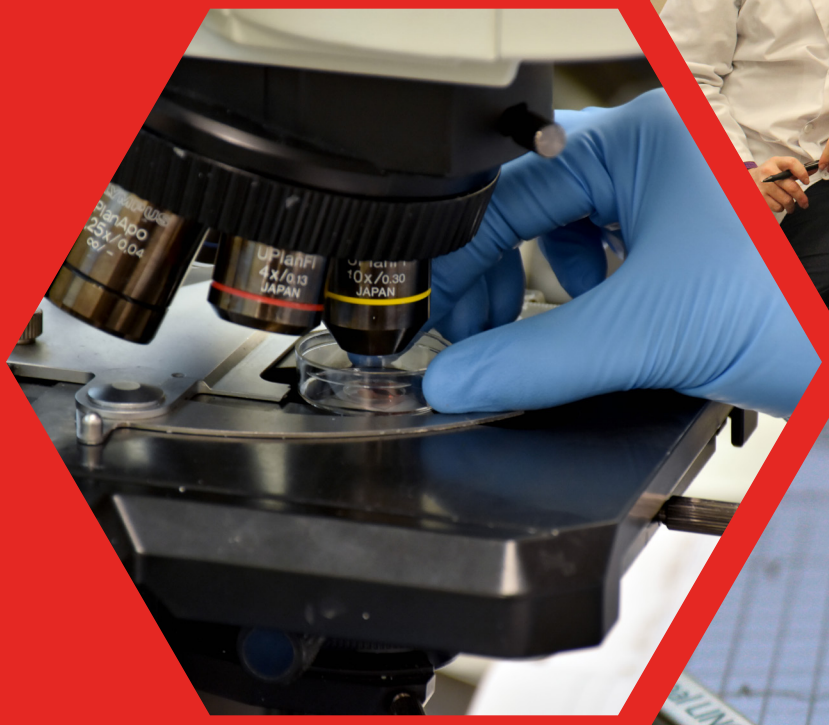
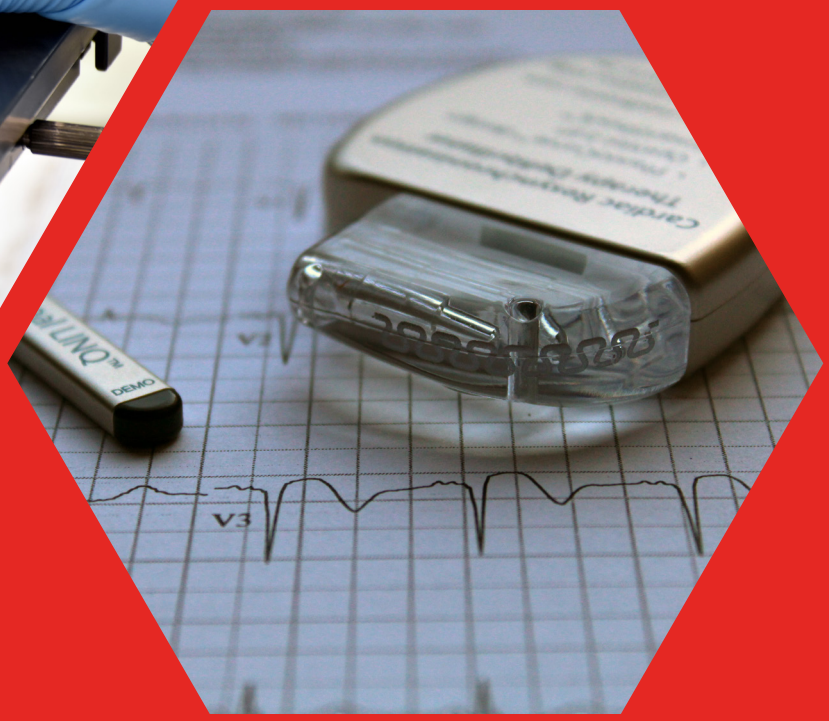
Department of Cardiac Sciences Annual Report

2019-2020





UNIVERSITY OF CALGARY

Alberta Health Services

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Executive Summary

The year 2019-2020 was marked by growth, unexpected challenges and the need for agile adaptation for the Department of Cardiac Sciences. Despite the turbulent year, there were significant successes, most notably the response to the COVID-19 pandemic. The members maintained outstanding quality and access to cardiovascular care despite continual uncertainty due to rapidly evolving public health directives. The pandemic response resulted in an increased use of virtual care platforms and offered new strategies for a more agile and integrated operational team.

Beyond the pandemic, we took significant steps to improve the experience of working in and receiving care at the Department. We established a physician wellness committee to begin addressing the stress of increased workloads in a volatile, uncertain, and sophisticated health-care ecosystem. In 2019-2020, the Department created a formal EDI committee to proactively consider how equity, diversity and inclusion (EDI) impact both patients and professionals and ensure that we are responsive and timely in meeting the unique needs of all of our patients and staff.

Clinical research is a crucial strength of the Department, and 2019-2020 was highly successful in terms of both research impact and productivity. The Department's research productivity, 5.7 publications per full-time equivalent, exceeded average for the Cumming School of Medicine (4.1 publications per full-time equivalent). Likewise, the research impact, as measured through annual citations per full time equivalent, significantly outpaced the CSM average (439 vs. 267).

The Libin Cardiovascular Institute (LCI) membership published more than 500 papers in the last year and received over $30 million in total research revenue. Likewise, education is a cornerstone of the Department. Specialty fellowship programs in electrophysiology, heart failure, interventional cardiology and echocardiology, as well as strong core clinical education programs in cardiology and cardiac surgery, were essential to the overall success of the department.

Formal reviews of the two core training programs were positive, and routine evaluations of this nature ensure a quality experience for learners. More than 260 graduate students, 40 undergraduate students and 37 postdoctoral fellows undertook advanced research training with the Department and Institute in 2019-2020. Our students received numerous scholarships and awards over the year.

This success came about during a year of significant leadership transitions. Dr. Todd Anderson, former Department Head and Director of the LCI, and Caroline Hatcher, long-standing Executive Director of Cardiac Sciences, both migrated to new administrative roles.

In addition to these changes, increased demand for clinical care delivery and the corresponding growth of clinical volumes in an environment of fiscal restraint continued to stretch our capacity. Such growth strains physician workloads, and we have experienced a resultant decrease in staff wellness. Consequently, the Department remains challenged to provide and effectively coordinate the human health resources necessary to safely cover the needs of the Zone. Moving forward we will require strong leadership efforts to reorganize and realign our human health resources to address these challenges.

We will continue to recruit physicians and restructure care models to support clinical care while protecting physician wellness. Opportunities exist for harnessing our rich data platforms and informatics capabilities.

We will invest in our data resources and transform our data into actionable information to improve patient outcomes and drive value (improved quality with less cost) to ensure our legacy of outstanding cardiovascular care is sustainable.

Leadership Personal Message

Paul W.M. Fedak, MD, PhD
Head, Department of Cardiac Sciences
Director, Libin Cardiovascular Institute

It is my privilege to serve as the Head of the Department of Cardiac Sciences and the Director of the Libin Cardiovascular Institute (LCI). The union of these two entities under a single leader ensures that we can provide excellence in the prevention and treatment of cardiovascular diseases, conduct world-class research and scholarship, and train the next generation of leaders in cardiovascular health.

The 2019 – 2020 year has been one of transformation for both the Department and the Institute. We saw the transition of influential leaders: Dr. Todd Anderson (former Department Head and Institute Director) became the Vice Dean of Medicine, Cumming School of Medicine; and the long-standing Executive Director of Cardiac Sciences, Caroline Hatcher, migrated to a new leadership portfolio within Alberta Health Services. Their tireless efforts created a strong foundation for the Department and the Institute, and we will build upon their legacy to expand our ambitious clinical and academic mission. We are incredibly grateful for their collective impact over the past decade.

Under our new leadership, the Department and the LCI invested in a joint strategic plan to crystallize an integrated vision for the future and develop an end-to-end road map for achieving it. Early in the process an International External Advisory Panel performed a review of the Institute and offered valuable insights for growth opportunities.

They called upon us to focus on better harnessing the research and health care modifying potential afforded by improved integration between the Department and the LCI. Subsequent member engagement sessions lead to a refined overarching vision - to lead and transform health care using precision cardiovascular health platforms.

This is well aligned with the Cumming School of Medicine priority focus on precision medicine, and the Alberta Health Services principle of ensuring that Albertans receive the right care, at the right time from the right provider. Our unique organizational structure - a fully integrated multi-disciplinary clinical department and cardiovascular research institute - allows for a comprehensive approach to precision medicine. We intend to leverage our unique capabilities to advance patient-centred, valued-based practices that will enhance patient-reported outcomes, increase access to care, and improve quality while reducing cost. In brief, we hope to promote a “better model for better care.”

Over the past year, the COVID-19 pandemic offered an unexpected challenge. I am very proud of our membership in stepping up and maintaining outstanding care for our patients and contributing to leading edge research in this area. The members showed enormous resiliency under a period of high stress.

Leadership Personal Message ...

The commitment to both exceptional patient care and the academic mission never wavered. The pandemic response was coordinated and nimble, and the Department seized the opportunity to mobilize existing data assets to enhance real-time clinical decision making. It also highlighted how our Department can be agile when needed and rapidly adapt to change. We were successful in promptly and effectively restructuring our cardiovascular services throughout the Zone to ensure a seamless provision of quality cardiac care throughout the pandemic. The lessons learned will help us shape future care models toward improved efficiency, value, access and appropriateness.

We believe that collaboration between the LCI and the Department of Cardiac Sciences offers immense value to the community by using our robust data enterprise to find and address gaps in care, reduce variability and develop the tools necessary to make a broader impact.

Accordingly, our strategy moving forward involves significant investments in clinical data and further integrating our data resources to inform best practices; cultivating a robust approach to sex and gender considerations in both research and clinical care (CV & Me); and reducing demand on the system through innovations in cardiovascular disease prevention and health promotion (P2).

We are in a strong position to respond to the enormous pressures and changes that threaten public health, and our broader health system. The Institute's integrated leadership structure, our outstanding and committed members, our robust enabling platforms, and our resiliency ensure our ability to face ongoing and future challenges and continue to meet expectations as we have done over the past year.

Departmental Structure and Organization

The Department of Cardiac Sciences is the arm of the Libin Cardiovascular Institute (LCI) responsible for the delivery of clinical care. The Institute is a joint entity of Alberta Health Services and the University of Calgary, with a mandate that also includes research and education.

Alberta Health Services is the most extensive integrated provincial health care system in Canada. Care is divided by geographic location, and the Calgary Zone is the largest in Alberta. The Calgary Zone serves more than 1.6 million people within a 40,000-kilometer squared area. This geographic area is over five times the size of Prince Edward Island. The Department of Cardiac Sciences coordinates cardiovascular care delivery for the Calgary Zone, which is largely administered through four acute care hospitals within the city of Calgary.

The Department delivers life-saving cardiovascular procedures, such as open-heart surgery and percutaneous coronary interventions, to population of more than two million residents living in three adjacent zones in Southern Alberta.

The membership of the Department of Cardiac Sciences is primarily composed of cardiologists and cardiac surgeons. We are home for more than 75 cardiologists with a mix of clinical, research, education, and leadership/administrative responsibilities.

We are proud to have a growing team of 12 clinical cardiac surgeons, who also hold a mix of academic responsibilities and clinical interests. While cardiology and cardiac surgery represent the Department's primary sections, we are a fully integrated team providing a cardiovascular service line.

As such, we have affiliated membership with cardiac anesthesia and cardiac intensive care colleagues. Our cardiovascular service line delivery model's integrated nature represents a fundamental value proposition of our organizational leadership.

We deliver clinical services to our health region as ambulatory care, cardiac diagnostics and life-saving interventional procedures such as open-heart surgery, structural heart interventions (TAVI) and primary coronary interventions (PCI) for acute myocardial infarctions and coronary revascularization. The Department provides the majority of cardiovascular care throughout our vast health region. Two community private practice outpatient ambulatory cardiac clinics also play an essential role in delivering outpatient ambulatory and diagnostic care in partnership with our members. Many of these community physicians are also affiliated members of our Department.

The Libin Cardiovascular Institute (LCI) is a joint entity of the University of Calgary and Alberta Health Services. The Institute coordinates all cardiovascular health care, education and research throughout the University of Calgary and the Calgary Zone of Alberta Health Services. The LCI is a wide-ranging program of cardiovascular integration that includes four large University of Calgary faculties, 10 faculty of Medicine departments, four Alberta Health Services clinical departments and five Alberta Health Services hospitals that work as a synergistic team to help all Albertans. This large scale, highly integrated enterprise represents an exciting opportunity to address the changing needs of cardiovascular care within our communities. We believe that lessons learned could be useful for health-care systems around the world.

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Department of Cardiac Sciences

LIBIN CARDIOVASCULAR INSTITUTE

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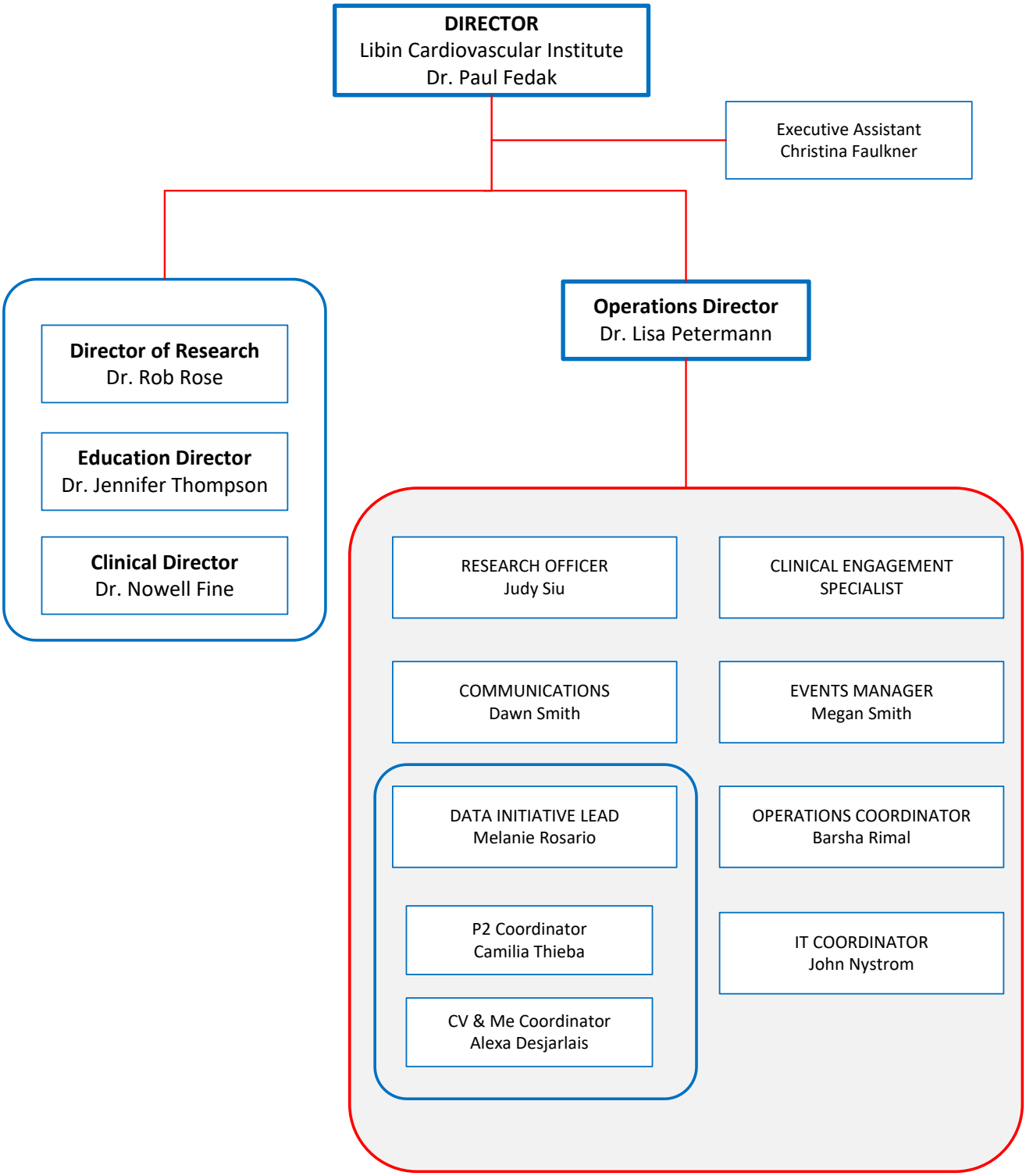

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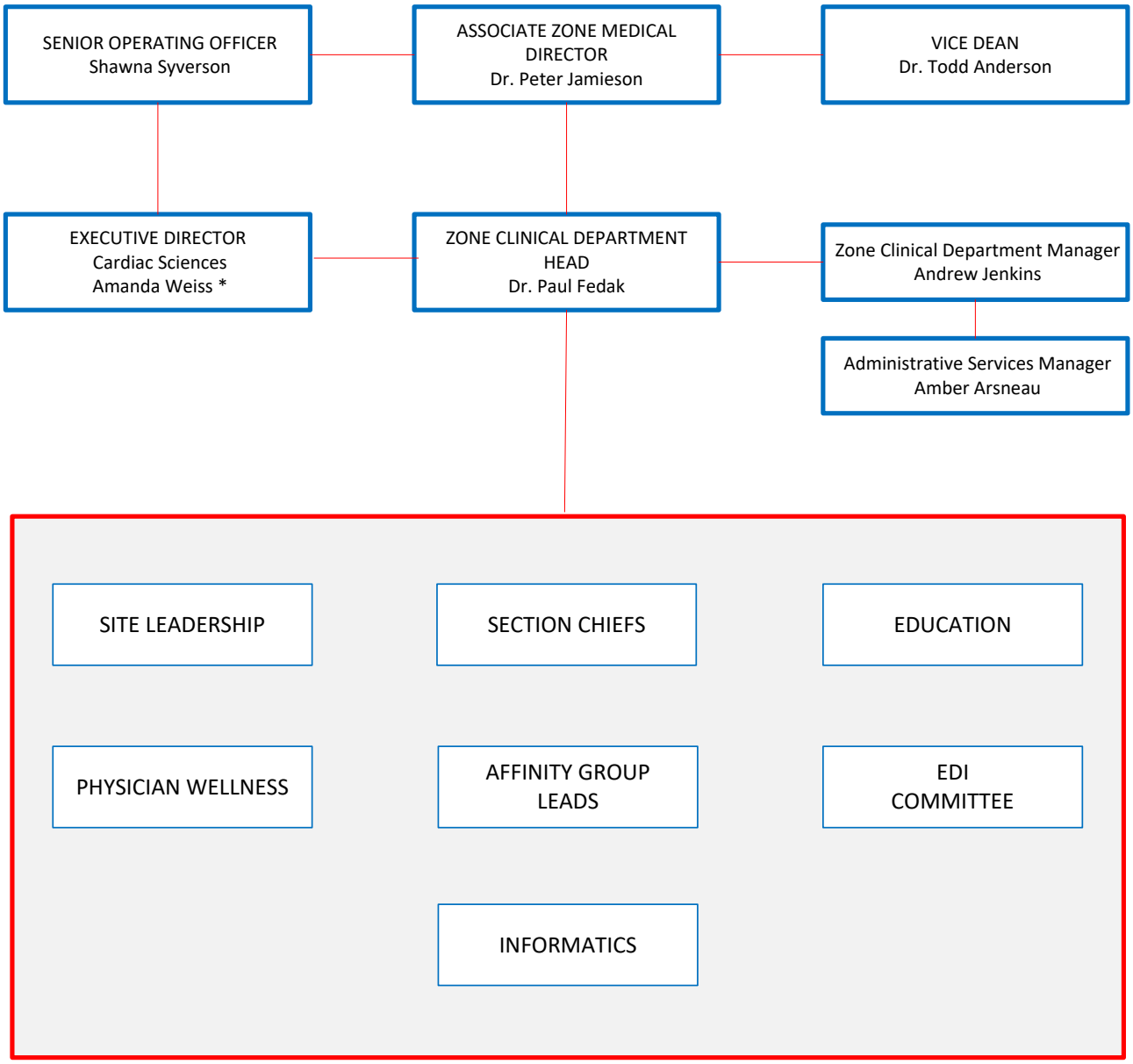
CORE LEADERSHIP
DEPARTMENT OF CARDIAC SCIENCES



