery, University of Calgary. The Department of Surgery recognized him as educator of the year in 2010 which is fitting as trauma education is a cause that is close to his heart.

In 2014 he joined the ICU Residency Training Committee, Department of Critical Care Medicine, University of Calgary. This committee ensures that all residents receive the

required hands on training in each rotation. Although much of his clinical work is focused in surgery, Dr. Dunham has taken on a role as a clinical leader with the Department of Critical Care Medicine (2013). He feels very privileged to work with the group of amazing physicians, nurses and allied health professionals. He enjoys loud music, cars from the 1960s, mountain biking, skiing, triathalon, World War II history and remote beaches. *Dr. Dunham's greatest accomplishment is being part of the team that opened up surgery at South Health Campus.*

Dr. Andre Ferland is happiest when he works hard while also planning a family trip. His motto is "be a Ferland", at least, that is what he says to his children!

Dr. Andre Ferland was born and raised in Quebec City, Quebec. In 1980 he graduated with DEC in Science, Collegial Studies from Cegep de l'Outaouais. He then went on to the University of Sherbrooke to get his Medical Doctorate (1984). Remaining in Quebec, he completed a clerkship (1984) and a internship (1985) with the Centre Hospitalier Universitaire de Sherbrooke. After completing his residency in internal medicine (1988) with the University of Sherbrooke, he came to Calgary as a critical care Fellow. In 2009 he completed a fellowship with the Libin Cardiovascular Institute of Alberta.

Dr. Ferland decided to remain in Calgary as an Intensivist because of the excellent overall morale of health care workers as well as high standards and respect. For his first job he was a score keeper in a Gatineau arena but has commented that his move to medicine was because as a dentist there would not be enough work if everyone, like him, had no cavities! Additionally, he is forever in search of the "Ultimate Diagnosis". Dr. Ferland has found his true calling as he has stated that if he were independently wealthy he would be a perpetual resident in training, holding multiple degrees. If forced to choose a different profession, he would be a "sad" engineer.

Over the course of his career, Dr. Ferland has been awarded all of the most important Department of Medicine awards (Rookie of the Year, Silver Finger, Silver Tongue and Golden Bull awards). In 2013, he was the recipient of the Department of Critical Care Medicine Rotating Resident Teaching Award for 2012 as well as the Hell Bender Honor Roll Faculty Appreciation & Awards Class of 2014. Since 1990 he has been the recipient of 14 awards for excellence as an education leader which clearly demonstrates that teaching at bedside is a cause that is really close to his heart.

He is also the recipient of the Department of Critical Care Medicine Dean Sandham award. He has made national contributions to the Royal College and has been an innovator for example as an earlier adopter of the CANMEDS program. As co-author of the University of Calgary

Clinical Clerk Critical Care Medicine Curriculum he has assisted in setting the guidelines and expectations for all Critical Care Medicine Clinical Clerks within Calgary.

Program Director of the Adult Critical Care Residence Training program, he has pioneered a new educational initiative that will assist in interdepartmental training. Echocardiographic studies offer superior hemodynamic information compared to other available monitoring tools. Previously, Diagnostic Imaging (DI) residents were restricted in their access to Echocardiographic laboratories. Current residency training no longer meets the required educational needs for both the Department of Critical Care Medicine (DCCM) and DI. Dr. Andre Ferland, in collaboration with leaders in DI, has pioneered a new training initiative which allows for DI residents and DCCM residents to create a resident-focused Echocardiography Teaching Unit. This University of Calgary and Critical Care/Diagnostic Imaging combined outpatient Cardiovascular Teaching Laboratory will provide residents with 3 months of basic training and 6 months advanced training. This greatly enhances resident learning as previous training was 1 month. Referred patents from family physicians and specialists will be sent to the lab for examination. Equipped with latest diagnostic imaging technology, the initial faculty consists of 3 level III certified Echocardiographer Intensivists with the potential to enhance the training facility with additional level III Echocardiographers, as needed. Activities started January 2014 with trainees from the University of Calgary Critical Care Medicine and Diagnostic Radiology, regular educational rotations are expected to start July 2014.