*Executive Director Cardiac Sciences
Ms. Caroline Hatcher
2009 - 2020

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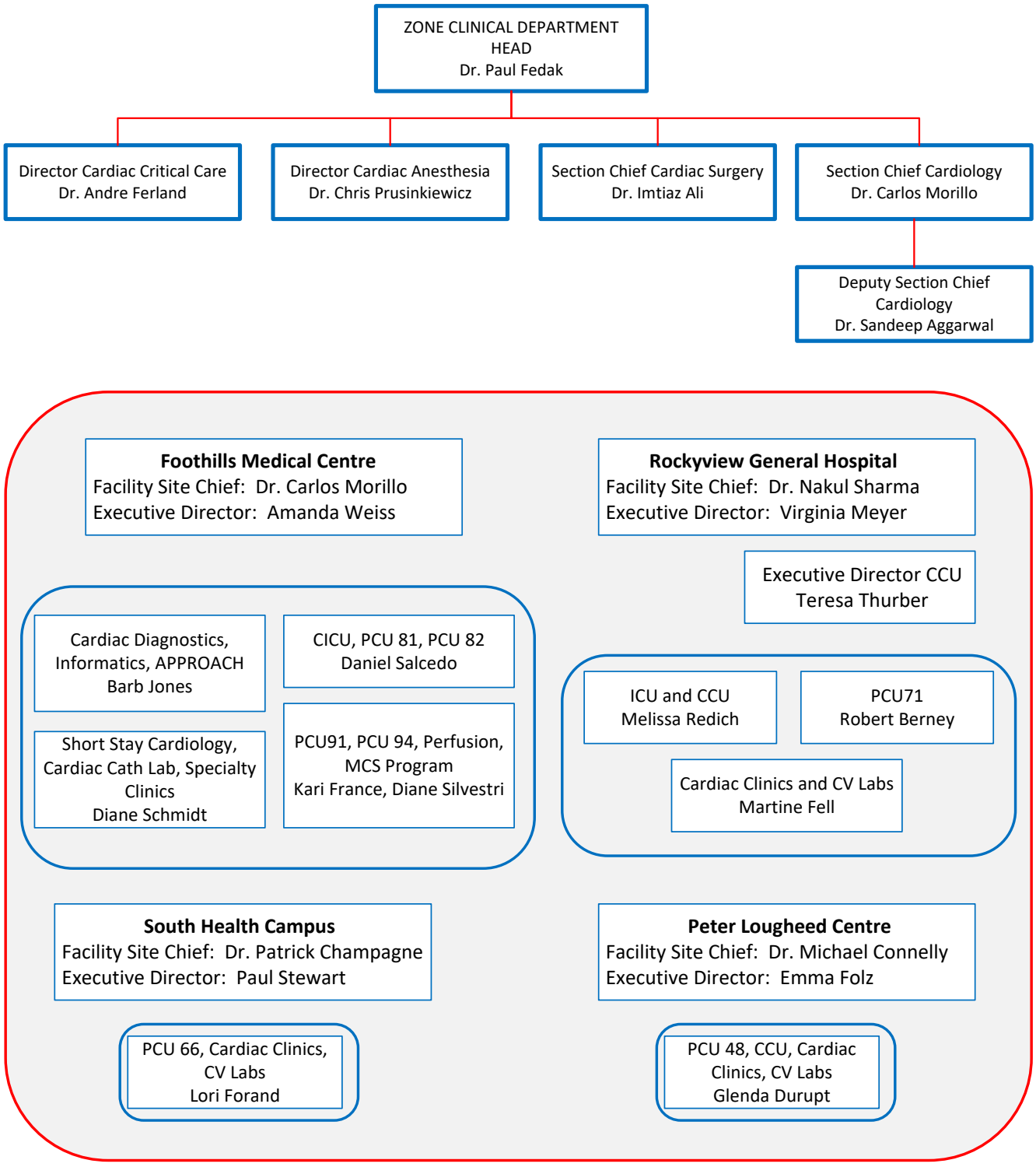
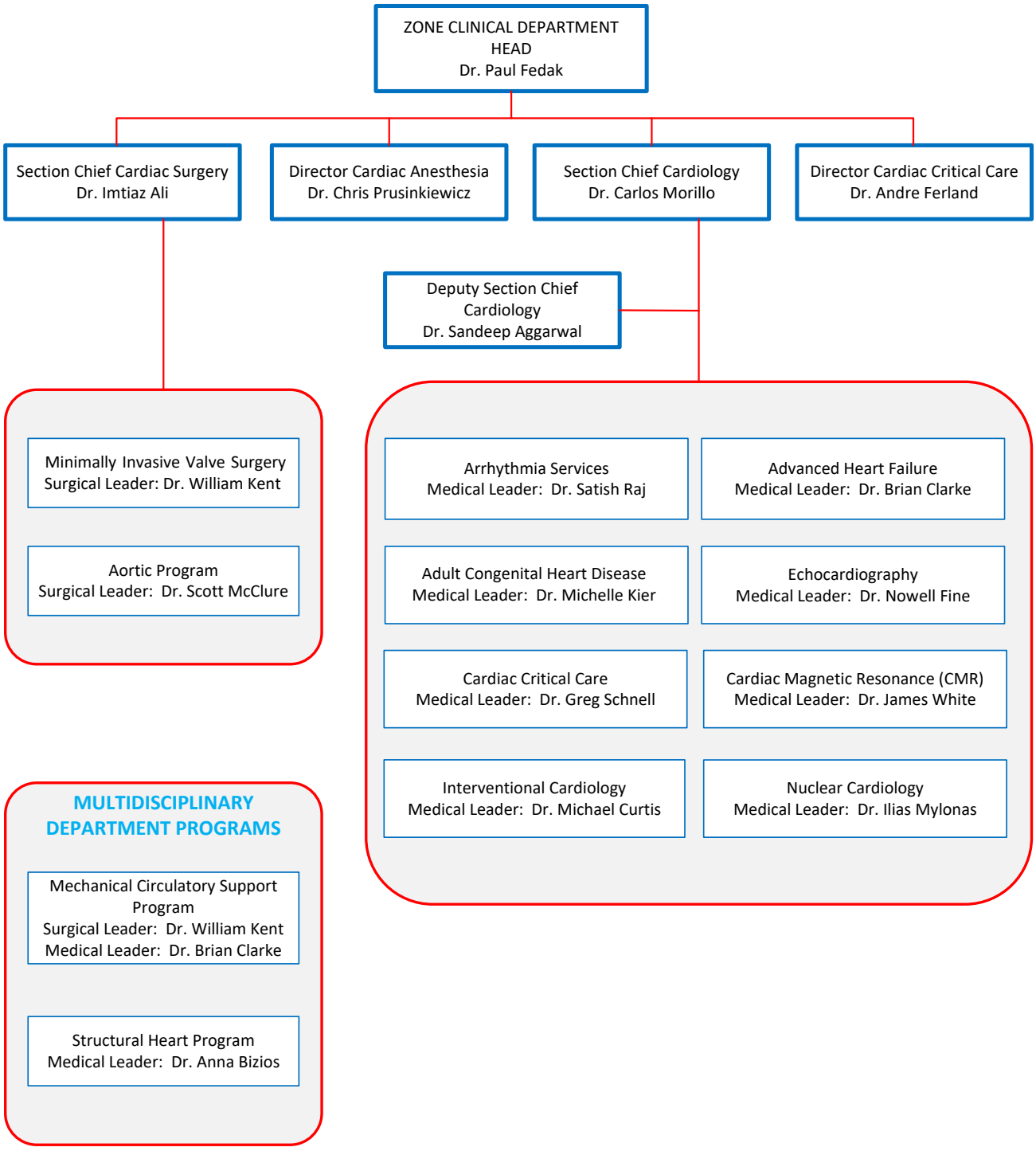
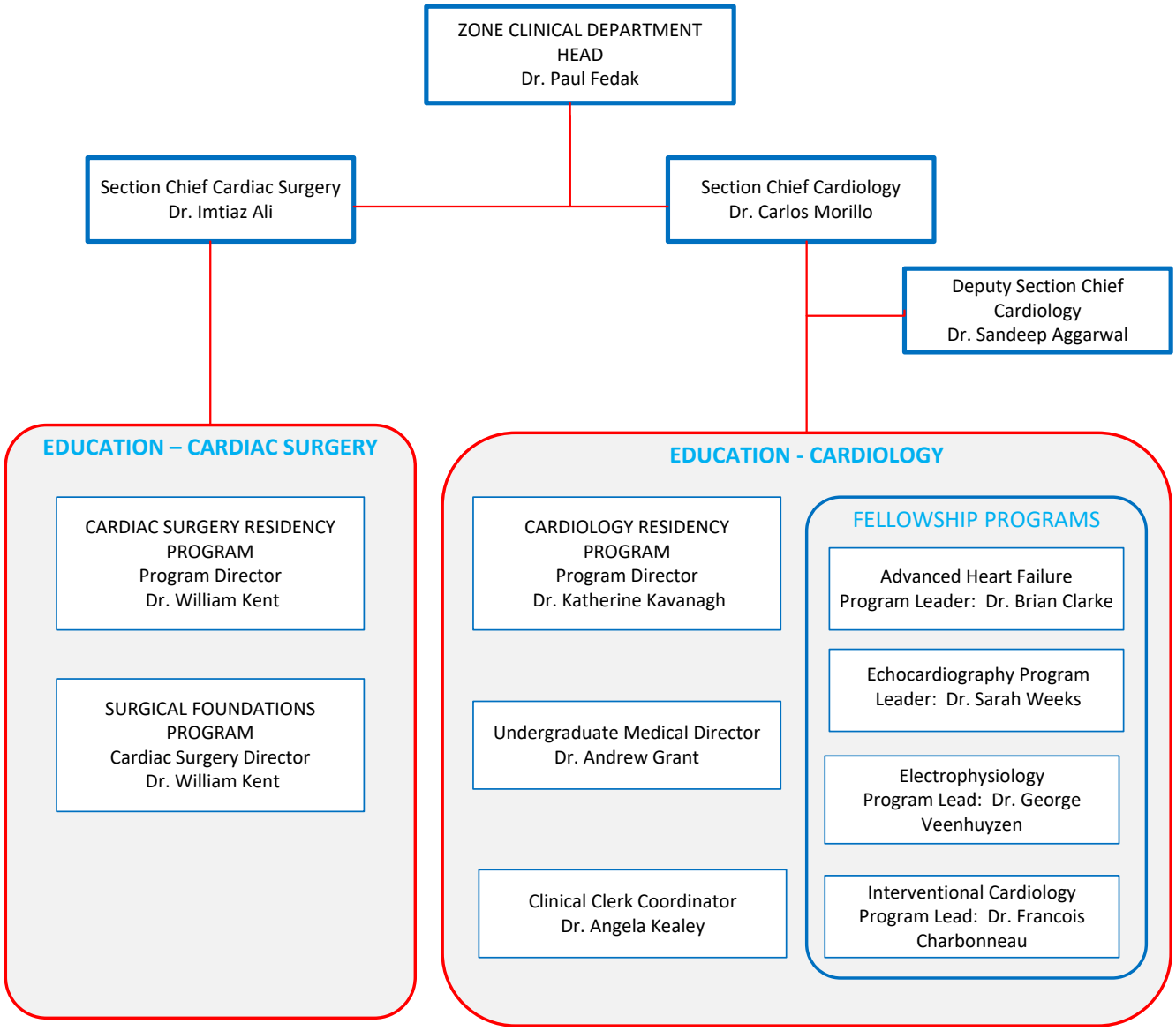
SITE LEADERSHIP
DEPARTMENT OF CARDIAC SCIENCES



PROGRAM LEADERSHIP
DEPARTMENT OF CARDIAC SCIENCES



EDUCATION
DEPARTMENT OF CARDIAC SCIENCES



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UNIVERSITY OF CALGARY
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Department of Cardiac Sciences

LIBIN CARDIOVASCULAR INSTITUTE

Departmental Committees

Department of Cardiac Sciences Physician Wellness Committee

Lead – Vikas Kuriachan

Our newly formed Cardiac Sciences Physician Wellness Committee consists of representatives across all four facets of our department: Chris Prusinkiewicz (Cardiac Anesthesia), Ken Parhar (Cardiac Critical Care), Andrew Maitland (Cardiac Surgery) and Jill Colbert, Grant Peters and Vikas Kuriachan (Cardiology). The committee addresses organization wellness concerns that arise and works with Well Doc Alberta. Also any of the committee member or leadership can be approached to discuss any wellness and burnout issues that arise for any staff physician in the Department of Cardiac Sciences.

If any concerns arise that cannot be satisfactorily addressed internally in our department then our ombudsperson for Wellness is Dr. Jeff Schaeffer, Zone Clinical Section Chief, Section of General Internal Medicine. Our committee ensures that all staff physicians have access to necessary resources such as the Alberta Medical Association Physician and Family Support Program (PFSP) and the Office of Professionalism, Equity and Diversity. The committee is also available to liaise and support trainee wellness and works closely with our clinical training programs.

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Sections and Programs

The Department of Cardiac Sciences has four Sections: cardiology, cardiac surgery, cardiac anesthesiology, and cardiac critical care.

Cardiology

Carlos A. Morillo, MD
Section Chief, Cardiology

The Section of Cardiology provides a unique program of standardized city-wide care and continues to develop innovative care pathways. The section provides both primary care and specialized care in numerous clinics around the city with specialties that include arrhythmias, atrial fibrillation, adult congenital heart disease, aorthopathies, cardio-oncology, cardiac implantable electronic devices, hypertrophic cardiomyopathy, cardiac rehabilitation, heart failure and transplant, syncope and autonomic dysfunction, and cardiology rapid access clinics. Our members also provide primary cardiology care and diagnostic tests that include exercise testing, echocardiography, myocardial perfusion imaging, CT scan, and Cardiac MRI.

Cardiac Surgery

Imtiaz Ali, MD
Section Chief, Cardiac Surgery

Our members perform numerous subspecialty operations in complex aortic surgery, hybrid aortic surgery, minimally-invasive valve surgery, complete arterial revascularization and transcatheter aortic valve surgery (TAVI).

Multidisciplinary Heart Teams are the basis for evidence-based decision-making for the treatment of all cardiac surgical patients. Members have a robust academic medicine approach and embrace quality improvement innovations.

For example, the division recently adopted the Keep your Move in the Tube (KYMITT) concept, replacing the standard sternal precautions approach for post-operative patients with the goal of faster recovery for open-heart surgery patients.

Cardiac Anesthesiology

Vision: To improve the quality of life and longevity of patients with surgical cardiac disease by optimizing perioperative management

Mission: To be an international leader in the enhanced recovery of cardiac surgery patients and to excel in academic cardiac anesthesia.

The Cardiac Anesthesia Group (CAG) consists of nine sub-specialty trained anesthesiologists who hold primary appointments in the Department of Anesthesiology, Perioperative and Pain Medicine (Foothills Medical Centre Section) with joint appointments in the Department of Cardiac Sciences. Group members also hold clinical appointments with the University of Calgary.

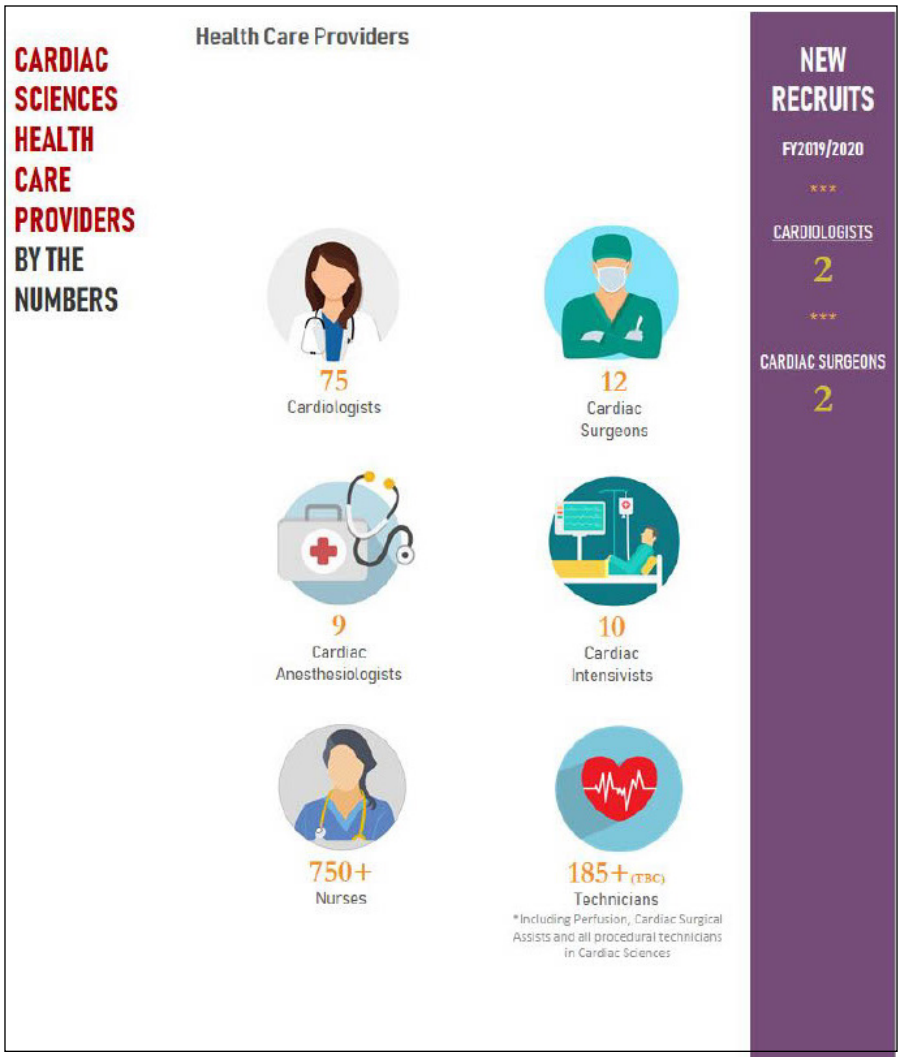
All group members have successfully completed the National Board of Echocardiography Perioperative Examination and have received certification in perioperative transesophageal echocardiography from the College of Physicians and Surgeons of Alberta.

The Director of Cardiac Anesthesia is Dr. Chris Prusinkiewicz and he represents the CAG on both the Zone Anesthesia Executive Committee and the Cardiac Sciences Executive Committee. Multiple group members hold leadership positions including Dr. Duc Ha (FMC Section of Anesthesia Site Chief), Dr. Alex Gregory (Director of Cardiac Anesthesia Research and Director of the Cardiac Anesthesia Fellowship Program), and Dr. Doug Seal (Cardiac Anesthesia Lead for Perioperative Blood Conservation).

The group has recently recruited Dr. Michael Gysel as a new member. Dr. Gysel will join the faculty in 2021, upon completing his fellowship in cardiothoracic anesthesia at Duke University. He will take a leadership role in developing quality assurance and quality improvement programs in cardiac anesthesia.

Cardiac Critical Care

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



The Cardiovascular Intensive Care Unit (CVICU) at the Foothills Medical Centre, is the only CVICU serving Southern Alberta with more than 1,650 cardiac surgery cases in 2019. The CVICU specializes in post-operative open-heart surgery with Coronary Artery Bypass Graft (CABG) and valve repair or replacement making up the majority of cases.

Other post-operative surgeries cared for in the CVICU include complex thoracic aortic surgery, minimally-invasive valve surgery including alternate approaches to femoral-based Transcatheter Aortic Valve Implantation (TAVI), Extracorporeal Life Support (ECLS) for both temporary heart and lung support (VV/VA ECMO), and Ventricular Assist Devices (VAD) which provide short term and more durable heart support.

Membership

The Department of Cardiac Sciences has 75 cardiologists, 12 cardiac surgeons, 9 cardiac anesthesiology, and 10 cardiac critical care physicians.

Caroline Hatcher takes a new leadership role in cancer care, read more about her impact in Cardiac Sciences in Appendix A

Improving the patient experience, read about new and innovative techniques used in the Department in Appendix A

Accomplishments and Highlights

Cardiology

Section Chief - Dr. Carlos Morillo

The Section of Cardiology (SOC) continues to expand its clinical footprint across the city of Calgary and southeastern Alberta. The SOC's seven affinity groups provide support on all the clinical and diagnostic areas of cardiology. With 75 cardiologists the SOC is among the largest in the country and is recognized nationally as a leader in several fields.

The structural interventional cardiology group has continued to expand and has streamlined the TAVI program,which is a joint effort between interventional cardiology and cardiac surgery. More than 125 TAVI's are implanted annually. The TAVI clinic, led by Dr. Anna Bizios, is implementing a streamlined TAVI assessment that includes an evaluation of frailty. Other structural procedures,such as PFO closures, have also continued to grow under the current leadership [Appendix B]

COVID-19 significantly disrupted the daily operational activities of the DOC city-wide. Outpatient clinics and diagnostics services were reduced by almost 90 per cent of our usual volumes. Strong leadership in the Department of Cardiac Sciences and the SOC coordinated a zone-wide response to ensure appropriate cardiac care was available despite these reductions. Many of our processes have been streamlined and adopted at the provincial level. Management of cardiac care was managed across the city through a COVID-19 dashboard.

Important highlights include establishing a Wellness Committee and an Equity, Diversity and Inclusion working group led by Dr. Vikas Kuriachan and Dr. Michelle Keir, respectively.

Advanced Heart Failure

Lead – Dr. Brian Clarke

The heart failure (HF) group and cardiac function clinic sees more than 17,000 patients across the city and has standardized HF pathways in Calgary, reducing hospital admissions and improving care.

The recruitment of former trainee Dr. Rob Miller following fellowship training in advanced heart failure & cardiac transplantation at Stanford University and multi-modality/nuclear imaging at UCLA is an asset to our program. Dr. Deb Isaac returned from sabbatical this spring. With the sudden upcoming departure of Dr. Andrew Grant, leaves an urgency for recruitment for the AHF program.

Our Calgary members have significant roles in the Canadian Cardiovascular Society including Dr. Nowell Fine, the co-chair of the CCS/CHFS Joint Position Statement on the Evaluation and Management of Patients with Cardiac Amyloidosis; Dr. Brian Clarke, the co-chair of the CCS/CCTN Joint Position Statement on Heart Transplantation: Patient Eligibility, Selection, and Post-Transplantation Care; Dr. Jonathan Howlett, CCS Primary Panel for Heart Failure Guidelines; and Dr. Kristin Lyons,CCS Guidelines committee member.

Highlights

- Successful Launch of Invasive Heart Failure Monitoring Program with Wireless Pulmonary Artery Pressure monitoring technology (second in Canada).
- Celebration of patient success five years on LVAD therapy Heart Failure Pathway for PCNs
- Active QI (Quality Improvement) and Clinical Research Program
- AHF members had more than 15 publications for AHF members

Awards

- Dr. Deb Isaac: University of Calgary Internationalization Achievement Award 2019
- Dr. Deb Isaac: Alberta Medical Association Award for Compassionate Service 2019
- Dr. Andrew Grant: Department of Cardiac Sciences Clinician of the Year 2019
- Dr. Andrew Grant: Cardiology Training Program Preceptor of the Year 2019
- Dr. Jonathan Howlett: Honorary Heart Failure society of America Fellowship 2019

Arrhythmias & Autonomics

Lead – Dr. Satish Raj

CIED Medical Lead – Dr. Vikas Kuriachan

Electrophysiology Medical Lead – Dr. Stephen Wilton

The arrhythmia group is among the largest academic groups in the country with 14 active members. The group provides highly specialized services for the region and on-site clinics (AF, CIED, Arrhythmia Syncope) at South Health Campus (SHC) and Foothills Medical Centre (FMC).

This year, Dr. Erkan Ilhan was recruited as a clinical electrophysiologist. Dr. Ilhan completed his Cardiac Electrophysiology Fellowship with our group, but unfortunately, there was not a position available at the end of his training. We are excited that he has now joined us. He expands our ability to see patients in a timely manner.

Highlights

- Our centre was the first in Canada to perform a left bundle branch pacemaker lead implant.
- Our centre was the first in Western Canada to perform a fluoroscopy-free complex atrial fibrillation ablation.
- Same-day discharge for most device and ablation procedures at FMC has been implemented seamlessly and has become the standard operating process. This decreases stress on our inpatient hospital beds and allows patients to get back to their families sooner. We have experienced no significant safety concerns in doing this. Reducing the demand for in-patient beds has resulted in significant savings to the health-care system.

The city-wide arrhythmia clinic underwent a quality improvement (QI) process to improve and reduce wait lists for clinic appointments. This led to a city-wide central triage referral process. The project is ongoing and full implementation is expected by the end of 2020.

COVID-19 put significant stress on our health-care system. However, due to a highly integrated level of cooperation between different groups, we were able to temporarily move most of our CIED implantation to the Cath/EP laboratories to ensure our inpatient device patients still received their devices in a timely manner, thus avoiding an excess of complications and prolonged hospital stays.

National Position Statements: Arrhythmia group members chaired or co-chaired Canadian Cardiovascular Society 2019 Positions Statements on Postural Tachycardia Syndrome (POTS) and on Reconciling Multiple Syncope Guidelines (ESC/AHA/ACC/HRS).

Awards

The Health Quality Council of Alberta Patient Experience Award Recipients 2020 was awarded to a group led by Dr. Derek Exner and Lucy Reyes, RN. The Performance Evaluation and Rhythm Follow-up Optimization through Remote Monitoring (PERFORM) program was funded by an AIHS PRIHS grant. It explored the appropriate implantation of implantable defibrillators in Alberta, and the expansion of remote CIED monitoring in Alberta to deliver care more appropriately, in a timely manner, and in the patient's home or community whenever possible.

Nuclear

Lead – Dr. Ilias Mylonas

The nuclear cardiology/CT group has continued to expand its clinical services across the city and provides both nuclear and CT testing at the FMC and SHC sites. Over 1,900 nuclear tests and more than 700 cardiac CTs are performed on a yearly basis. [Appendix B]

Dr. Mylonas has decided to step down as medical lead of the Nuclear Cardiology department after seven years of hard work and dedicated leadership. During his tenure, Dr. Mylonas continued the development of the nuclear cardiology departments at both sites and endeavored to ensure uniform, comprehensive reporting with the current APPROACH software.

Highlights

- Dr. Robert Miller recently joined our team and took over as affinity group leader in June 2020
- Standardized reporting has been implemented and will be used with Connect Care across the city.
- Protocols for imaging with technetium pyrophosphate to help diagnose patients with transthyretin cardiac amyloidosis have been implemented.
- Upgraded SPECT camera at FMC to the latest generation solid-state camera system.

Adult Congenital Heart Disease (ACHD)

Lead – Dr. Michelle Kier

The Adult Congenital Heart Disease group has had an excellent and productive year. Our biggest achievement thus far is the recruitment of Dr. Nita Guron to our team to help care for our burgeoning and complex patient population. Other accomplishments this year include the creation of a multidisciplinary complex ACHD clinic—with Dr. Stephen Reynolds at the helm, Dr. Meredith Borman from Hepatology and Dr. Doug Helmersen from Respirology—to address the multi-organ disease that results from complex congenital heart disease. We have also significantly expanded our research program, led by Dr. Michelle Keir, and Calgary is now enrolling patients in national and international registries. We are creating a participatory action research network, involving patient partners at all stages of the research process, and are grateful to our patient advocates who have participated in focus groups this year.

Cardiac Magnetic Resonance (CMR)

Lead – Dr. James White

The CMR group remains one of the most active and productive groups nationwide. With over 4,000 CMRs a year, the group has one of the world's largest databases in several cardiac pathologies. The CMR group has multiple areas of interest and has develop a highly specialized system including AI and ML algorithms for the prediction of sudden cardiac death. The CIROC registry has a unique large database of over 10,000 patients with cardiovascular disease that is undergoing intense research.

Highlights

High impact publications

- More than 25 publications over past 18 months
- Example publication: MINICOR Registry Inaugural publication in "Circulation Cardiovascular Imaging" (April 2020)
- Multi-national registry led by Dr. James White focused on dilated cardiomyopathy
- 1,762 patients with DCM - LGE predictive of sudden cardiac death and mortality

CIROC Registry

- Registry turns five years old and tracks more than 10,000 patients with cardiovascular disease (>25,000 patient years of follow-up)
- Provides access to CMR-based phenotypes matched to administrative data from across province of Alberta (labs, ECG, pharmacy, hospitalization & procedural data, vital statistics)

- Pre-defined sub-cohorts currently under study: Cardio-oncology, HCM, DCM, ICM / stress perfusion, PV ablation (AFIB), amyloid

Personalized Diagnostic Program (PDP)

- Data Science Program in Risk Prediction Modelling
- Lead: Dr. James White
- Co-PI / Supervisors: Dr. Joon Lee, Dr. Russ Greiner, Dr. Marina Gavrilova
- Students: two post-doctoral fellows, two PhD , four masters
- Focus: Machine learning / AI-based risk prediction of heart failure admission / arrhythmia (SCD and AFIB) / major cardiovascular events

4D Flow Research Program

- Lead: Dr. Julio Garcia
- Students: one post-doctoral fellow, one PhD , two masters
- Over 1,000 4D Flow MRI studies now accrued (second largest repository globally)
- Numerous cohort studies evaluating bicuspid aortic valve disease, mitral valve disease, congenital heart disease, atrial fibrillation

CMR Quality Assurance Program Update

- Completion of n=100 Healthy Volunteer Study at the Stephenson Centre to establish normal healthy ranges for all Cardiac MRI-based measurements, inclusive of locally developed 3D Strain software platform
- Upgrade to Cardiac MRI unit workflow / reporting architectures (June 2020):
- Greater standardization / reproducibility of CMR reporting
- Updated references ranges (see above) applied to reporting
- Expansion of appropriate use criteria / wait-time tracking
- More advanced analytics capacity

Understanding Heart Failure, read about new and innovative techniques used in the Department in Appendix A

Echocardiography

Lead – Dr. Nowell Fine

The Echo group provides regional coverage with more than 20,000 tests performed city-wide in 2019-2020. Unified reporting across the city has been implemented in the past years and has been consolidated. Development of stress echo capabilities and the purchase of new Philips Epic echo machines at Peter Lougheed Centre (PLC) has improved our capacity to provide these tests across the city.

Section Recruitment includes Dr. Jacksy Zhao who joined the Echo Lab as a staff echocardiologist and HCM specialist. Dr. Nita Guron also joined the Echo Lab as a staff echocardiologist and adult congenital heart disease specialist.

Dr. Jeff Shaw continues his echocardiography clinical fellowship with plans to join the Echo Lab as staff upon completion.

Foothills Interventional Cardiology Service (FICS)

Lead - Dr. Michael Curtis

The FICS affinity group is among the top three centres in Canada according to the 2019 CIHI report, with one of the lowest STEMI mortalities in the country. With over 9,500 catheter lab procedures a year (>2,500 PCIs) the FICS group remains a leader in the region and nationwide.

There has been a transition of leadership with Dr. Goodhart, who assumed the directorship of the FICS group in 2015, stepping down and Dr. Curtis taking over leadership in February 2020. Dr. Goodhart implemented many innovations during his tenure, including the Cardiac Navigation that has recently been streamlined for cardiology referrals. Dr. Goodhart and Dr. Traboulsi were instrumental in developing the advanced CTO angioplasty program and advanced physiology testing in coronary circulation among many other contributions. The FICS group has been actively interviewing candidates and intends to hire Dr. Sachedina who has trained in interventional cardiology in Toronto and is completing his training in advanced interventional heart failure in Houston. Dr. Sachedina will join the DOC in Sept. 1, 2020.

Cardiac Surgery

Section Chief – Dr. Imtiaz Ali

Vision: To improve the quality of life of patients suffering from the burden of cardiac surgical disorders.

Mission: To be an international leader in cardiac surgical patient care, education, and research.

The Section of Cardiac Surgery was comprised of 11 cardiac surgeons for most of the 2019 – 2020 fiscal year. Three members have GFT appointments at the University of Calgary and the remainder have clinical appointments.

Dr. Andrew Maitland returned from a year sabbatical in several centres in Europe. He has assumed a mentorship role in the Section with his learnings in MIVS surgery and complex valve surgery adding an important component to our section.

Dr. Muhammad Ahsan who had been working as a locum surgeon within our section since January 2019 was recruited to a staff surgeon position in September. Dr. Ahsan came to us from Toronto and possesses niche expertise in complex aortic surgery. He will work closely with Dr. Scott McClure, the lead of the Aortic Program, to provide state-of- the-art surgical care for patients with aortic pathology.

Dr. McClure, an experienced aortic surgeon, made huge gains in collaborating with the Section of Vascular Surgery to ensure those patients get the full range of treatments available. This includes the start of a new collaborative Aortic Clinic at South Health Campus.

This spring also saw the recruitment of Dr. Corey Adams to the Section, bringing the total number or surgeons to 12. Dr. Adams is experienced in transcatheter valves and minimally invasive valve surgery. Dr. Adams will add immense expertise to the already existing MIVS Program.

Members continued to lead projects and innovations in clinical care, research, and education. Multidisciplinary heart teams continued to function as the basis for evidence-based decision making for the treatment of all cardiac surgical patients. The Royal College-approved six-year Residency Training Program (RTP), led by Dr. William Kent, continued to attract the best and brightest individuals.

The program has maintained a 100 per cent examination success rate since its inception. Excellence in education is highly valued in our Section. Our RTP is highly regarded amongst applicants across the country and known to provide first-rate,hands-on training from an early stage. Thus far, all trainees have passed their Royal College Certification exam.

All members contribute to the training of our residents and there is protected time every week for formal teaching. Dr. Teresa Kieser also leads several international teaching courses through the European Association of Cardiothoracic Surgeons. In addition, members regularly contribute to the teaching of medical students and residents rotating on cardiac surgery from other specialties such as cardiology, vascular surgery, and thoracic surgery.

The Section of Cardiac Surgery continued its growth in cardiac surgical case volumes in fiscal 2019 – 2020. The Section performed a total of 1,771 cases including 126 trans-catheter aortic valve implantation (TAVI) cases that were done in conjunction with our cardiologists as part of the Structural Heart Team. This represents an increase of 70 per cent relative to fiscal year 2010– 2011 when surgical volumes began to increase. Isolated CABG procedures (976) continue to be the most common surgery (57 per cent). [Appendix B]

Operating room utilization rates were a respectful 92 per cent and 13 per cent of our cases were emergency cases. Sub-specialty operations in complex aortic surgery, hybrid aortic surgery, minimally invasive valve surgery, complete arterial coronary revascularization, and (TAVI) continued to grow in number. The right anterior mini-thoracotomy approach to aortic valve replacement surgery led by Dr. Kent is established as a viable alternative to patients at high risk of a standard sternotomy that do not qualify for a TAVI.

A primary goal is to expand the research profile of our Section with respect to both translational and clinical outcomes research. Dr. Fedak's lab continued to study the nuances of bicuspid aortic valve pathology with grant support from the National Institutes of Health (NIH). Drs. McClure, Kent, and Holloway,as well as others, continue to work on clinical outcomes projects relative to their areas of clinical expertise. Currently we continue to query the APPROACH data base for the outcomes studies and will look to other venues such as the STS data base in the future.

Lastly, Dr. Paul Fedak, a long-time section member, experienced surgeon, and renowned researcher, was appointed as the Director of the Libin Cardiovascular Institute and Department Head of the Department of Cardiac Sciences. The Section is very proud of Dr. Fedak.

Highlights

- New Aortic Clinic at South Health Campus. This clinic is novel in the sense that it is multi-disciplinary and brings together the expertise of our vascular surgery colleagues from the Peter Lougheed Centre (PLC) and our interventional radiology colleagues from both the Foothills Medical Centre and PLC sites.

- Innovation in post-operative care occurred with the adoption of the Keep Your Move In the Tube (KYMITT) concept. Initial study of this concept revealed that it is safe and comparable to the older sternal precautions approach for post-sternotomy care.

- A formal and "proper" surgical "MAZE" program was initiated by Dr. Ganesh Shanmugam in collaboration with our electrophysiology (EP) colleagues continued to grow. Patients are highly selected pre-operatively and receive a formal MAZE IV procedure that ablates atrial fibrillation (AF) and leaves both atria capable of being activated during normal sinus rhythm. Post-operative follow-up is done in conjunction with EP Cardiology to document and maintain sinus rhythm with appropriate pharmacological adjuncts.

- Dr. William Kent led a team of Department of Cardiac Sciences and Libin Cardiovascular Institute members including Dr. Ken Parhar, Dr. Duc Ha, and Steve Menzies, who travelled to Gdańsk, Poland to teach advanced cardiac surgery techniques and minimally invasive surgical skills to heart surgery teams. Read more about this exciting effort: https://www.ucalgary.ca/news/calgary-gdansk-team-teaches-innovative-heart-surgery-techniques-poland

Awards

- Dr. William Kent: 2019 – 2020 PGME Outstanding Commitment to Residency Education
- Dr. William Kent: 2019 – 2020 Cardiac Surgery Preceptor of the Year award
- Dr. Daniel Holloway: 2019 Peak Scholar for inventing and patenting a simulator to help cardiac surgery residents practice the technically challenging task of suturing the heart during open heart surgery.

Innovation and Education – read about how a cardiac surgeon invented a simulator to teach trainees how to suture the heart in Appendix A

New recruit saves man's life - twice, read the details in Appendix A

Minimally Invasive Valve Surgery (MIVS)

Lead – Dr. William Kent

The MIVS program has expanded significantly over the last year. Established in 2012 by Dr. Andrew Maitland and joined by Drs. Dan Holloway, Corey Adams, and William Kent, more patients in the Calgary region are now treated with innovative, leading-edge surgical techniques to repair and replace diseased valves.

As the program has grown, minimally invasive aortic valve replacement and mitral valve repair is now offered to most valve patients. The minimally invasive technique, which uses sternum-sparing small incisions and thoracoscopic instrumentation, is also used to repair atrial septal defects. With these techniques, patients gain the benefits of less pain, less blood transfusion, shorter hospital stay, and a quicker return to normal activity.

Recent advancements in valve technology have led to the development of rapid deployment and suture-less bioprosthetic valves, which further facilitate minimally invasive surgery and provide patients the benefit of an aortic valve replacement through a right anterior mini-thoracotomy rather than conventional sternotomy.

The establishment of a dedicated Valve Clinic has also been a significant achievement for the group. Based at the South Health Campus with the support of cardiologist Dr. Jill Colbert and nurse clinician Deborah Lundburg, this multi-disciplinary clinic follows valve patients with echocardiographic and clinical follow-up to minimize the risk of valve-related complications.

The clinic also offers an opportunity for research endeavors through participation in valve registries and clinical outcome studies.

Highlights

Two publications including a paper on the importance of qualitative patient-centered metrics to guide innovation.

Aortic Program

Lead – Dr. Scott McClure

The Calgary Aortic Program is a broad, multidisciplinary group of clinicians and researche rs representing several specialties invested in aortic disease management. Cardiac surgery, cardiology, interventional radiology, vascular surgery, anesthesia, intensive care, genetics, pathology, rheumatology, biomedical engineering, and others all collaboratively interconnected and shares a common goal to achieve excellence with respect thoracic aortic disease.

It is an exciting time for the Aortic Program. To facilitate a more unified and standardized approach to the management of complex aortic disease in Calgary and Southern Alberta, the “Aortic Team” concept has come to fruition. With the recent opening of the multidisciplinary Calgary aortic clinic at South Health Campus, clinicians from the various specialties now convene and assess aortic patients together in a collaborative space to determine best treatment with a team approach to care. Our vision is to develop a city-wide aortic surgery team managing all such complex patients.

Multidisciplinary Departmental Programs

Mechanical Circulatory Support

Surgical Lead - Dr. William Kent
Medical Lead - Dr. Brian Clarke

Patients with advanced heart failure represent a growing population and the Mechanical Circulatory Support Program (MCSP), led by cardiologist Dr. Brian Clarke and cardiac surgeon Dr. William Kent, provides both medical and surgical therapy for these critically ill patients. Using implantable pumps for temporary and long-term support of the failing heart, patients can be stabilized until they recover cardiac function or receive a heart transplant.

The program has focused on minimally invasive strategies to reduce the risk of surgical intervention and this year Foothills Medical Centre became the first centre in Canada to implant the HeartMate 3 left ventricular assist device (LVAD) with a bilateral mini-thoracotomy approach. The HeartMate 3, together with the HeartWare HVAD, are the latest generation of durable LVADs, which allow patients with end-stage heart failure to continue to live active lives for many years until a heart transplant becomes available. The program also uses ECMO and Impella devices to rescue patients who present acutely in cardiogenic shock. The Centri-Mag pump is also used for acutely ill patients who require more prolonged support before a durable LVAD can be implanted or a donor heart can be procured.

The MCSP applies a team-based multi-disciplinary approach to the care of heart failure patients. Dr. Daniel Holloway recently joined the group from his fellowship at Northwestern University in Chicago. He is a cardiac surgeon specializing in minimally invasive implantation of LVADs. The group is presently involved in many clinical trials and researcher and Departmental Head, Dr. Paul Fedak, directs a translational research laboratory with a goal to develop innovative therapies, such as epicardial infarct repair, which may eventually restore function to the myocardium of heart failure patients.

Transcatheter Aortic Valve Implantation (TAVI)

Lead – Dr. Anna Bizios

The TAVI program continues to provide high quality care and life-saving aortic valves for Albertans who are unable or less suitable to undergo open heart surgery. The program continues to expand and streamline the joint interventional cardiology and cardiac surgery program that includes evaluation of frailty. We are currently performing 125 TAVI per year with most cases being performed in the catheter lab with percutaneous femoral techniques. Outcomes remain excellent and many patients can be discharged from the hospital the day after surgery.

Alternate access TAVI through the left axillary artery in the shoulder or through minimally invasive surgical techniques directly into the aorta are being performed with increased frequency. These techniques enable TAVI for patients who may not have been able to receive a new valve prior to these new technologies and techniques.

The TAVI team has benefited with the addition of another cardiac surgeon: Dr Corey Adams, who brings experience with trans-femoral and alternate access TAVI.

The COVID-19 pandemic has created many challenges, but the TAVI program has been able to maintain the same high volumes and outcomes for the patients we serve.

Living with the LVAD: A patient's perspective, read more about it in Appendix A

Cardiac Anesthesia

Director - Dr. Chris Prusinkiewicz

Clinical Practice

CAG members work in a multidisciplinary environment to provide anesthetic care for a complex variety of cases in an increasingly" "elderly patient population. Anesthesia services are provided for open-heart surgery, off-pump coronary artery bypass grafting, aortic reconstruction including deep hypothermic circulatory arrest, mechanical assist device support, total endovascular aortic repair, minimally invasive valve surgery, and complex pacemaker/ implantable defibrillator lead extractions.

Outside the cardiac operating rooms, group members provide anesthetics in the cardiac catheterization laboratories for both electrophysiology procedures and for percutaneous structural heart procedures such as transcatheter aortic valve implantations (TAVI), atrial septal defect closures, perivalvular leak closures, valvuloplasties, and left atrial occlusion device insertions. Upon request, members also provide care to patients with complex cardiac disease undergoing non-cardiac surgery. Outpatients awaiting heart surgery are reviewed by cardiac anesthesiologists at the weekly pre- admission clinic, while inpatients receive preoperative assessments by cardiac anesthesiologists on an ongoing basis.

Demand for cardiac anesthesia services continues to be high. In recent years, the CAG has expanded coverage to meet the demands of the cardiac surgical uplift and an increased number of both percutaneous structural heart procedures and complex electrophysiology procedures. In the spring of 2020, cardiac surgical volumes and cardiology procedural case volumes were reduced due to the COVID-19 pandemic.

Traditional CAG assignments were temporarily reduced to approximately 75 per cent of the usual workload. During this time, CAG members contributed to the COVID-19 effort in multiple ways including serving on the on the ECMO team, a multi-disciplinary team composed of surgeons, intensivists, anesthesiologists, nurses, perfusionists, and respiratory therapists, which inserted and managed extra-corporeal membrane oxygenation machines in patients failing traditional ICU ventilator therapy CAG members also participated in numerous COVID-19 clinical simulations and were available for the anesthesia airway team.

The COVID-19 response required flexibility even in traditional CAG assignments, such as a change in the pre-operative assessment clinic from an in-person model to a phone-based model. In the coming months, the CAG anticipates increasing its clinical commitment further, in response to the planned increase in cardiac surgical volumes to allow for "catch-up" from the COVID-19 operating room slow-down. Although the COVID-19 pandemic was and continues to be a challenging time, the CAG has been most impressed by the way in which health-care providers from many different fields have collaborated for the common cause.

Education

CAG members strive to provide the highest standard of clinical education and numerous members have been recipients of teaching accolades over the last year, including the Excellence in Medical Education Award received by Drs. Alex Gregory, Chris Noss, and Chris Prusinkiewicz. On an international level, Dr. Duc Ha represented cardiac anesthesia as part of a multi-disciplinary delegation that travelled to a large hospital in Gdansk, Poland, to provide education on minimally invasive cardiac surgery.

Anesthesia residents complete two blocks of cardiac anesthesia in their fourth year. Off-service trainees rotating with the CAG include fellows from critical care medicine, cardiology, and perioperative ultrasound, and , residents from cardiac surgery. The group would like to acknowledge Dr. Nicole Webb, who has taken over the role of cardiac anesthesia resident coordinator this year from Dr. Prusinkiewicz.

CAG members provide didactic teaching for the anesthesia residency cardiovascular core program on a bi-annual basis. Computer-based learning is available through the TeachingMedicine.com website, which is designed by group member, Dr. Jason Waechter, and includes modules on transthoracic and transesophageal echocardiography.

Research

The CAG has an active research program with numerous publications by multiple members. Highlights include recent publications by Dr. Gregory in "JAMA Surgery," "Annals of Thoracic Surgery," "Journal of Cardiothoracic & Vascular Anesthesia," and the "European Journal of Cardio-Thoracic Surgery" (among others).