Dr. Ferland is inspired by his internist and intensivist mentors. His favourite past time is travelling and scuba diving with his family.

Dr. Ferland's greatest accomplishment is figuring out a complex diagnosis through really hard Work.

Dr. Tom Stelfox is happiest when walking in the woods. His motto is "champions get up when they can't".

Dr. Tom Stelfox was born and raised in Edmonton, Alberta. He received an undergraduate degree in biochemistry at the University of Alberta (1993). His medical degree was received in 1995 with Distinction & Honors in Research. In 2004 he completed a Fellowship in Critical Care at the Massachusetts General Hospital in Boston. While at Harvard University he also obtained a PhD in Health Policy and completed a Post-Doctoral Fellowship in Anesthesia and Critical Care (2006). In 2006 he accepted a full time position with the University of Calgary. Dr. Stelfox took the opportunity to move back to Alberta and join a strong critical care team to do the work that he loves. He enjoys taking care of patients and finding ways to improve their care. This is a long way off from his first job as a ranch hand at Roy Lake Ranches.

Luckily for the Department of Critical Care Medicine, Dr. Stelfox chose medicine over being a biologist as he originally intended. Specializing in health care organization, health services and intensive care, Dr. Stelfox' research activities include developing quality indicators of trauma care; developing strategies to improve continuity of patient care across the care continuum including the discharge of patients from ICU; and improving the translation of scientific evidence into clinical practice. In 2012, Dr. Tom Stelfox was awarded the Cochrane Distinguished Achievement Award in recognition of the high impact of his research.

With over 90 peer-reviewed publications in notable journals such as JAMA and the New England Journal of Medicine, he has also helped secure over $18 000 000 in funds for his research activities in the last 5 years. A former Fullbright Scholar, Dr. Stelfox has earned a CIHR New Investigator Award (2009-2014), and is recognized as an Alberta Innovates Population Health Investigator (2010-2017).

In 2013, Dr. Tom Stelfox assumed the role of Scientific Director for the Critical Care Strategic Clinical Network (CCSCN). He hopes to integrate science and innovation with

patient care and create a 'living laboratory' of ICUs across Alberta that develop, evaluate and implement sustainable, patient-centered and cost-effective best practices.

He believes that the complexities of caring for modern day critically ill patients requires a comprehensive, multi-disciplinary, partnership-based approach that integrates scientific excellence from all pillars with a healthcare sustainability model that will allow the system to identify patient care challenges, develop interventions and to track, manage, and deliver outcomes. Dr. Stelfox successfully applied for two Alberta Innovates – Health Solutions Partnership for Research and Innovation in the Health System (PRIHS) grants. As Principal Investigator of the "Reassessing Practices in the Daily Care of Critically Ill Patients: Building Capacity and Methodology to Identify and Close Evidence Care Gaps" project he was granted $748,790. As Co-principal Investigator for "Identifying and Evaluating Intensive Care Unit Capacity Strain in Alberta", he was instrumental in helping Dr. Sean Bagshaw develop his successful application worth $743,818. In addition, he has recently been awarded a $589,573 operating grant from the National Centers of Excellence Technology Evaluation in the Elderly Network to "Reengineer the Discharge of Patients from Intensive Care Units". An active member of the Ward of the 21st Century (W21C), a research and innovation initiative through the University of Calgary, he is Co-lead (with Dr. Bill Ghali and Dr. John Conly) on the Alberta Innovates – Health Solutions CRIO Team "W21C: Interdisciplinary Research and Innovation for Health System Quality and Safety".

He says that his inspiration comes from his late grandmothers who both lost their husbands at young ages and raised their families on their own. Dr. Stelfox enjoys hiking, reading and watching sports and strongly believes in maintaining our environment for future generations.