Regarding ongoing research, we have successfully completed our participation in the multi-centre CAMRA-1 study (Site Lead Investigator: Dr. A Gregory; Study Principle Investigator: Dr. V. Chan, University of Ottawa Heart Institute) and the manuscript has been submitted for publication in "Circulation". CAMRA-1 evaluated the difference in trans-mitral pressure gradients during exercise in patients who received mitral valve repair surgery using one of two different repair techniques.

Following a postponement in research due to the COVID-19 pandemic, we have resumed recruitment for our active projects: NETWON-CABG (RCT of PCSK9-inhibitor vs placebo on CABG vein graft patency at two years); TITAN- SvS (a trial of early surgery versus surveillance in patients with intermediate risk aortic aneurysms);and a pilot study on the impact of CPB on platelet function using a novel platelet procoagulant membrane dynamics technique (in collaboration with Dr. E. Agbani).

Recruitment is also ongoing for the PREPARE Study (Site Lead Investigator: Dr. R. Chun; Study Principle Investigator: Dr. D McIsaac, Ottawa Hospital Research Institute) which is a multi-centre randomized trial of frailty-focused preoperative exercise to decrease postoperative complication rates and disability scores.

Dr. Seal is the project holder of the Foothills Medical Centre Staff Anesthesia Research Fund. The fund was established through the generosity of Dr. Tim Tang, a former CAG member, and was developed to promote research in the areas of cardiac anesthesia, patient outcomes, and quality improvement.

Enhanced Recovery After Cardiac Surgery

The CAG is on the forefront of the design and implementation of an Enhanced Recovery After Cardiac Surgery (ERAS) program. Enhanced recovery after surgery programs have been developed in other fields to improve patient comfort and outcomes and to decrease the length of hospital stay. ERAS implementation involves a multidisciplinary team of health-care professionals including anesthesiologists, surgeons, intensivists, and nurses. The ERAS pathway was successfully launched in Calgary in the summer of 2019, and collaboration is ongoing with the Cardiac Anesthesia Section of the Mazankowski Heart Institute to establish an Alberta-wide ERAS program.

Perioperative Blood Conservation Initiative

Despite steady improvements over the last decade, cardiac surgery continues to have a high rate of blood transfusion compared to other types of procedures. Preoperative anemia significantly increases a patient's chance of requiring perioperative blood products and the risk of transfusion-related complications. The Perioperative Blood Conservation Initiative has been launched to help identify and treat patients with preoperative iron deficiency anemia using either oral or intravenous iron. The algorithm also contains a provision for the use of erythropoietin in a select patient cohort. The medical leader of the initiative is Dr. Seal and nurse Rebecca Rock is the Perioperative Blood Program coordinator.

Cardiac Critical Care

Director – Dr. Andre Ferland

Patient Care

The Cardiovascular Intensive Care Unit (CVICU) is focused on providing patient and family-centered care (PFCC). The CVICU has its own PFCC committee which continues to build the foundation to include the patient and family members as integral partners in health care. As an example, this past year the multidisciplinary committee has implemented the "Getting To Know Me" tool that is usually completed by the patient's family member with the goal of improving the CVICU patient experience by knowing their individual preferences.

The CVICU consists of a large multidisciplinary team:

- 110 registered nurses
- One clinical nurse educator
- Ten cardiovascular intensivists MDs
- Seven intensivists have obtained advanced echocardiography training
- Two intensivists have additional training in ECLS
- 12 cardiac surgeons
- 18 registered respiratory therapists
- One physiotherapist
- One clinical pharmacist
- Ten unit clerks
- 15 health-care aids
- Two housekeeping staff
- Two social workers

CVICU has the highest number of advanced certifications in critical care including IABP, CRRT, three VAD devices, pulmonary artery catheters, advanced pacing, lumbar drains as well as other ICU advanced certifications.

Education

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

The CVICU is heavily involved in a simulation program. The purchase of a specialized mannequin has enhanced the learning experience for emergent post-operative procedures.

The ECLS program is very thankful to be the recipient of a generous donation from the Rotary Club for the purchase of an Ebbtides Parallel ECMO simulator which will greatly enhance the education for the multidisciplinary team who specialize in the care of these patients:

- Dr. Andre Ferland, FMC CVICU Medical Director
- Kari France, FMC CVICU Acting Manager
- Chris Coltman, FMC CVICU CNE

Research

Over the past year the FMC CVICU was one of the first in Canada to implement a new cardiac surgery post-operative movement protocol called Keep Your Move in the Tube. This is designed to improve mobility and independence without compromising the breastbone/sternal wire integrity. This resulted in a small research project in collaboration with Dr. Kathryn King-Shier from the University of Calgary.

The CVICU is also in the second year of the Early Chest Opening (ECO) after Cardiac Surgery protocol adopted from the new European Resuscitation Council guidelines. And the CVICU is proud of the team who have published in the May 2020 Special Patient Safety Issue in Clinical Simulation in Nursing titled: Preventing Harm: Testing and Implementing Health Care Protocols Using Systems Integration and Learner-Focused Simulations: A Case Study of a New Post Cardiac Surgery, Cardiac Arrest Protocol. This publication was spearheaded by the FMC lead simulation consultant Mirette Dube along with many other CVICU team members.

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

- New Patient Flow Project – Optimizing patient flow from CVICU to cardiac surgery ward Unit 91
- New Early Recovery After Surgery (ERAS) Phase 1 protocol
- Identification and management of delirium post-operatively concentrating on early mobilization
- Wound Care Project – Implementation of a new sternal dressing September 2019

Sites

The Department of Cardiac Sciences operates in four acute care facilities across the Zone: Foothills Medical Centre (FMC), Peter Lougheed Centre (PLC), Rockyview General Hospital (RGH), and the South Health Campus (SHC). The following section provides site specific highlights from the past year.

Foothills Medical Center (FMC)

Executive Director: Amanda Weiss

Medical Cardiology – Units 81 & 82

We have seen a change in management and leadership with the teams and with that change has come a new level of engagement from our staff. This has been particularly valuable as the teams worked through many new and rapidly changing processes as part of the COVID-19 pandemic response. In addition, with our recently expanded telemetry monitoring capacity in the Cardiac High Observation Area, we have realized a decrease in patient days within the Cardiac Intensive Care Unit for specific patient populations. We continue to have future state discussions about remote monitoring of high-risk patients, as well as innovative approaches to further decrease the length of stay for various patient populations served within Medical Cardiology. We continue our focus on fall risk assessment and reduction and have introduced anti-slip socks for high risk fall patients. We continue to pave the way to higher team influenza vaccination rates and have an 87 per cent vaccination rate; which exceeds the organizational goal of 80 per cent.

Cardiac Intensive Care Unit – Unit 103B, CICU

The CICU has worked closely with partners across the Calgary Zone to create additional critical care treatment spaces as part of the COVID-19 pandemic response. This is a testament to the adaptability, commitment, diligence and expertise of the multi-disciplinary team that serves the department.

The CICU continues to engage with the Southern Alberta Organ and Tissue Donation Program to further the DCD (Donation after Cardiac Death process. This process provides the opportunity, in appropriate cases, for organ donation in situations where the prognosis is poor and life-sustaining treatments will be discontinued. This process helps to increase the number of kidneys and other organs available for transplant.

CICU continues to support the trans-aortic valve implantation (TAVI) program and we are seeing increased numbers of patient coming to CICU post implant. These patients are mobilized early after admission and many can go home the day after admission.

CICU staff are highly engaged to ensure that all admissions are screened for fall risk, ARO, and DVT prophylaxis contributing to a culture of safety on the unit.

Cardiovascular Intensive Care Unit – Unit 94, CVICU

The CVICU values its commitment to patient and family care and has worked to further refine various initiatives, including new admit on date of procedure processes, leader rounding and a pager system for families of patients in the CVOR. The CVICU received the president's award of excellence for its continued work on patient delirium. Ongoing projects include working with PCU 91 on new sternal precautions (KYMITT), reviewing pressure ulcers, new sternal dressings, and Enhanced Recovery After Cardiac Surgery (ERAS).

Cardiac Surgery – Unit 91

Unit 91 contains 38 beds that include a 12-bed telemetry area to receive patients from the CVICU 24-48 hours post cardiac surgery. The process KYMITT promotes greater use of upper extremities while limiting range of motion. The multidisciplinary team spearheading the project presented at the Canadian Cardiovascular Conference in October 2019. PCU 91 continues to work on Quality Improvement, formalizing a committee and key performance indicators for 2020.

Peter Lougheed Center (PLC)

Executive Director: Emma Folz

Unit 48 – Coronary Care Unit

Unit 48 is a six-bed stand-alone CCU. Occupancy has been quite high this past year, and we have taken initiative to repatriate appropriate patients to our site. This work supports CCU capacity within the zone and aligns with a Patient and Family Centered Care approach. During the Covid-19 pandemic, we moved the Unit 48 staff and patients to the high observation ward on Unit 49 where they worked and took excellent care of patients for eight weeks. The staff on this unit are resilient and provided best practice care within their new space.

Unit 49 – Medical Cardiology

Unit 49 is a 32-bed inpatient medicine unit with a specialty of Medical Cardiology and Internal Medicine. We participate in zonal optimization of the care we provide to patients with a diagnosis of heart failure and COPD.

PLC CV Labs

The Cardiac Function Clinic has been focusing on wait list management strategies, in alignment with Path to Care, in an effort to deal with continued increases in referral volumes. We are also participating with the rest of the zonal clinics in a Quality Improvement project focused on standardization of the four clinics. This included admission and discharge criteria of patients and updated algorithms to support patient care.

The Congenital Heart Clinic continues to see growth in clinic size. Over the last year aortopathy referrals, in particular, have grown significantly in both number and complexity and are related to improvements in genetic testing. We welcomed Dr. Nita Guron to our team in January, 2020 and saw the retirement of Dr. Tim Prieur and nurse clinician Yvonne Balon in July of 2019. Both Tim and Yvonne had been with the clinic since the beginning and are sorely missed by staff and patients alike. Physician leadership within the clinic has also recently transitioned from Dr. Nanette Alvarez to Dr. Michelle Keir.

The Echocardiography Department at the Peter Lougheed Centre remains very busy with inpatient and outpatient studies. Similar to other sites in the zone, we are working creatively to support retention of casual staff and overall recruitment of sonographer staff members to the Calgary zone.

Rockyview General Hospital (RGH)

Executive Director: Virginia Meyer

Unit 71

In the past year, Unit 71 has continued to focus on optimizing heart failure outcomes for patients at RGH. After attending the Heart Failure Optimization Learning Collaborative last fall, our team with the support of the Unit Quality Council, focused on ensuring patient education was provided to patients during their acute care admission on Unit 71. Unit 71 has also continued to encourage early and frequent mobilization for all patients during their admission; as well as, promoting the Patient and Family Centred Care (PFCC) initiative and the 'End PJ Paralysis' initiative, which encourages patients to get up and get dressed while in hospital.

Additionally, this year during the COVID-19 response, Unit 71 enthusiastically prepared for the possibility of acute cardiac care step-down beds on our unit should our site's CCU beds need to be relocated during an ICU surge.

With the support of our cardiologists and cardiac nurse practitioners, staff received the required education and skills to care for acutely ill cardiac

patients in the inpatient setting. This education is ongoing and will be used if needed during a potential second wave of COVID-19. Furthermore, as a response to continuous masking and increased use of PPE, Unit 71 has also been very engaged in promoting the PFCC practice of Visual NOD, which encourages health-care providers to wear a laminated picture of themselves to help patients recognize their care team and know the role of each care provider.

RGH Cardiac Function Clinic

In the past year the Cardiac Function Clinic at Rockyview General Hospital has continued to see steady increases in the number of patients. The clinic continues to be engaged in quality improvement practices. In September of 2019 the clinic implemented standardized processes developed in collaboration with all four Cardiac Function Clinics in Calgary. These processes were aimed to improve patient access to the clinic by standardizing the referral process, along with improving other operational processes. During the COVID-19 pandemic, the clinic continued to provide outstanding support to heart failure patients, sometimes virtually, ensuring patients receive the care and support they require in the community during this challenging time.

RGH CV Lab

In the past year, RGH CV Lab has performed almost the same number of tests/procedures as last year, so it has been another very busy year. We continue to participate in the Connect Care Cupid platform development as requested. Over the past nine months, the echo techs have been involved in a quality assurance initiative that involves a cardiologist reviewing five random echo results with each tech in order to provide constructive feedback and ensure best practice.

Nurse practitioner-led cardiac unit among the first in Canada – read more about it in Appendix A

South Health Campus (SHC)

Executive Director: Paul Stewart

All areas within Cardiac Sciences at SHC have continued to grow an be successful. Recently, considerable efforts have been made to prepare for the impact of COVID-19. In addition to the comprehensive SHC site plan, the Cardiac Sciences team worked to consolidate and relocate services throughout the site and zone. In particular Nuclear Cardiology temporarily relocated to the FMC while the cardiac clinic consolidated to one floor. The CCU beds located within the ICU footprint were temporarily relocated to ACU 66 with the expectation of additional ICU patients during the pandemic.

Moving forward with flattening the curve, clinics are starting to relaunch and services are returning to their original locations. However, patients, staff, and physicians are preparing for the new ways to care for our patients with more IP&C restrictions and the need for social distancing.

All clinics are continuing with Quality Improvement specifically reviewing Path to Care guidelines and referral processes. ACU 66 continues to work on COPD/HF, and the successes are now being shared by spreading the pathways to other inpatient units throughout the hospital. Data continues to show an improvement in patient education and ambulation during their inpatient visit.

SHC capacity continues to be the primary challenge on ACU 66. The unit is consistently hosting four extra patients. During peak demand we will open an additional two bed spaces, putting the unit six patients over its capacity.

SHC was pleased to assist FMC nuclear cardiology last summer by temporarily relocating patients and workload while the FMC camera was being replaced.

Heart Health month at SHC grows into a larger event each year. It is now a significant event both within SHC as well as the surrounding community.

The focus on promotion of wellness activities, including the importance of an active and healthy lifestyle, adds a spark to the area that lasts throughout most the year. We also had strong community participation, with local businesses challenging both one another and SHC in an effort to beat our total stair count. The Courtyard & Residence Inn by Marriot, Calgary South has joined our effort with sponsorship of the event, as well as enthusiastic participation.

TotalCardiology

TotalCardiologyTM Rehabilitation and Risk Reduction has been providing secondary prevention of cardiovascular disease services through its rehabilitation program to residents of Alberta Health Services Calgary Zone for over 23 years. The program also offers screening and primary prevention services for those who either self-refer or are referred by their family physician. The foundation of the program continues to be early access, quality patient education, health coaching, and timely medical intervention. We continue to strive for the highest quality integrated cardiovascular wellness, clinical care, education and research as evidenced below

We continue to have great success with the Early Cardiac Access Clinic (ECAC)All STEMI, NSTEMI, and ACS patients continue to be assessed within four to 10 days of hospital discharge. The success of this program has contributed to timely program participation and an increased number of separations, defined as those who complete the traditional 12-week program or satisfactorily graduated from an individualized program. In the period of January 1, 2019-December 31, 2019 we had 2,096 patient separations, which represents a six per cent increase from the previous year and five per cent above our contracted quota.

We continued to streamline our patient education program with a focus on ensuring that all patients receive the core information needed to support them in their lifestyle change. More than 80 per cent of new patients attend our introductory education series “Taking Charge of Your Heart Health”.

Partnerships with hospital and community groups have allowed us to expand our services to new populations including atrial fibrillation patients. Additionally, we have run pilot projects over the past year targeted at identifying cardiac rehab patients with undiagnosed peripheral artery disease (PAD). We also promoted heart healthy living in the community through participation in health fairs offering basic risk screening and heart health education in partnership with the Libin Cardiovascular Institute.

We continue to foster medical education within our clinic and coordinated rotations for those physician residents specializing in internal medicine, family medicine, cardiology, sport medicine, physiatry as well as allied health undergraduate and graduate students.

The Research Committee continues to be very productive. It hosted a Research Retreat on March 20, 2019 during which four outstanding ‘rising star’ scholars presented research on topics including the efficacy of cardiac rehabilitation, predictors of treatment response, and the influence of patient education and motivational factors on cardiac rehabilitation participation. The first annual TCRN Research Retreat was highly successful and positively received. We were asked to submit an invited commentary to the “Journal of Cardiopulmonary Rehabilitation and Prevention.”

The publication was intended to demonstrate that our approach can be done with limited extramural research funding and can be highly productive, as indicated by our history of conference presentations as well as peer-reviewed published manuscripts and abstracts. It is our hope that this invited commentary inspires other groups to consider similar initiatives, at a scale that is feasible, further expanding the CR evidence base in a way that facilitates an evolution of clinical practice that optimally improves patient outcomes.

Rapid Access Cardiology Clinic

The Rapid Access Cardiology Clinic (RACCTM cardiology clinic) is an important part of TotalCardiology services. RACCTM cardiology clinic

began in 2008 and continues to provide essential outpatient cardiac care. We use skilled personnel, technology, and advanced access principles to optimize clinic operations.

RACCTM cardiology clinic has grown from its inception of providing care for patients with chest pain symptoms to a full-service cardiology clinic, receiving referrals with a wide range of cardiac anomalies. Today, RACCTM cardiology clinic accepts referrals for all cardiac-related issues and provides access to cardiac consultation, tele-consults and cardio-diagnostic testing. Consultation services are provided at our Sunridge location and in our Clinical Care Centre at our Bridgeland location.

Referrals are accepted from community clinics, physician offices, emergency departments and urgent care centers. Our sophisticated access models begins with medically supported triaging of patients by a registered cardiac nurse followed by timely access cardiology consultation.

All RACCTM clinical consultation letters and TotalCardiology Services diagnostic reports are uploaded to Alberta Netcare system making them readily available to health care providers. This allows for improved continuity of care, avoids redundant testing and reduces overall health care costs.

Education

Education is essential component of the Department of Cardiac Sciences. Over 260 graduate students, 40 undergraduate students and 37 postdoctoral fellows undertook advanced research training with the Department and Institute in 2019-2020. Our students received numerous scholarships and awards over the year.

We have two outstanding core clinical training programs: Adult Cardiology and Cardiac Surgery which are both accredited training programs with the Royal College of Canada.

Postgraduate Medical Education

Cardiology Training Program

Program Director – Dr. Katherine Kavanagh

The 2019 – 2020 academic year was interesting and challenging. We welcomed eight new trainees into the program: Drs. Nabila Mahdi, Ahmed Moustafa, Angella Woodman, Alexei Savtchenko, Xiao Cai (Western), Kimesh Chetty (U of S), Vincent Le (NOS), and Yuan Zhang (U of A). The latter four joined us in Octoer and filled our ministry-funded spots. Four trainees wrote the Royal College exam last fall and were successful.

The internal review of our program, in February, was successful, with no weakness identified. Changes will, however, be made in our RPC minutes processes.

Our program administrator, Julie O'Keeffe, is on maternity leave. While she is on leave, Sajjad Surani is taking on her role. Thank you Julie for all your hard work!

COVID-19 brought a lot of changes to our program, but we adapted quickly. Within days, we moved our round and academic half-day sessions online. Attendance for these virtual sessions has been better than with the traditional format. COVID also impacted clinical rotations. Clinic visits and routine investigations were canceled; therefore, some rotations were moved to the following year and others were modified to provide optimal training for our trainees. I want to thank interventional cardiology, echo, nuclear, MRI and congenital cardiology for their creativity this year.

Cardiology electives were canceled across the country, leaving absences in our call schedule. These were filled by cardiology trainees and interventional fellows. Because of the cancellation of these electives, we did not have the chance to work with the fall of 2020 CARMS applicants as in previous years. This poses a risk for us in filling our ministry-funded positions at CARMS this year.

Inter-provincial electives will likely be cancelled until the end of 2020. CARMS interviews will be virtual this fall.

The initiation of CBD for adult cardiology, which was set to begin in July 2020, has also been delayed by a year due. However, our competency committee and faculty advisors are in place and we have hosted faculty development sessions for them. The silver lining to the delay is that we have all of the pieces in place for next year, which will give us more time to focus on preparing for our Royal College external review, scheduled for the spring of 2022.

Royal College spring exams were also impacted by COVID, with internal medicine exams scheduled to be written locally on Sept. 29-30, 2020. The schedule change impacted our rotation and call schedules. The fall cardiology exam will also be written locally, and there will be no OSCE this year. Our Cardiology Specialty Committee stressed that more comprehensive STACERs will be completed this year. The Committee provided a new form. Dr. Hamid Banijamali, previously a Royal College examiner, has graciously agreed to do the comprehensive STACERS.

Four seniors are graduating this year:

- Dr. Payam Pournazari will be pursuing an imaging fellowship at the University of Texas in Houston.
- Dr. Jessica Patzer will be pursuing a fellowship in congenital cardiology at the University of Toronto.
- Dr. Cvetan Trpkov will be pursuing an echo fellowship in structural heart disease followed by an ICU fellowship at the University of British Columbia.
- Dr. Safia Chatur will be pursuing a fellowship in advanced heart failure and transplant at Harvard.

Awards

- Our four graduates were successful in obtaining the Childs Scholarship to further their training.
- Dr. Cvetan Trpkov won the CCTN-CHFS Research Competition at the 2019 CCC annual meeting. He presented his project “Intra-Renal Doppler Vein Evaluation of Cardio-Renal Syndrome in Acute Decompensated Heart Failure.”
- Dr. Safia Chatur has been named the Harvard “Daniel Pierce Family Fellow” for 2020 – 2021.
- Dr. Sudhir Nishtala received the University of Calgary - Faculty of Medicine Faculty Clerkship Teaching Award Recipient for 2020.

Resident Publications

Nine resident publications including the “Journal of American Cardiology” (JACC) and “Journal of the American Heart Association” (J AM Heart) publications.

Cardiac Surgery Training Program

Program Director – Dr. William Kent

The Cardiac Surgery training program is fully accredited by the Royal College thanks to the leadership of Dr. William Kent (Program Director) and Christina Faulkner (Program Administrator). This year, the program successfully underwent a Royal College Internal review with no identified weaknesses.

It was a year of significant change. Drs. Lucy Jefferson and Amy Brown were welcomed to the program as first-year residents and graduating trainees and Drs. Holly Mewhort and Aaron Spooner were successful in their Royal College Exams.

There were also leadership and administrative changes with Dr. Daniel Holloway assuming the role of program director and Ms. Faulkner moving on to department administration after 13 years of outstanding work. Selena Gill took over the program’s administrative role, bringing past experience in fellowship training.

Seven residents are enrolled in the Calgary training program, which is supported by 12 full-time dedicated cardiac surgeons. All members of the division are committed to residency education and work to provide a superior training environment. The academic curriculum consists of academic half days focused on didactic teaching, journal clubs, thoracic aortic rounds, M and M rounds, and cardiovascular triage rounds.

The academic schedule is well partnered with the Department of Surgery curriculum, including critical thinking, surgical skills, surgical foundations and CanMEDs. Our junior residents also attend a teacher training retreat, which prepares them to become educators and leaders in their future careers.

There is an increased amount of simulation and hands-on skills offered by the program, including labs for cadaveric dissection and minimally invasive valve surgery. In the operating room, residents are trained in complex open-heart procedures, pacemakers, mechanical circulatory support, endovascular aortic surgery and transcatheter valve implantation. Opportunities in clinical outcomes, basic science and translational research are also supported and this year, residents successfully presented their work at both national and international meetings.

The COVID-19 pandemic was a major challenge for training this year and resulted in redeployment of residents, who assumed critical care roles in the ICU. Academic teaching was temporarily suspended, including John Burgess Research Day and our swine heart transplant simulation lab, which has been a highlight of the curriculum since its introduction three years ago. Overall, the effects of the pandemic on our senior resident clinical rotations were minimized and we are proud of our residents for meeting the challenges of this difficult time. As in years past, the success achieved by our residents has further established the University of Calgary as one of the top residency training programs in the country.

Awards

- LB Mitchell Research Award – Dr. Ali Fatehi Hassanabad
- Micheal J. Davidson Fellowship Award - Dr. Aaron Spooner

Resident Publications

Nine resident publications including multiple resident collaborations.

Fellowship Programs

The Department of Cardiac Sciences offers clinical fellowships for advanced training in the following four areas: Electrophysiology, Interventional Cardiology, Echocardiography, Heart Failure (Cardiovascular Magnetic Resonance Training, Cardiac Rehabilitation). The Electrophysiology program is an Area of Focused Competence (AFC) Program and is accredited by the RCPSC. Our fellowship programs train both domestic and international medical graduates who have successfully completed a residency training program in Canada or elsewhere.

Echocardiography

Program Lead: Dr. Sarah Weeks

The Adult Echocardiography Fellowship Program at the Libin Cardiovascular Institute is a 12-month program with a strong clinical focus. There is capacity for one fellow per year. In June 2019, Dr. Samir Basmaji completed his level III echo training through the program. Our current fellow is Dr. Jeff Shaw, who will complete his training in December 2020.

Dr. Shaw has been awarded the Arthur J.E. Child fellowship for the duration of his echocardiography training. Dr. Shaw has completed his cardiology training, followed by a fellowship in critical care and plans to use echocardiography to optimize patient care in the cardiac critical care setting.

Electrophysiology

Lead - Dr. George Veenhuyzen

The Adult Cardiac Electrophysiology Training Program is one of a few programs in Canada recognized by the Royal College of Physicians and Surgeons of Canada as an accredited Area of Focused Competency (AFC) Training Program. Though the EP Fellowship Training program at the Libin Cardiovascular Institute is over 30 years old, this recognition by the Royal College is new, and last year, our first fellows received their AFC Diplomas. The Program currently has four fellows including three new trainees from Ontario, Israel, and Belgium.

Heart Failure

Program Leads: Dr. Brian Clarke

The advanced heart failure fellowship program did not have a fellow for the 2019-2020 year. The AHF fellowship has bridge funding through SERVIER ALBERTA Innovation in Health Fund (SAIHF) for three years. Due to COVID-19, our fellow for 2020-2021 is unable to complete and we have a planned fellow for 2021-2022 who will be completing a combined AHF/EP fellowship at Libin. The AHF program had been working towards submitting an application for Royal College accreditation in the Area of Focused Competence (AFC) in Advanced Heart Failure and Cardiac Transplantation and will need to work with the Department of Cardiac Sciences, Libin Cardiovascular Institute, and University of Calgary to support this application.

Interventional Cardiology

Lead - Dr. Francois Charbonneau

For the last 38 years, the Foothills Interventional Cardiology Service (FICS) has trained more than 70 cardiology graduates. These fellows have become experts and leaders in catheter based, diagnostic and therapeutic invasive procedures across Canada, Europe, the US, Australia, and the Middle East.

In 2019 – 2020, our program included six fellows. Two successfully completed their training in June 2020. One individual is returning to his home country to develop Interventional Cardiology in Trinidad & Tobago. The other will pursue further training in structural Interventional Cardiology in Florence, Italy. In collaboration with the University of Calgary, FICS is in the process of applying for recognition of our training program by the Royal College of Physicians as an area of focused competency in Adult Interventional Cardiology.

Grand Rounds

Cardiac Sciences Grand Rounds run from September until June. The attendance at our Grand Rounds is excellent, with an average of more than 40 attendees weekly between physician staff, trainees, researchers and nursing staff. In addition, the rounds are held at the Foothills Medical Centre and telecast to all of the major teaching hospitals: Peter Lougheed Hospital, Rockyview General Hospital and South Health Campus. We continue to attract world class national and international speakers. These featured speakers also meet with our trainees and participate where possible in our academic teaching session.

Our Grand Rounds program is supported by the pharmacological industry and the Libin Cardiovascular Institute (LCI). Since COVID-19, Grand Rounds has moved online and we have seen an increase in the number of attendees. Another advantage of this shift in delivery is that the presentations are now archived and featured on the Libin YouTube Channel: https://www.youtube.com/channel/UCrmaxT41CgMZcRNyDhDBYiA

The complete list of speakers can be found in the Appendix.

Research

The Libin Cardiovascular Institute is working to prevent and reduce the risk of cardiovascular diseases while improving detection, treatment, survival and quality of life of impacted individuals and populations. Our members have had a productive year in 2019-2020.

A snapshot of the core research metrics is as follows:

Publications

- Total number of publications by Libin Institute members: 562
- Mean impact factor of publications: 5.9
- Number of publications with an impact factor over 10: 53

Samples of these publications include:

- Dr. Aaron Phillips, PhD, was published in *Neurology* for his research project which found that disturbed breathing during sleep may increase the risk of strike in people with spinal cord injury.

- Dr. David Montero, PhD, was published in The Lancet Diabetes & Endocrinology for his study which found that endurance activities may lead to major health benefits for people with diabetes.

- Dr. Paul Fedak, MD, PhD, was co-lead of a study that discovered a previously unidentified cell population in the pericardial fluid surrounding the heart has the potential to repair damaged hearts. The resulting article was published in the internationally recognized journal *Immunity.*

Trainees

Number of students (undergrad, graduate, PDF) supervised by a Libin member

- Undergrad - 40 students in Summer 2020
- PDF - 37
- GSS – 260

Number of students registered in the Cardiovascular/Respiratory Science program - 68

Patients as partners – read about a $3M research project designed to improve patient outcomes and their health care experiences in Appendix A

Award winning women's cardiovascular health program – read more about it in Appendix A

New cell discovered that can heal hearts – read more about it in Appendix A

Grants/Research Revenue

The Institute garnered $31,885,305.91 in research revenue in 2019-2020. That is $1.02M/RE in comparison to the $0.77M/RE for the Cumming School of Medicine.

Awards and Recognition

Our members work was recognized many times throughout 2019-2020, within the University and AHS and by external stakeholders.

- Dr. Braden Manns was named as a fellow to the prestigious Canadian Academy of Health Sciences fellows

- Dr. James White, MD, received an ASTech award in the category of health innovations for his development and commercialization of software enabling precision healthcare delivery in cardiovascular diagnostics.

- Dr. Jordan Squair, PhD, a postdoctoral fellow at the Cumming School of Medicine was named a 2019 Killam Laureate for his spinal cord stimulation project focused on cardiovascular health of spinal cord injured patients.

- Dr. Hude Quan received a prestigious Killam Annual Professor Award, https://www.ucalgary.ca/utoday/issue/2019-04-12/five-ucalgary-faculty-members-awarded-killam-annual-professorships

The work of Dr. Ed O'Brien, MD, was featured during the coveted Late Breaking Science sessions at the European Society of Cardiology (ESC) Congress—the largest cardiology conference in the world.

Megha Murali, a PhD candidate in the lab of Dr. Justin MacDonald, PhD, was invited to present a rapid fire talk in basic science at Heart Failure 2019, held in May in Athens, Greece. Her abstract was also pre-selected to be highlighted on the final day of the conference, organized by the European Society of Cardiology.

- Dr. Derek Chew, MD, received a $140,000 Banting Scholarship from the Canadian Institutes of Health Research.

- Dr. Cvetan Trpkov, MD, a sixth-year cardiology resident at the Cumming School of Medicine, placed first in the CCTN/CHFS Research Competition at the 2019 Canadian Cardiovascular Congress.

- Dr. Aaron Spooner, MD, was awarded a $25,000 Michael J. Davidson Fellowship Award from the Thoracic surgery Foundation, the charitable arm of The Society of Thoracic Surgeons. The grant will help support an education program, "Transcatheter Aortic Valve Replacement." https://www.sts.org/media/news-releases/tsf-announces-951500-funding-cardiothoracic-surgery-grants-2019

- Dr. Norm Campbell received an honorary degree from Memorial University for his dedication to championing the prevention and control of hypertension. https://gazette. mun.ca/campus-and-community/convocation-approaches-2/

- University of Calgary Equity, Diversity and Inclusion Team award: Libin Cardiovascular Institute of Alberta's Women's Cardiovascular Health Initiative: CV&ME

Challenges

The Department of Cardiac Sciences faces numerous challenges and similarly innumerable opportunities for the future. Current issues reflect:

- Increased demand for service in a time of unprecedented fiscal restraint
- Increased procedural wait times
- Insufficient infrastructure to meet specific type and volume of patient concerns
- Physician burnout and resulting inability to provide appropriate coverage across the zone

We have seen unprecedented growth in open-heart surgery, electrophysiology ablation procedures, the need for diagnostic testing and outpatient consultations. Incompatibly, this increased demand comes at a time of increased fiscal restraint. Accordingly, the Department is challenged to deliver timely access to cardiovascular services while "holding the line" on costs. To address such growth, the Department made efforts to enhance efficiency, increase the appropriateness of procedures and improve access to care through central triage models. We believe that a central referral system both for open-heart surgeryand all life-saving cardiovascular interventions, for example, may increase accessibility to care for patients and improve appropriateness of procedures.

The patient wait list for open-heart cardiac surgery continues to be a concern and major priority area. Surgical results have been outstanding, and quality has remained excellent despite an increased acuity of the nature of the patients and increased co-morbidities such as age, diabetes, and other chronic diseases that can negatively influence outcomes.

The wait list has been stable over the past year (despite an uplift of case volumes and increased referrals) but continues to be higher than optimal. This year, the total amount of cardiac surgery open heart cases will exceed 1,800. It will be one of the highest volumes of all open- heart surgery centers in North America as a single-site program. Patients requiring the niche expertise of a particular surgeon will be appropriately assigned to that surgeon. However, most patients needing heart surgery will be referred to the "next available surgeon in an effort to minimize wait times that remain a significant and pressing issue.

A working group led by our QI lead is exploring the underlying mechanisms responsible for the unrelenting growth of this program over the past ten years, and the opportunities for improvement that may exist in this area. Recruitment has occurred to meet these needs.

Limited infrastructure within the four acute care sites around the Zone constrains our ability to meet patient needs. The Foothills Medical Center, our largest operational site, is where most resource-intensive procedures take place. With creativity from our executive leadership, growth has occurred despite the limited infrastructure (i.e. open-heart surgery uplifts). However, we will be challenged in the future to be responsive to wait-list pressures (i.e. Alberta Surgical Initiative) as efforts to reorganize and maximize our existing infrastructure have already been exhausted.

The increasing growth and restrained resources throughout the Department present are contributing to physician wellness and physician burnout. For example, we have seen increasing strain related to city-wide cardiology night coverage across the Zone to provide 24/7 care at all four acute care hospitals. These include emergency admissions as well as critical care beds, which must be serviced with cardiology expertise. Given changing pressures in educational programs and the lack of adequate physician extenders, we remained challenged with the threat of physician burnout for our cardiologists who cover all sites at all times. We view this as an opportunity to explore new ways to deliver care and alter service models. Recruitment of nurse practitioners at each location may alleviate some burden as they have traditionally performed outstandingly well for our Department at sites where they currently reside.

We have an opportunity to explore this model further at all acute care sites with possible centralization of some of these services. Additionally, we have made efforts to address physician wellness with a new committee and dedicated resources and attention toward a culture of wellness for physicians.

Opportunities

Though we have identified opportunities in each of the current challenge areas, there are also five distinct opportunities that could be pursued to enhance patient care in the Department of Cardiac Sciences:

- Fostering the growth of the structural heart program and the role of academic medicine in interventional cardiology
- Embracing an effective multi-disciplinary heart team approach involving all aspects of the Department of Cardiac Sciences.
- Reducing recovery time and promoting early discharge to manage surgical demand, mitigate costs and enhance the overall patient experience
- Cultivating a multi-disciplinary, collaborative approach to cardiovascular disease
- Utilizing existing data platforms to enhance real-time decision making

The interventional cardiology group is among the largest in North America and performs almost 10,000 procedures a year. The Canadian Institute for Health Information (CIHI) report places our group among the top three centres in the country based on a number of quality indicators.

The adjusted 30-day STEMI and PCI mortality was significantly lower at our centre compared to the national adjusted averages, which places Calgary at the top in care for STE and ACS across the nation. There may also be opportunities to expand into structural heart interventions, and our multidisciplinary TAVI program continues to grow with exceptional results. Such patients can now receive an aortic valve intervention without general anesthesia, which results in rapid discharge (within one- or two-days post op). Structural heart interventions are an opportunity for enhanced value and patient satisfaction.

We believe that as we expand into structural heart interventions, we can decant some resource-intensive open-heart surgeries and improve our capacity and access to life-saving procedures. To that end, recruitments have occurred and will continue to be a focus with further expansion.

The growing prevalence of risk factors such as diabetes and obesity have resulted in high demand for revascularization procedures. The quality of our percutaneous intervention program has been a benchmark of excellence for decades, despite increasing pressures.

There may be further opportunities to investigate increased use of percutaneous interventions for coronary disease, which may help decant the need for surgical revascularization, which is more resource-intensive and less favoured by our patients. Our multi-disciplinary teams attend cardiac surgery triage rounds on a twice-weekly basis to provide multiple perspectives for each patient.

We believe that appropriateness has improved due to the various inputs of cardiology, cardiac surgery, cardiac anesthesia and cardiac critical care. The impact of this approach highlights an enormous opportunity to implement routine multidisciplinary heart rounds across the whole Department to enhance appropriateness and increase access to care. Enhancing connections with the Person to Population (P2) program at the Libin Cardiovascular Institute can also help reduce demand on the system by increasing health promotion and chronic disease prevention activities in the community and primary care setting.

Innovations to reduce the surgical wait list remain somewhat challenging due to financial constraints and efforts to focus on maintaining the current quality service at the increased volume. The department is focusing on initiatives that improve efficiency and provide better value for our patients. For example, the enhanced recovery after surgery (ERAS) program led by our cardiac anesthesia group may offer more rapid recovery and early discharge, which could provide more cost savings and improved patient outcomes.

Along the same lines, minimally invasive cardiac surgery has grown within the Section and is a key priority. We obtained outstanding results, and we are collecting data to determine the possible benefits of

this approach to accelerated recovery and decreased length of stay. We will assess the patient experience by monitoring patient-centred metrics to confirm whether or not patients favour such approaches.

Further oversight and collaborative effort for cardiovascular patients may allow us to improve efficiency and access while still delivering outstanding quality. This will require coordination between AHS clinical operational leaders and all members of our Department. Section Chiefs will need to provide strong leadership and influence cultural and behavioural changes in referral patterns and practices. Focused leadership and service line philosophy of our Department of Cardiac Sciences should put us in an excellent position to be leaders in a collaborative approach to cardiovascular care.

Leadership in the Department is spread out at four different sites across the city, limiting organic interactions and communications. We made efforts this year to improve communication across the Zone. In dealing with the intensely stressful situation created by the COVID-19 pandemic, we learned how collaborative and agile our leadership can be when faced with a specific threat. Using virtual platforms, we connected all leadership within the Zone for regular meetings and found that we were nimbler and more responsive as a result. We will continue to explore such approaches to reduce isolated structures and better coordinate care across the four sites.

There is a significant opportunity to utilize existing data platforms to enhance real time decision making. During the pandemic, we had an excellent experience using some AHS informatics platforms such as Tableau to link our leadership and provide timely actionable data across the Zone. For example, we used a Tableau-based dashboard to show all beds across all sites and their current status. This allowed a centralized approach to ensure adequate coverage and accessibility of care across the Zone. There are also opportunities to link with the provincial SCN networks to learn from other sites and share our learnings across the province. Working through the Libin Cardiovascular Institute, we will begin integrating our existing data assets and build physician capacity to utilize data to support clinical decision making.

2019-2020 Retirements	2019-2020 Recruitment	2019-2020 Libin Members	2020-2021 Recruitment
James Cohen (cardiologist)	Muhammad Ahsan (surgeon)	Liane Tomfohr-Madsen (Psychology)	Interventional Cardiologist - Dr. Ayaaz Sachedina
Patrick Ma (cardiologist)	Corey Adams (surgeon)	Jonathan Smirl (Kinesiology)	General Cardiologist - Dr. Nishant Sharma
James McMeekin (cardiologist)	Nita Guron (cardiologist)	Lyn Yang (Community Health Sciences)	GFT Cardiologist/Scientist
Timothy Prieur (cardiologist)	Robert Miller (cardiologist)	Amelie Stritzke (Pediatrics)	Advanced Heart Failure Cardiologist
	David Campbell (Libin - endocrinologist)		Interventional Cardiologist
			Surgical Assistant

Workforce Planning

Cardiology

Summary of Recruitment

Recruitment has been focused in increasing our pool of general cardiologists: seven new recruits have joined the Section of Cardiology with primary general cardiology functions, two with major interests in echo and adult congenital heart disease. An additional recruit has joined the Section focused on advanced heart failure and multi-cardiac imaging. An interventional cardiologist will also join the Section in the fall for a total of 10 recruitments.

Future Needs

The DOC continues to grow and as some of our senior members retire or reduce their activities future recruitments will be needed in the next three to five years. Dr. James Cohen has practiced in Calgary for 40 years, and Dr. Patrick Ma has practiced for 35 years as a general cardiologist – both have retired this year and their significant contributions to the Section of Cardiology and cardiac care in Calgary were recognized at the Libin Awards dinner.

Dr. Andrew Grant is relocated to Charlottetown, PEI with a joint appointment at Dalhousie and Memorial University, on Aug. 1. Several areas that are of great interest for the development of the DOC include cardio-oncology and geriatric cardiology. Further general cardiology recruits are needed to implement and improve cardiac outpatient care across the city. As the management of critical cardiac patients evolve in the next year, two to three cross-trained cardiologists/critical care physicians will be recruited and transition of leadership within our cardiac critical care group will be ensured. Academic recruits focused on big-data, quality assurance and improvement, health economics and electrophysiology are planned within the next two to three years.

Goals and Strategies

The goals of the Section of Cardiology are to provide the best personalized and timely cardiac care to Albertans in Calgary and the southeastern region of the province.

To achieve this, active recruitment is in place and strategies towards standardizing care across the city have started to be implemented. Central referral and triaging to improve our wait lists and ability to provide expedited care across the city are currently being developed. Overnight and weekend coverage has been a pain point within the Section, but the development of an evening nurse practitioner initially at RGH, has been highly successful and the goal is to implement these programs across all our sites. This program will ensure appropriate coverage across the city and increase patient safety and physician wellness.

Impact on other Department and Regional Resources

In principle, no major impact on other departments and regional resources are expected.

Cardiac Anesthesia

The most pressing current challenge for the cardiac anesthesia group involves unknowns about intermediate-term manpower needs, due to still developing plans for future cardiac surgical case numbers and interventional cardiology case numbers, as a result of the COVID pandemic. Over the next year the group is seeking adequate support to further develop the research program. Additionally, the group needs support for our developing Quality Assurance/ Quality Improvement (QA/QI) program, including introducing our new cardiac anesthesiologist to mentors in the field and connecting him to appropriate local QA/QI resources.

Future Needs

Calgary is a leader in cardiac surgical ERAS (Enhanced Recovery After Surgery). Future ERAS opportunities include a) performing data analysis on existing interventions to determine their effectiveness and streamlining the ERAS pathway by eliminating interventions which are felt unlikely to be effective and replacing them with higher-yield interventions; b) expanding the cardiac surgical ERAS program to become a province-wide initiative; and c) publishing the results of the Calgary cardiac surgery ERAS experience.

The cardiac anesthesia group is developing our quality improvement/quality assurance program, including the hire of a new colleague in the summer of 2021 who will lead this initiative. Areas of future work may include a) examining the rate of perioperative neurologic complications following cardiac surgery, such as delirium and stroke; b) examining the rate of perioperative line infections; and c) further optimizing perioperative blood conservation. The relationship between cardiac anesthesia, cardiac surgery, cardiac ICU, and cardiology is close and highly collaborative. A future "big" idea would be to leverage this relationship and our local expertise into creating a "Cardiac Surgical Centre of Excellence" - for example in minimally invasive cardiac surgery.

Quality Assurance, Quality Improvement and Innovation

General

Cardiac Sciences Quality Assurance Committee:

This committee formerly co-chaired by Jamie McMeekin and Caroline Hatcher is now co-chaired by Bill Kidd and Amanda Weiss. One case has been reviewed and discussed with recommendations presented, two cases are still in progress.

Cardiac Sciences Quality Improvement and Innovation

This team looks at system safety and process review and has 7 projects underway ranging from Cardiac Surgery wait times, STEMI transfers to sustained improvements with Cardiac Function Clinic referrals and developing appropriate palliative at home care for heart failure patients. Our teams mobilized and utilized many resources to surge plan during COVID to ensure patient flow and that staff and patient needs were met. This included surge planning between ICU, CICU and CVICU in response to the COVID 19 pandemic, Cardiology patient flow for suspected or confirmed COVID 19 cases and defined patient flow for cardiology patients who require CCU care during different levels of COVID 19 pandemic response. One outcome from the pandemic that will have positive long term affects for our department was the development of our patient dashboard in TABLEAU.