Dr. Stelfox' greatest accomplishment has been providing mentorship to some of our Department's fabulous trainees.

Dr. Bryan Yipp is happiest when working in his lab.

Dr. Bryan Yipp was born and raised in Calgary. He was drawn to Critical Care Medicine as a specialty because of the clear parallels between clinical and basic immunology. He is a clinician-scientist and assistant professor in the Department of Critical Care Medicine at The University of Calgary. His research interests include imaging host-pathogen responses and the in vivo immune system. Dr. Yipp completed a graduate immunology and medical degree in Calgary (2000-2005). He pursued Internal Medicine at The University of British Columbia in Vancouver (2005-2008) followed by Critical Care Medicine in Calgary (2008-2010). Dr. Bryan Yipp joined a clinician-scientist training program at The Rockefeller University, New York, under the supervision of Dr. Ralph Steinman (Nobel Laureate 2011)(2010-2011). There he studied the roles of dendritic cells and monocytes during acute infections. In 2011, Dr. Yipp returned to Calgary because of the imaging infrastructure and what he calls “a great ICU work environment” to investigate acute immune responses in the lung using advanced resonant scanning confocal and multiphoton intravital microscopy. He has received a Canada Foundation for Innovation award in pulmonary immunology, inflammation and host defence for his world class imaging program in mice. He holds a Canada Research Chair (tier II) in pulmonary immunology, inflammation and host defence. In January 2014, he was appointed Associate Director of Leaders in Medicine (LIM).

Dr. Yipp’s greatest accomplishment is developing an independent lab.

10.0 Awards and Recognitions

DR. LUC BERTHIAUME
DCCM ROTATING RESIDENT PRECEPTOR OF THE YEAR AWARD

DR. TOM STELFOX
DCCM RESEARCH MENTOR OF THE YEAR AWARD

DR. TOMAS GODINEZ
DCCM DEAN SANDHAM PRECEPTOR OF THE YEAR AWARD

DR. ANDRE FERLAND
LONG TERM EDUCATION CONTRIBUTIONS AWARD
FOR CLINICAL, ADJUNCT AND RESEARCH FACULTY

10.1 UME Teaching Awards

UME Associate Dean's Letter of Excellence Award:

Dr. Luc Berthiaume- Gold Award

Dr. Nazerali-Maitland- Bronze Award

Dr. Dan Niven

Dr. Jason Waechter

10.2 Other Achievements

Dr. Selena Au completed her Masters in Quality Improvement and Patient Safety at the University of Toronto with a focus on "Using Time of Contact (TOC) Goals in a Stepped Wedge Design Trial to Increase Family Satisfaction and Timeliness of Communication in the Intensive Care Unit."

Dr. Amanda Roze Des Ordons completed master's degree in medical education from the University of Dundee. The title is "Teaching and learning communication skills in postgraduate medical education: a mixed-methods needs assessment"

Dr. Paul Campsall & Dr. Dan Zuege released **Spectrum Calgary**: a Calgary-specific antimicrobial stewardship app. The app is now available on the App Store as a free download.

This DCCM app was created here and funded by the Alberta Sepsis Network. The content was developed and reviewed under the direction of ICU physicians and pharmacists in addition to ID and Med Micro physicians.

Dr. Jason Waechter

Co-author of Applied Pharmacology, a 446 page Pharmacology textbook of which he authored 45% and edited 55%. This is a textbook aimed at trainees, with a focus on applied learning strategies.

Founder of www.teachingmedicine.com, a competency based medical education website that is now used at 3 Canadian Medical Schools as mandatory core curriculum, has received over 24,000 visitors in 2014 and currently has 2,400 registered users. Website includes educational content (PDF format) for UME; interactive competency based skill modules including topics on chest x-ray, ECG, CT, ultrasound, and echo; Tools for instructors which includes internal curriculum development.