Future Directions and Initiatives

Over the coming year we will leverage our unique organizational structure - a fully integrated multi-disciplinary clinical department and cardiovascular research institute – to pursue a comprehensive approach to precision medicine.

We will leverage our unique capabilities to advance patient-centred, valued-based practices that will enhance patient-reported outcomes, increase access to care, and improve quality while reducing cost. In brief, we hope to promote a "better model for better care." In 2020-2021 we will launch a flagship data initiative to integrate the existing cardiovascular-oriented data assets and allow us to make enhanced real-time clinical decisions for optimal patient care. The data initiative will build on the success of the Stephenson Cardiac Imaging Centre and their predictive modelling work, as well as leverage the resources in the Centre for Health Informatics at the University of Calgary.

We have had an excellent experience in our Choosing Wisely program to better understand the role of low value diagnostic testing in our Zone.

This work has reduced the amount of diagnostic testing in the area of ECGs, and we can extend this effort to other non-invasive cardiac diagnostic modalities. These opportunities can create needed cost savings without altering patient outcomes or placing patient care at risk. With further central triaging and more centralized leadership and improved communication, a low-value testing reduction is a low hanging fruit that deserves further attention.

Appendix A

Longtime executive director with a passion for patients steps down

Caroline Hatcher taking on new role in cancer care

After over a decade as executive director of Cardiac Sciences at Foothills Medical Centre, Caroline Hatcher is stepping down to take on a new challenge as executive director of the Tom Baker Cancer Centre.

Hatcher is leaving a legacy in patient care, leadership and quality improvement that won't soon be forgotten.

"She is a very strong and inspirational leader," says Dr. Todd Anderson, MD, Vice Dean of the Cumming School of Medicine. Anderson knows Hatcher well. As former head of the Dept. of Cardiac Sciences, Anderson and Hatcher co-led the Dept. of Cardiac Sciences for 10 years.

Anderson explained Hatcher's strengths were varied, making her a wonderful collaborator and partner. Hatcher's ability to get things done, her commitment to her team and her passion for patients stood out to Anderson.

Hatcher's masters degree was in the area of health studies and leadership, and this enabled her to make great strides in improving care for cardiac patients. She was a strong supporter of clinical research and had several wins in this area, such as revamping clinics and reducing wait times in critical care and cardiac surgery. She also helped secure funds for numerous projects, such as the hybrid operating room and innovations in cardiac surgery.

Hatcher collaborated with numerous organizations around the province, and was on the Cardiovascular Health and Stroke Strategic Clinical Network (SCN), where her role focused on metrics and outcomes.

The word "advocate" comes up often when discussing Hatcher. Whether she is backing her staff, her colleagues and friends or the cardiac patients she represents, Hatcher is known for her passion and strength.

"She has always been a force to be reckoned with," says Jennifer Coulthard, a colleague who has known Hatcher for 10 years. "She set and maintained the bar for excellence and professionalism and was such as strong beacon of leadership for others to aspire to."

Coulthard says Hatcher's keen eye for detail and her commitment to building relationships went a long way.

Hatcher's former boss Shawna Syverson, the senior operating officer at Alberta health Services for Foothills Medical Centre, agrees.

"She was always looking at what is best for patients," says Syverson, who has known Hatcher for more than 20 years. "We are quite proud of how she re-profiled the cardiac sciences footprint to optimize things, despite fixed resources. It is an area of constant growth and innovation where the technology advances very quickly, and she has a very strategic mind."

In her role, Hatcher led a massive team that touched thousands of patients each year. Cardiac care in Calgary leads the country in numerous areas, including survival rate for heart attack patients.

Despite having such a large portfolio, Hatcher always made time to mentor her leaders and teams.

"She is constantly looking to grow people," says Barb Jones, who reported to Hatcher for nine years as a clinical nurse specialist within Cardiac Sciences before becoming the manager of cardiac diagnostics, clinical informatics and quality at Alberta Health Services. "She grows people out of working for her, which is the sign of a really good leader."

Syverson concurs, saying Hatcher provided unique mentorship and connection opportunities, like leadership book clubs, breakfasts and parties, for her teams.

"She is really committed to the mentorship of the leaders and managers on her team," says Syverson. "She spends a lot of time helping them to grow as leaders."

But Hatcher, a mom to two grown children and caregiver to both of her aging parents, has a playful side as well.

Her staff will always remember Dance Off Fridays in Hatcher's office, which involved competing to see who had the best moves. She will also be fondly remembered for convincing members of her team to join lip sync performances and karaoke videos.

"She engenders a lot of love and playfulness; there is a lot of fun around her teams," says Syverson.

Hatcher's compassion for others, shown in numerous ways, including through her humanitarian work around the globe, endear her to many. In fact, her empathy and kindness in dealing with her staff and colleagues have resulted in numerous genuine connections.

"She leads with heart, kindness and compassion," says Syverson. "You would have to describe her as a trusted colleague and friend."

Anderson feels the same.

"She is an incredibly valued friend and colleague," he says.

By Dawn Smith, Dawn Smith/Libin Institute

Cardiologist uses innovative techniques to improve patient experience

It has been couple of tough years for Al Cheney, 75. The retired oil and gas worker's quality of life plummeted after suffering a massive heart attack in 2017.

Suffering with symptoms such as an irregular heartbeat, swelling and difficulty breathing that made mobility difficult, Cheney was diagnosed with heart failure following the heart attack.He has spent a great deal of time in the hospital – often weeks at a time.

Although Cheney's life improved somewhat after treatment, doctors determined he needed an implantable defibrillator with a special pacemaker lead to help improve his heart function. Cheney received the defibrillator, protecting him from dangerous heart rhythms. However, his cardiac resynchronization therapy implant procedure—which involves adding a pacing lead through the coronary sinus, a special vein in the heart—was not successful because of the anatomy of his heart. But in August 2019, Cheney's physician, Dr. Jacques Rizkallah, MD, a young cardiologist who began working in Calgary in 2016, was able to overcome this using a novel technique known as Left Bundle pacing. It was the first time that this surgical technique was performed in Canada.

Rizkallah, who received specialized training at Harvard Medical School, explains that in standard pacemaker implant procedures, doctors insert one or more pacemaker wires into the heart to activate it based on the specific needs of the patient.

Although the purpose of a pacemaker is to treat patients with slow heart rates, in some rare cases, activating the heart with the pacemaker can cause it to enlarge and weaken. Known as pacemaker mediated cardiomyopathy, the condition is caused by activation of the heart out of sync.

In the new approach, also referred to as physiologic pacing, the pacing wire is implanted in a specific part of the heart along its normal conduction system, reducing the risk of pacemaker mediated cardiomyopathy and treating heart failure in some cases.

"This allows us to stimulate and activate the heart with the pacemaker the way it is naturally designed to be activated," says Rizkallah.

There are two surgical techniques involved in physiologic pacing: HIS bundle pacing and Left Bundle pacing. HIS Bundle pacing places the pacemaker lead closer to the centre of the heart's conduction system along the ventricular septum. Left Bundle pacing positions the lead in a deeper, specific location in the heart muscle that is more challenging to reach but provides a good alternative for patients in whom the HIS Bundle location isn't technically feasible.

Cheney notes there was significant improvement in his quality of life after the left bundle pacing procedure.
"Everything is better," he said. "I have nothing but good things to say about that surgery."

Although the HIS bundle and Left Bundle pacing techniques are more technically challenging and require more time to perform than the standard pacing methods, Rizkallah is pleased with the results.

"Persevering through these surgeries is very rewarding when we see patients benefit with improvements in their heart function," he says.

Radiation-free ablation
Rizkallah was also the first in Western Canada—and amongst the first in Canada—to perform a radiation-free complex ablation, a procedure that uses special catheters to burn or freeze circuits in the heart that cause abnormal rhythms.

Most physicians rely on fluoroscopy using X-rays to visualize their tools in the heart when performing complex ablations, but this standard procedure has a potentially serious drawback. Both patients and physicians are exposed to radiation, with the amount dependent on the length of the procedure.

Over time, the cumulative exposure increases the risk of cancer for health-care providers. To shield themselves and reduce radiation exposure, physicians wear a cumbersome, lead apron weighing about 30 pounds while performing ablations. Not using fluoroscopy during ablations avoids all those complications, explains Rizkallah.

Although fluoroscopy-free ablations are performed at many centres in Canada, Rizkallah is employing it for complex procedures, such as those that require the atrial septum of the heart to be punctured to treat arrhythmias like atrial fibrillation.

The approach uses ultrasound imaging within the heart as a guide, a method that is performed at just a few of the largest hospitals in Canada. The zero-fluoroscopy ultrasound-guided technique has only been around for a couple of years and is harder to learn and implement.

“The first case was a little nerve wracking, but exciting,” says Rizkallah. “I was fortunate to have access to the right technology at our institution, which allows us to be innovative.”

Rizkallah says his colleagues are also keen on learning the new method.

“I work with a great group of colleagues that are always looking to adopt innovative ways to deliver the best care to our patients.”

By Dawn Smith, Libin Institute

Researcher leads international study of patients at risk of heart failure and death

Heart Failure impacts between three to four per cent of the general population. It is commonly related to heart attacks but can also be linked to a condition called dilated cardiomyopathy (DCM), a condition characterized by an enlarged and weak heart muscle that can't efficiently pump blood. An international, multi-centre study led by Dr. James White, MD, PhD, a clinician and researcher at the University of Calgary's Cumming School of Medicine (CSM), has revealed magnetic resonance imaging (MRI) can be used to predict major cardiac events for people diagnosed DCM.

White's study, published in Circulation Cardiovascular Imaging, confirms about 40 per cent of patients with DCM have injury patterns on their heart muscle, which can be seen with MRI. These patterns are associated with higher risk of future heart failure admissions to hospital, life-threatening heart rhythms and death.

The study, which was the largest ever conducted using MRI in patients with DCM, also shows that cardiac MRI can play an important role in guiding the care of individual patients with heart failure. The results of this study could lead to trials looking at how patients at higher risk may benefit from more intensive treatments. White says that treating patients with DCM is challenging because there is a lack of understanding into what causes the disease and why patients respond differently to the available treatments.

"We have tended to think of dilated cardiomyopathy as one type of heart disease and that all patients with the condition should respond the same, but we are learning that it is a collection of diseases that affect each patient differently," says White, explaining those that don't respond well to treatments are more prone to cardiac arrest, which kills about 35,000 Canadians annually. "The purpose of our study was to see if we could find individual patient features that can help us prescribe life-saving therapies, such as the ICD (implantable cardioverter defibrillator)."

Dr James White

White and his team assembled the MINICOR (Multimodal International Cardiovascular Outcomes Registry) group, which involves 12 centres in Canada, the United States, Spain and Italy, to provide researchers access to highly standardized data collected from patients around the world with the goal of promoting personalized care for patients with cardiovascular disease.

"You can have a much greater impact on patient care and on clinical practice in general when you work together," says White "The true benefit of initiatives like this is the ability to test innovative

ideas quickly and show that they can work in different health-care systems and patient populations. This is the unique power of multi-national collaborations."

White and his team of data scientists and students are currently tracking the health of over 10,000 Albertans who have undergone cardiac MRI. With this data they are developing new approaches to deliver personalized risk predictions for patients with cardiovascular disease.

Libin Institute Director Dr. Paul Fedak, MD, PhD, is excited about the potential of this project and its alignment with the Institute's aim to lead in the area of "precision" cardiovascular medicine.

"These are important steps towards personalizing care decisions for individual patients," says Fedak. "We are constantly being reminded that the more we know about each patient and their own disease, the better we can make decisions to improve their health."

By Dawn Smith, Libin Institute

Cardiac surgeon invents simulator to help teach new trainees how to suture the heart

Daniel Holloway was a cardiac surgery resident when he created a simulator to help him practise the technically challenging task of suturing the heart during surgery. Working with Innovate Calgary, Dr. Holloway, MD, an assistant professor at the Cumming School of Medicine, secured a patent for the training device.

The accomplishment recently earned him recognition as a 2019 Peak Scholar by University of Calgary President Ed McCauley.

“Securing the patent has been a steep learning curve and something quite different from my normal day job, but I enjoyed it,” says Holloway.

Prototype built at home

The busy surgeon developed the simulator at home, creating the circuit board and electronics, developing the model using 3D printing and carefully choosing the silicone product that best replicates a surgeon’s experience while sewing through tissue.

Several prototypes later, the simulator uses electronics to measure the time required to perform randomly assigned suturing tasks at varying angles. The idea is to improve the efficiency and proficiency of suturing on and around the heart.

The device is now being used on a regular basis by residents at the Foothills Medical Centre and has inspired a bit of friendly competition between trainees. The device was also at the centre of a competition involving trainees from across the country at the Canadian Cardiovascular Congress, held in Montreal last fall.

“Two of our [local] residents won the competition,” says Holloway with a laugh, noting the device was well received, not only because it is fun to use, but also because it helps develop the critical skills surgeons need.

Having the simulator showcased at the largest cardiology conference in Canada has created a demand for the product. Holloway says his next step will be in the manufacturing and business side of his invention.

Dr. William Kent, MD, the director of the cardiac surgery residency training program, is proud of Holloway.

“Dr. Holloway is a tremendous innovator, and his suture simulator is novel, simple and highly effective for teaching basic suturing skills,” he says. “With his simulator, he has contributed to the surgical training of residents in Calgary, and I expect that it will be a component of training at every centre. We are very proud of Dr. Holloway’s success and the recognition it will bring Calgary and our training program.”

Dr. Imtiaz Ali, MD, the chief of cardiac surgery, says Holloway’s project is a good example of the excellence of the Libin’s cardiac surgery program.

“We are proud of the quality of our surgical program, which attracts some of the top trainees in Canada,” he says. “Dr. Holloway’s invention is a good example of the innovation that our team strives for each day. We are pleased he has been recognized.”

Holloway completed his surgical training at UCalgary in 2017 before heading to Northwestern University in Chicago, where he completed a fellowship in mechanical circulatory support and cardiac transplant before returning to Calgary to practice.

By Dawn Smith, Libin Cardiovascular Institute

New recruit to Cumming School of Medicine's Libin Cardiovascular Institute saves man's life — twice

Doctor Corey Adams, MD, returned to the University of Calgary on April 1 as a new recruit to the Cumming School of Medicine's (CSM) Libin Cardiovascular Institute. He earned a master's degree in '04 in kinesiology at UCalgary, later discovering his passion for heart surgery. He could not resist the offer to combine his passions; perform surgery, conduct research and teach, in a city that holds many fond memories for him.

"After five enjoyable years working in St. John's, N.L., my wife and I decided to look for new personal and professional challenges. With two young children, her gynecology practice, and my cardiac surgery practice I was really looking for a location that provided long-term family stability and was committed to professional excellence and growth," says Adams, a clinical associate professor in the Department of Cardiac Sciences at the CSM.

"The Libin Institute has an outstanding reputation, and having known several members of the surgical division before, it's exciting to come back to Calgary. Our boys love the sunshine and outdoor adventures."

On June 20, the family went on their first hike at Grassi Lake Trail, near Canmore. As they were driving away from the trail head, traffic stopped, and someone yelled, "A man is unconscious, and turning blue". Adams and his wife, Jennifer, jumped out of the vehicle to see if they could help.

Just off the trail lay Darrell Parker, who was also on a hike with his family, unconscious after having a heart attack. Another hiker had just started cardiopulmonary resuscitation (CPR). The Adamses assisted until firefighters and paramedics arrived.

"Collectively, several of us began a co-ordinated resuscitation. As a cardiac surgeon I work daily with teams who are experts at reviving patients; however, it was truly special to work in the field

Darrell Parker and his wife

with paramedics, firemen, and my wife to respond to this emergency," says Adams. "I really feel the collective teamwork of this group saved Darrell's life. It's an example of knowing the importance of CPR, and remaining calm."

The ambulance set off for the Canmore General Hospital; however, Adams's connection to the Parker family would not end there. Due to severe blockages in his heart, doctors transferred him to the Foothills Medical Centre (FMC) for surgery. The FMC team learned that Adams had been the one who performed CPR and thought who better to perform the operation than the doctor who had already saved the 60-year-old's life.

"We couldn't believe our luck. The same doctor who happened to be on the trail that day at the same time Darrell had his heart attack was also going to be our surgeon," says Shirley Parker, Darrell's wife. "It was amazing."

The Parkers had travelled to Canmore from Paradise Hill, Sask., just across the Alberta border, for a hiking trip with their son, Travis, and his wife, Seanna.

“I work in the oilfield, I’m very active and have always considered myself very healthy. I had no idea what poor condition my heart was in,” says Parker, after having five bypasses to improve blood flow to his heart, nine days after his heart attack.

According to Heart and Stroke, there are nearly 60,000 hospitalizations a year for heart attack in Canada.

“Without question this event will be a highlight of my career. As health-care members, we often take some of the things we do as just part of the job. But after talking with Darrell and his family, it stresses the important role that we can make in people’s lives,” says Adams.

Parker is looking forward to returning to work in about three months. He plans to start walking regularly, and maybe even go hiking again. Meanwhile, Adams says his family is looking forward to many more trips to the mountains — but it is likely going to be their very first Alberta hike, at Grassi Lakes Trail, that is talked about and remembered the longest.

By Kelly Johnston, Cumming School of Medicine

Living with the LVAD - A valuable exchange for a better life

It is indeed five years ago on Feb. 10, 2015 that I started living with the VAD, a major milestone in my life, which has become my second birthday. This was a great opportunity, and I am thankful, grateful and blessed to be alive, celebrating a better life with my wonderful family, loved ones and friends. The journey had been great and exciting, albeit with certainly some ups and downs.

I recall waking up to the reality at the end of January 2015, following a very successful year, presenting to a global audience, teaching, working on projects, vacationing with my family and celebrating our 25th anniversary with my wonderful wife Daphne.

It all started with a feeling of fatigue, breathlessness, loss of appetite and swollen ankles. I chose to suffer in silence and tried hiding these observations from my wife until the night of January 28, 2015 after a long day attending meetings up to 8 pm.00 PM.

On arriving at home, I could not climb the stairs. I finally gave up and told my wife that I need to go the hospital the next morning. My wife hearing that from her husband for the first time in 25 years, immediately went upstairs, ensured the kids were in bed and insisted that we check in to emergency at the Peter Lougheed that same night. This proved to be a step in the right direction as the medical team started working immediately to stabilize me. My family was informed that I was in such bad shape with barely 48 to 72 hours to live.

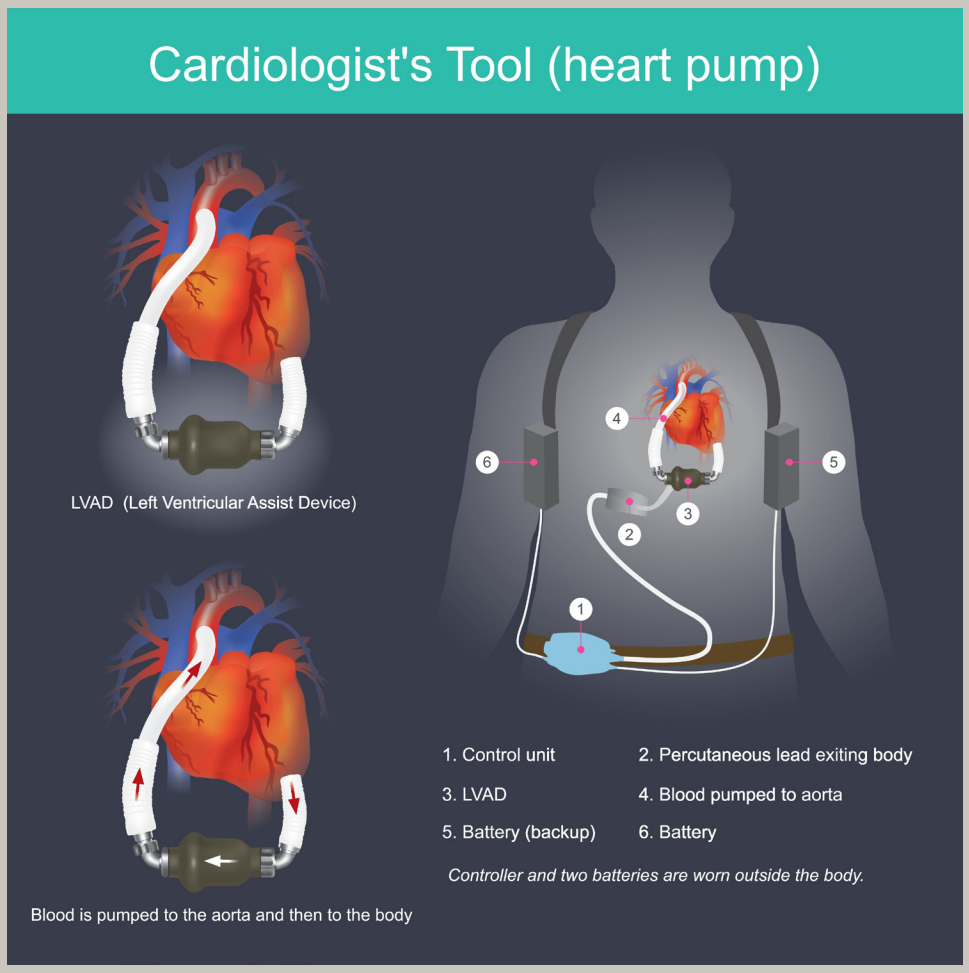
The following week, I was transferred to the Foothills Medical Centre where I was diagnosed with advanced end stage heart failure. The amazing personnel at the Libin Cardiovascular Institute started working on my case right away to turn things around for the better. Dr. Debra Isaac whilst working frantically on my case said this to my wife, –"'We are here to give life……".'. After treatment for about a week, I felt better than I could recall for decades in my life. I was now hoping that it was time for me to be discharged so that I could now join my family again and carry on with my life, when I was presented with the option of surgery for the implantation of the VAD.

This decision was definitely not received very well and it turned out to be my greatest 'CHAlleNGE' ever. As you will probably notice, the word 'CHANGE' is embedded in CHALLENGE. For the very first time, I had a feeling of vulnerability, 'shock-prised' for the lack of a better word, having lived a healthy lifestyle all throughout my life. I was now left with no alternative but to face this inevitable change.

It started off with the DENIAL phase. I remember my surgeon Dr. Paul Fedak, MD, PhD, standing by my bedside, introducing himself and walking me through the procedure for the surgery. I heard him say at one point that "'We will break your breastbone."….'. This did not sound right to me at the time, going through my denial phase. However, I got to realize later that probably there wasn't a better way to have put this across.

On the morning of Tuesday, Feb.10, 2015 when I was wheeled to the operating room. My surgeon did an amazing job and told my wife afterwards that there were no issues during my surgery and was quite pleased. He went on further to say, that "your husband was the kind of patient I like to work on." I woke up in the ICU and wasn't feeling any pain, hoping that the VAD was not implanted after all.

This feeling of false hope did not last for too long, when I suddenly heard the alarm beeping needing a replacement of the batteries. Now, the denial stage was fading away fast and it was time to accept. During that period of transition, I was unnecessarily mean to the amazing staff



at the CVICU (Unit 94), physiotherapists and VAD team who remained very professional and understanding, exercising a lot of patience. The critical care doctors including Dr. Tomas Godinez and all the other medical personnel worked hard and eventually I was now moved to Unit 91.

I quickly moved fully to the acceptance stage being alone in my room in Unit 91. This presented me with a serene environment to reflect on my life and the recent happenings that which I was still trying to grapple with. It brought with it some major changes and I gradually started showing appreciation for the medical personnel.

I was discharged in March 2015 and started to learn how to live with the VAD, especially the alarms – battery replacement, low flow (by far the most irritating tone in the world and cannot be ignored). The once-a-week showers was also something new to me. I couldn't go back to playing my fast-paced, stress relieving sports - squash. There were many times when I get up from my bed or a chair forgetting that I had this amazing piece of technology attached to me. I was always gently reminded by the sudden pull of the driveline on my abdomen.

Throughout this time my family was very helpful and supportive, as they accepted their 'bionic' husband and dad. It was unbelievable that within a month after discharging, I returned to my job, working from home and teaching my first course at Mount Royal University for two (2)- 8eight hour days on my legs the whole time. Another challenge I was faced with was trying to be as discrete as I could during my classes.

Having the controller and batteries in a fanny pack initially looked like a great idea, until a student had this comment in the evaluation following one of my Leadership classes at the University of Calgary. The comment was "'How can we take Clifton as a serious leader if he is always carrying a fanny pack?'". This was hilarious and serious at the same time. I shared this with Jill Roy, my VAD Coordinator who suggested that I should tell them my story.

I reluctantly shared my story in the next course using the different stages of change (denial and acceptance), whilst teaching a module on the 'Leader and Change.'. It turned out to be a story very well received and the students got to realize how vulnerable one could be.

This experience made me more creative in my attempts at being discrete and it had been interesting looking at all the options I have tried. There were a couple of other moments on the lighter side which I would like to share. I was approached at the gym and there was someone who was curious enough to ask what is all the 'stuff' I have strapped around my waist? . I did not even hesitate to respond that it is a personal stereo system.

I went on further to explain that the controller was the system which has a built-in hard drive to store the music and amplifier, with the batteries as the speakers. This sounded very interesting and this individual believed every bit of it before I could even say exactly what it is. It was surprising to me coming across so many personnel in the hospitals and clinics, the countless times they would ask that I take off my valuable attachment before stepping on the scale to get my weight. I am certain they would not have loved to see that happen.

The VAD as a part of me for the past five (5) years, has no doubt being a valuable exchange for a better life. This equipment and especially the pump has been running for just under 160 million seconds. With this I have fully returned to a better life physically and mentally. I still teach my two2-day marathon courses at the university and also managed multi-million dollar projects since 2018.

I would like to take this opportunity to express my sincere thanks and appreciation to the medical personnel at the Libin Cardiovascular Institute FMC, the VAD team, Unit 94, Unit 91, physiotherapists and social worker. Without their great support, advice, patience and professionalism, I wouldn't be celebrating this major milestone.

By Clifton Thornton

Nurse practitioner-led cardiac unit amongst first in Canada

There were some exciting changes to the medical cardiology coronary care unit (CCU) at Calgary's Rocky View General (RGH) hospital in 2019.

On February 1, 2019, the seven-bed unit, which treats patients admitted with heart problems, became one of the first in Canada to be led by nurse practitioners, health-care leaders with advanced training in nursing.

Nurse practitioner Nancy Clarke, who spearheaded the initiative and is now the clinic nurse practitioner lead for the clinic, says the model provides consistent care for patients, as there is now a dedicated team of professionals on hand with advanced knowledge in cardiology and the ability to diagnose and prescribe medication.

"We are the first in line to consult with the emergency room on cardiology matters," she says. "We are available for all hours, covering all shifts. We see all patients."

Rocky View's cardiology program is one of the busiest in Calgary. The hospital has a 35-bed cardiology ward and seven-bed CCU. Prior to the change, it operated like most across the country, although it did have support from nurse practitioners, including Clarke.

But when the nurse practitioners weren't on shift, the unit was dependent on extenders and clinical assistants to cover the load. These clinicians came and went, covering shifts in hospitals around the city. According to Teresa Thurber, the executive director of critical care and women's health at RGH, although care was excellent, it was difficult to ensure there was consistency and around-the-clock expertise for patients. This new model has solved these issues. Eight nurse practitioners with specialized training in cardiology look after the unit. There is always one, and often two, of these highly educated professionals on duty.

They work in conjunction with a consulting cardiologist to ensure the critically ill patients have what they need. These professionals are responsible for the first line of care in the unit doing everything from assessments and urgent bedside consults to diagnostics and treatments.

The nurse practitioner led team at Rocky View General's medical cardiology coronary care unit

The nurse practitioners are also the first point of contact between the emergency department and the unit and provide cardiology consults for the emergency team.

"This creates consistency and continuity in coverage," says Thurber, noting despite the fact that the supporting cardiologist on the unit changes weekly, there are now professionals in place who "know the patients really well."

Thurber says although data is preliminary, she expects it to show that patients are having better experiences and outcomes within the unit. She is confident there will be a reduction in length of stay and readmission rates for patients. Thurber is impressed with the nurse practitioners' commitment and passion to the model.

"We have an exceptionally wonderful group," she says. "When we talk about putting our patients first, these providers are truly committed to doing that. They follow their patients from the emergency department to CCU or the ward and even into the community."

Dr. Nakul Sharma, who has worked alongside the nurse practitioners as the lead

By Dawn Smith/Libin Institute

Researchers receive $3M CIHR grant to conduct trials co-designed with patients

Randomized clinical trials are widely considered the most robust form of evidence when it comes to medical research. The ultimate goal is designing trials that advance science and address issues important to patients. It requires clinicians and scientists to include patient advisors in the process.

Researchers within the Libin Cardiovascular Institute at the University of Calgary's Cumming School of Medicine (CSM) received a $3 million grant from the Canadian Institutes for Health Research (CIHR) to conduct three innovative, patient-oriented trials – science that can inform health care and medical practices while addressing issues that matter to people living with chronic illness. These trials use clinical registries, existing surveys and electronic health record systems to recruit patients and collect data more efficiently than traditional randomized trials.

"We worked with patients to identify research projects that are practical and address the concerns they have about improving their quality of life, and interactions with the health care system," says Dr. Matthew James, MD, PhD, a kidney doctor, associate professor at the CSM and one of the lead researchers. "Our findings will be relevant to patients and the health-care community."

Over the next four years, the team plans to test health innovations and interventions that aim to improve care, safety and outcomes for people with three common and closely related chronic diseases: heart disease, diabetes and kidney disease.

These studies will focus on: the way patients' symptoms and experiences are recorded, communicated, and acted upon during doctors' visits, and whether these changes improve patient outcomes and experiences; the impact of using electronic health record systems on patients' experiences and outcomes in various settings across Alberta; and, strategies using pharmacists to improve safety in using common medications during times of illness.

Winnie Pearson has been a cardiac patient for 30 years, and is a trained patient-researcher and patient-advisor within the province's Strategic Clinical Networks and the Libin Institute. She believes patients like herself can help researchers and physicians improve Alberta's health care system.

> ***"Patient experiences can reveal a lot, both good and bad."***
>
> ***- Winnie Pearson, patient advisor***

"Involving patients in choosing what to research and how to research means we learn how to correct mistakes and do things better than we did before," she says. "Patient experiences can reveal a lot, both good and bad."

At age 73, Pearson registered at UCalgary to gain the education required to help design scientific studies. She says being involved in this work has been rewarding, especially in recent years, when patient-oriented research has taken off.

"I am very, very pleased and honoured that I am able to be part of this research," she says.

The researchers are part of the Interdisciplinary Chronic Disease Collaboration, a multi-discipline, multi-site team made up of health-care leaders, researchers, patients and care providers who have united to address key challenges in chronic disease care.

By Dawn Smith/Libin Institute

Members of CV & Me pose with UCalgary President Dr. Ed McCauley (far left) after receiving th University of Calgary Equity, Diversity and Inclusion Team award.

The CV & Me Women's Cardiovascular Health Program within the Libin Cardiovascular Institute at the University of Calgary supports the conduct of novel cardiovascular research that impacts patients, trains future scientists and leads institutions in incorporating sex and gender considerations into research and care.

Our work spans sex (biological attributes) and gender (socially constructed roles, behaviors, expressions, identities) considerations in cardiovascular research and patient care.

In the first six months of the Initiative, CV&Me has executed three community engagement events featuring internationally recognized experts in sex and gender differences in cardiovascular health, reaching nearly 700 people in the community. Additionally, the initiative hosted an International Trainee Symposium: Research is Better with Sex and Gender, where 75 trainees from across Canada and the Netherlands came together to learn how to better integrate sex and gender considerations in their research moving forward.

New cell discovered that can heal hearts

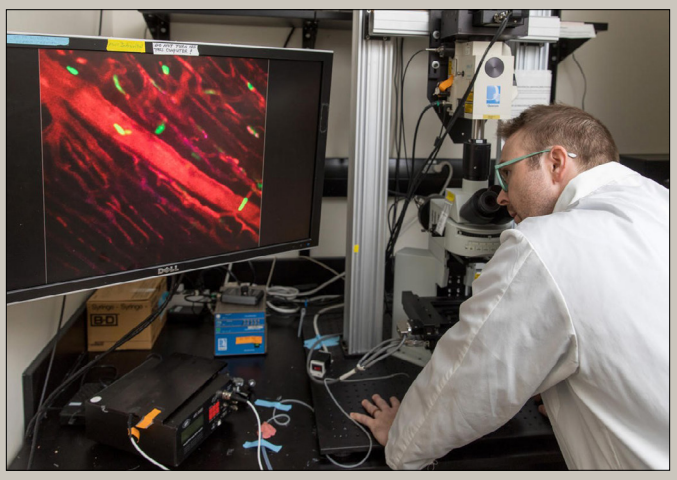
University of Calgary researchers are the first to discover a previously unidentified cell population in the pericardial fluid found inside the sac around the heart. The discovery could lead to new treatments for patients with injured hearts. The study led by Drs. Paul Kubes, PhD, Justin Deniset, PhD, and Paul Fedak, MD, PhD, is published this month in the internationally recognized journal Immunity.

The Kubes lab, in collaboration with the Fedak lab, found that a specific cell, a Gata6+ pericardial cavity macrophage, helps heal an injured heart in mice. The cell was discovered in the pericardial fluid (sac around the heart) of a mouse with heart injury. Working with Fedak, a cardiac surgeon and incoming director of the Libin Cardiovascular Institute of Alberta, the same cells were also found within the human pericardium of people with injured hearts, confirming that the repair cells offer the promise of a new therapy for patients with heart disease.

Photo above: Clinician-scientist Paul Fedak, left, with immunology researchers Paul Kubes and Justin Deniset. Photo by Adrian Shellard, for the Cumming School of Medicine

“The fuel that powered this study is the funding from the Heart and Stroke Foundation of Canada, the collaboration between two major research institutes at CSM (Snyder and Libin) and the important contribution of philanthropy from the Libin and Snyder families to obtain imaging equipment available to very few programs globally,” says Kubes, the director of the Snyder Institute for Chronic Diseases at the Cumming School of Medicine (CSM) and professor in the Department of Physiology and Pharmacology.

Heart doctors had never before explored the possibility that cells just outside the heart could participate in healing and repair of hearts after injury. Unlike other organs, the heart has a very limited capacity to repair itself, which is why heart disease is the number one cause of death in North America.

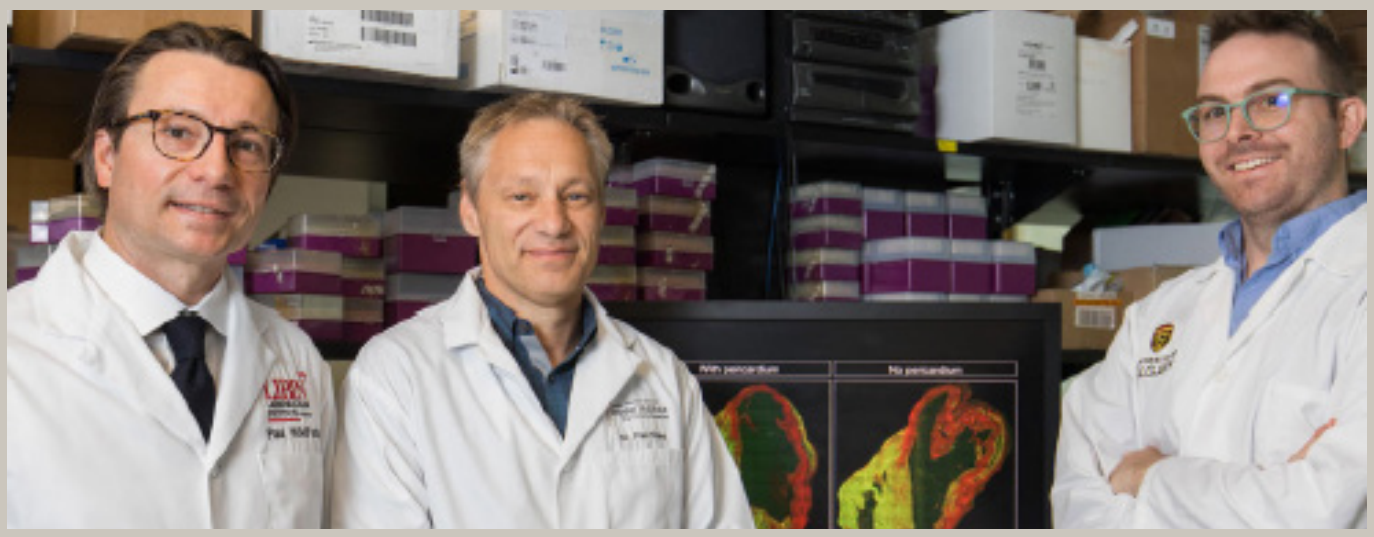


Justin Deniset uses live imaging microscopy to watch the cell as it travels through the heart. By Adrian Shellard, for the Cumming School of Medicine

“Our discovery of a new cell that can help heal injured heart muscle will open the door to new therapies and hope for the millions of people who suffer from heart disease. We always knew that the heart sits inside a sac filled with a strange fluid. Now we know that this pericardial fluid is rich with healing cells. These cells may hold the secret to repair and regeneration of new heart muscle. The possibilities for further discovery and innovative new therapies are exciting and important,” says Fedak, a professor in the Department of Cardiac Sciences.

Working together and bringing expertise across disciplines, the basic researchers working with the cardiac surgeon, clinician researcher, have identified the cell in less than three years — a relatively quick time frame to move research from the lab and animal models to people.

Justin Deniset, who is the first author on this study, has worked on this research since it



Dr. Paul Fedak, Dr. Paul Kubes and Dr. Justin Deniset pose in front of a screen showing the hearts of animal models.

began. “This project stemmed from wanting to integrate my previous research training in cardiovascular disease with my current focus on the immune system within the Kubes laboratory. The diverse expertise in both areas combined with the state-of-art infrastructure we have here at the Cumming School of Medicine made it the ideal setting to undertake such an endeavour. Collaborating with a clinician scientist such as Dr. Fedak provided a different perspective to our research questions and enhanced the impact of our work. This type of partnership also paves the way to explore how to translate our findings from the bench to the clinic, which is ultimately our goal,” he says.

Next Fedak hopes to recruit a basic scientist to move the research to a broader study of human heart repair. This new program will extend the collaboration between basic and clinical research to find potential new therapeutics to improve heart repair.

Philanthropy fuels advances in research

Both the Kubes and Fedak labs have a solid foundation of support from some of UCalgary’s most generous philanthropic partners, including the Snyder, Libin and Campbell families, whose contributions over the years have allowed the researchers to bring in cutting-edge technology and talented trainees to advance their work and make a global impact in health outcomes.

“The results are spectacular — a fundamental scientific discovery with enormous clinical relevance. It highlights that supporting any part of the CSM enterprise can result in a significant impact in ways you may not expect,” says Fedak. “I am thankful for the support of these families for strengthening my laboratory and allowing me to successfully collaborate with a world-class scientist from the Snyder Institute. We may have invented a new field of research — immuno-cardiology!”

This research is supported by the Heart and Stroke Foundation of Canada, the Canadian Institutes of Health Research, the Canada Research Chairs Program, the National Institutes of Health.

By Jordanna Heller and Steve Macfarlane, Cumming School of Medicine

Appendix B

Cardiac Sciences Grand Rounds Speakers

SPEAKER	ORIGIN	TITLE
Iain Parsons	South London Deanery, Major–British Army	Syncope in the UK Armed Forces
Jacob A. Udell	University of Toronto	Influenza, Respiratory Infections and Cardiovascular Outcomes - New Evidence and Role of Vaccination
Shelley Zieroth	University of Manitoba	Harnessing Social Media: How Twitter may be an efficient tool for # WIC, knowledge translation, collaboration and academic promotion in Cardiovascular Medicine
Kevin Busche and Sarah Weeks	University of Calgary	Mistreatment in Medical Education - Teaching with the Mind and the Heart
Andre Diedrich	Vanderbilt University	
Nashville, TN	Postural Tachycardia Syndrome - Neuropathic or Hyperadrenergic	
Rajat Sharma	University of British Columbia	Improving outcomes after In-hospital cardiac arrest
Benjamin Hibbert	University of Ottawa	Experimental Medicine in Interventional Cardiology: Closing the Translation Gap
Roopinder Sandhu	University of Alberta	Measuring the Quality of Care for Atrial Fibrillation in Canada: Are we doing a good job?
Mark Chandy	Stanford University	Gene and environmental interactions in cardiovascular disease
Meena Madhur	Vanderbilt Institute for Infection, Immunology, and Inflammation	Hypertension: What's Your Goal?

SPEAKER	ORIGIN	TITLE
Jonathan Howlett	University of Calgary	The Role of Mini AVR in an Evolving TAVI World
Rahul Potluri	Aston Medical School, United Kingdom	Big data in Cardiology: Current applications and Roadmap to the future
Robert Califf	Duke Health	Generating and Disseminating the Evidence to Improve Cardiovascular Health
Residents	University of Calgary	Christmas Jeopardy
Carlos Morillo	University of Calgary	Cardiology 2019 in Review
Blandine Mondesert	Université de Montréal	Cardiac Implanted Electronic Devices and Tranvenous Lead Extraction in Adult Congenital Heart Disease patients
Maria Jose Santana	University of Calgary	The Role of Patient-reported Outcomes and Experiences in Health and Health Care
Anita Y. M. Chan	Toronto	Cardiac Amyloidosis: The Unique Role of Nuclear Cardiology
Brian Clarkee	University of Calgary	Remote monitoring in heart failure: possibilities, pitfalls, and patient perspectives
Amy B. Bromley	University of Calgary	Navigating Care After Death in Calgary
Piotr Slomka	Cedars Sinai	Translating artificial intelligence developments into clinical practice of cardiovascular imaging
Renato Lopes	Duke University	Treating patients with AF and PCI: Where do we stand in 2020?
Marc Deyell	University of British Columbia	The Lowly PVC: Implications and Treatment in 2020
Glen Sumner	University of Calgary	Alignment of Incentives with Health Outcomes: The Future of Physician Payment

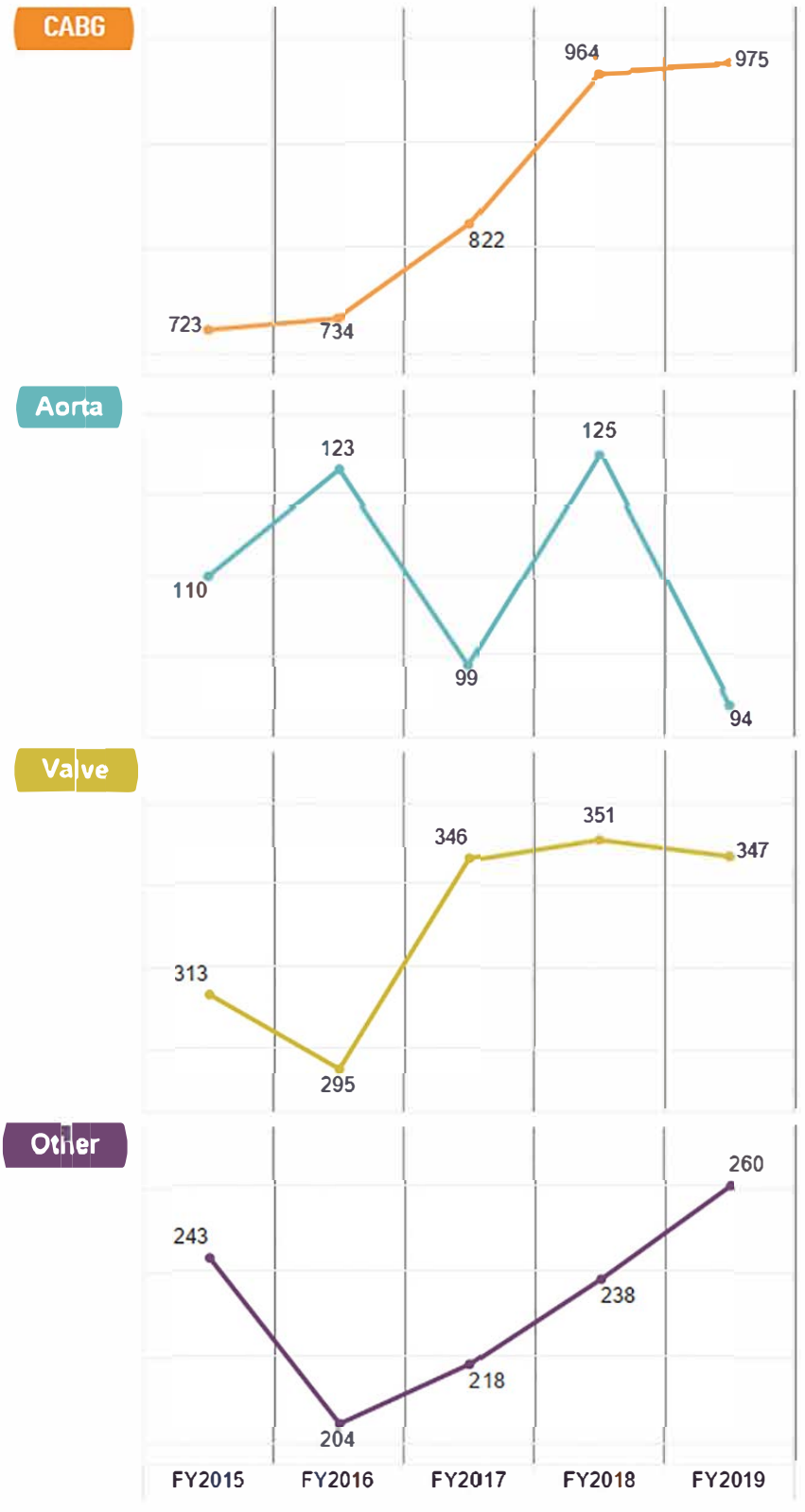
SPEAKER	ORIGIN	TITLE
Eliano Navarese	Nicolaus Copernicus University, Bydgoszcz, Poland	Evidence on PCSK9 Inhibitors in high-risk patients
Jagat Narula	Mount Sinai	Can we eliminate coronary disease in our lifetime?
Daniel Malebranche	Bern Freiburgstrasse Bern, Switzerland	One and done? Evaluating patterns of LV assessment in patients with Acute Coronary Syndromes: ACS Choosing Wisely
Ayaaz K. Sachedina	University of Texas	The Goldilocks Conundrum: Finding the mechanical support device that's "just right"

CARDIAC SURGERY PRIMARY CATEGORY BY THE NUMBERS

A pattern of growth

CARDIAC SURGERY PRIMARY CATEGORY

INCREASE OVER THE PAST 5 YEARS



FY2019/2020

***

ECMO INSERTION

29

***

VENTRICULAR ASSIST DEVICE (VAD)

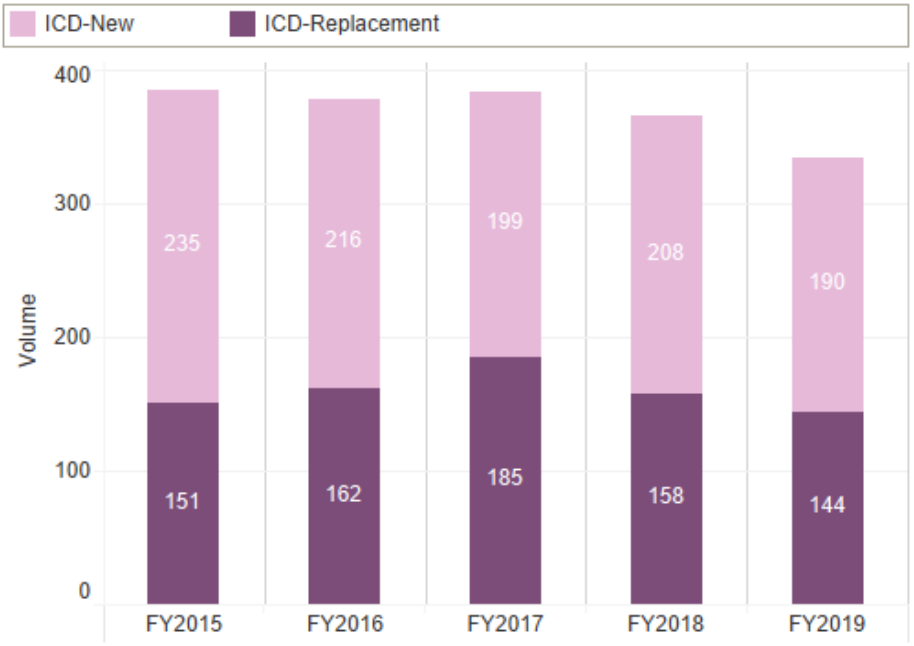
14

CARDIAC DEVICES BY THE NUMBERS

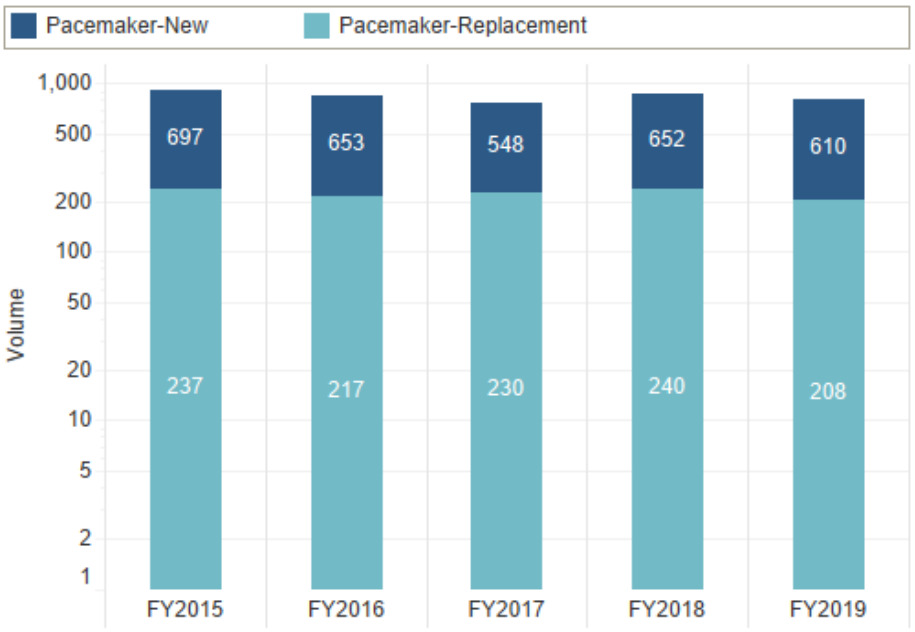
A pattern of growth

CARDIAC DEVICES

Implantable Cardioverter Defibrillator (ICD)



Pacemakers



CARDIAC SCIENCES BY THE NUMBERS

A pattern of growth

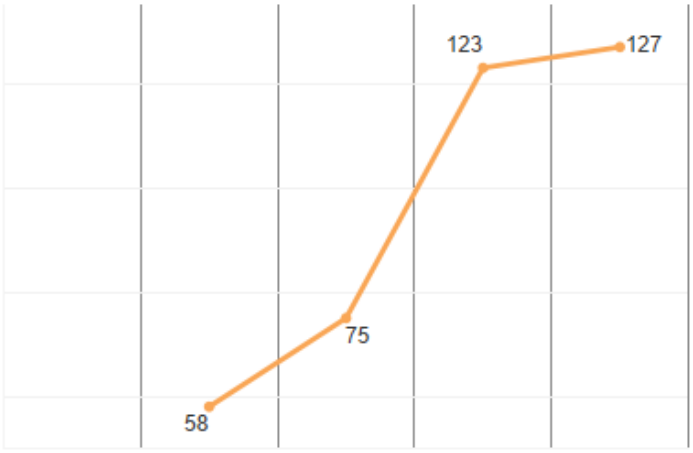
STRUCTURAL HEART PROCEDURES

PFO
FY2019/20
24

ASD
FY2019/20
6

Perivalvular Leak Repair
FY2019/20
2

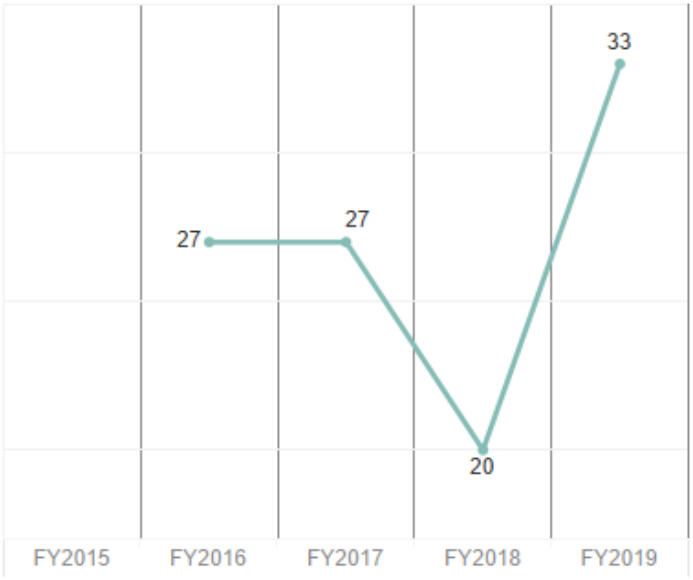
TAVI



INCREASE OVER THE PAST **5 YEARS**

119%

Valvuloplasty



22%

FY2019/20

***

NO. OF STRUCTURAL HEART PATIENTS

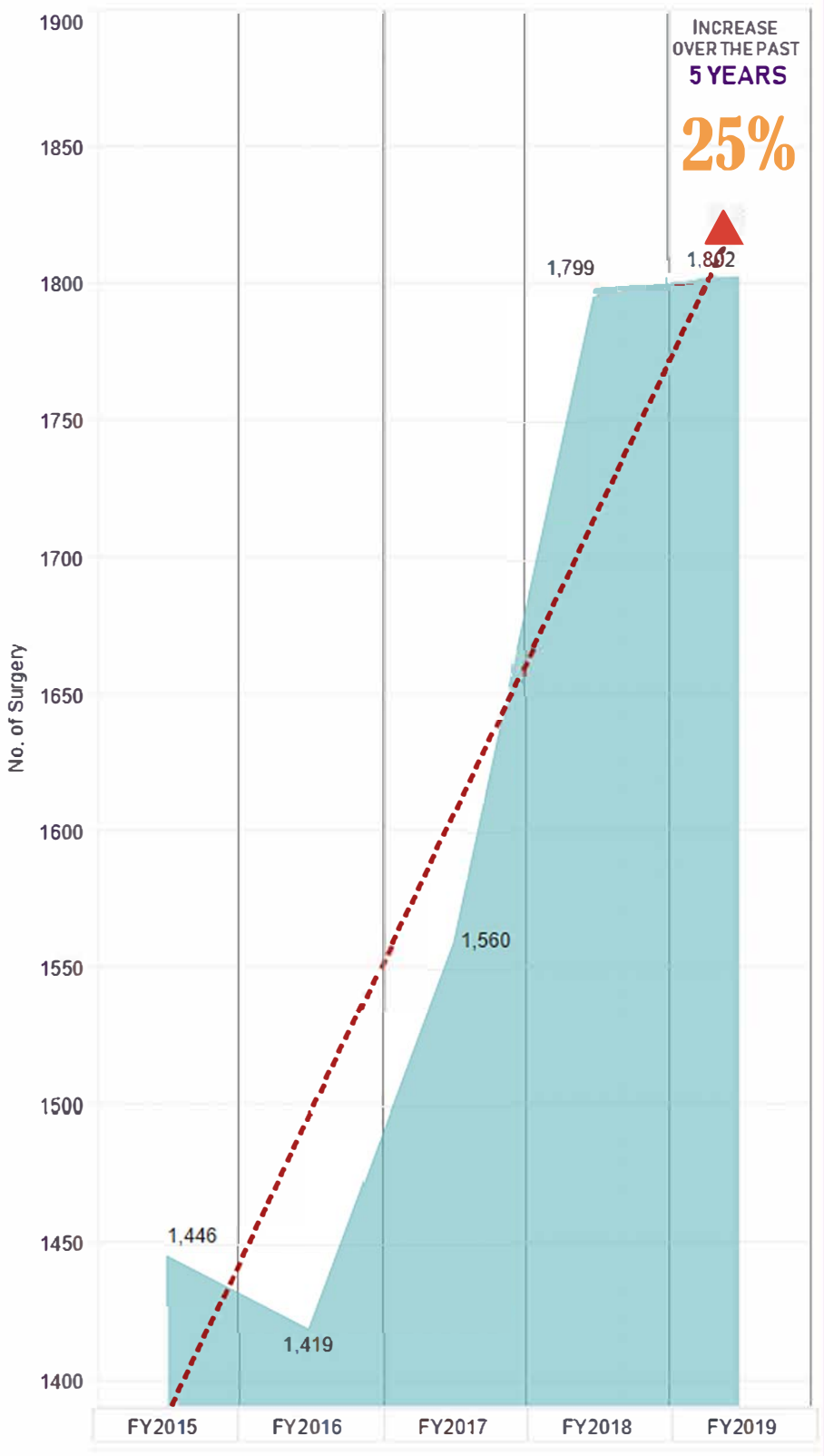
150

***

CARDIAC SURGERY BY THE NUMBERS

A pattern of growth

CARDIAC SURGERIES PERFORMED



FY2019/2020

***

SURGERIES PERFORMED

1,802

Cardiovascular surgeries performed, including coronary artery bypass grafting, aortic valve repair, mitral valve repair, etc.

***

NEW SURGERY REFERRALS

2,505

INCREASE OVER THE PAST 5 YEARS

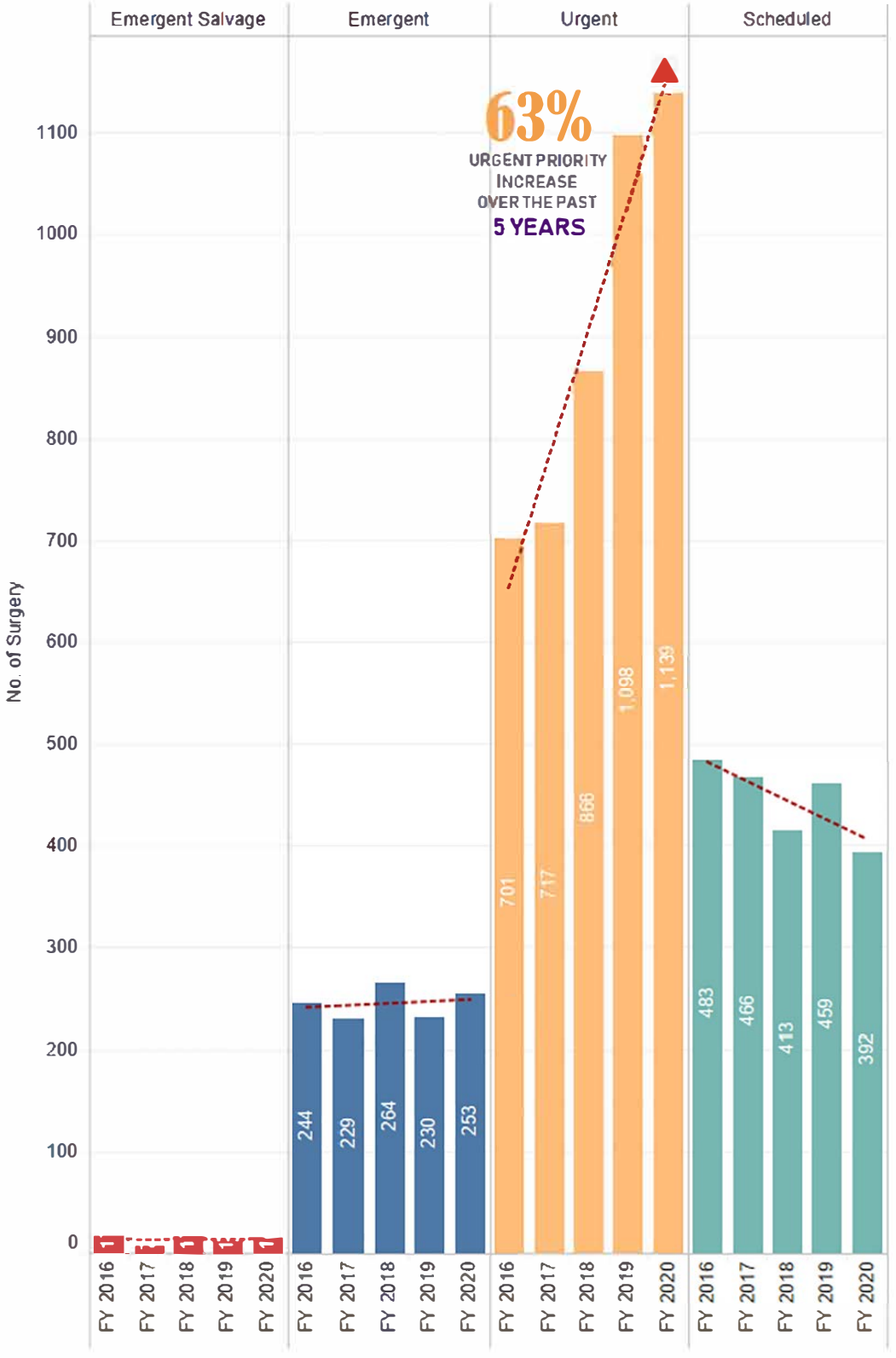
38%

***

CARDIAC SURGERY PRIORITY BY THE NUMBERS

A pattern of growth

CARDIAC SURGERY PRORITIES



CARDIAC SCIENCES BY THE NUMBERS

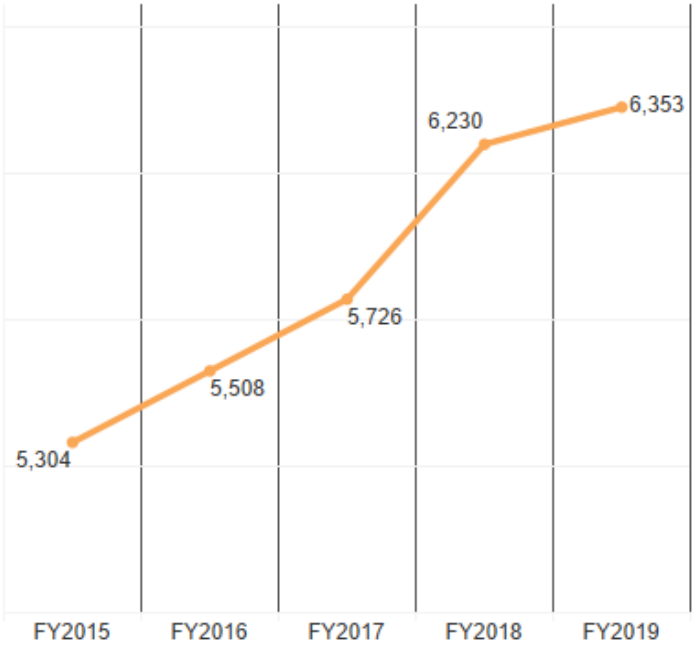
A pattern of growth

PATIENT FLOW THROUGH THE EMERGENCY DEPARTMENT

No. of Consultations from the Emergency Department

INCREASE OVER THE PAST 5 YEARS

20%



FY2019/20 ED Disposition

***

ADMITTED

3,908

(62%)

***

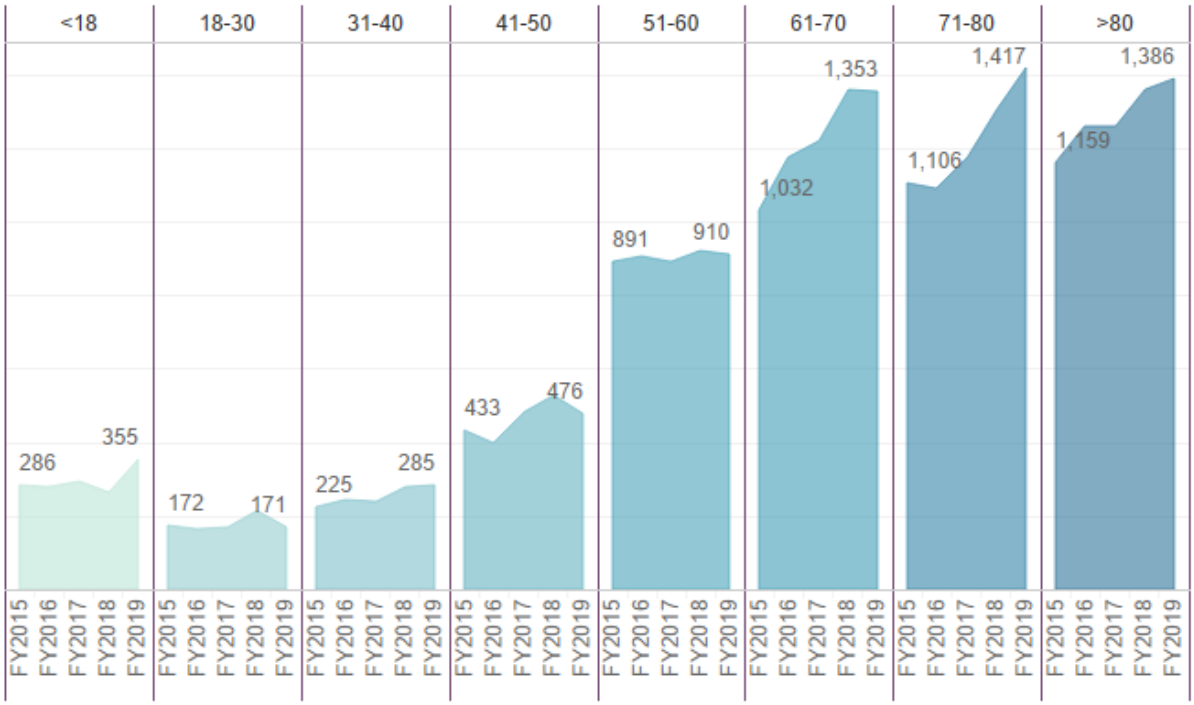
DISCHARGED

2,259

Age Groups of Emergency Department Referrals

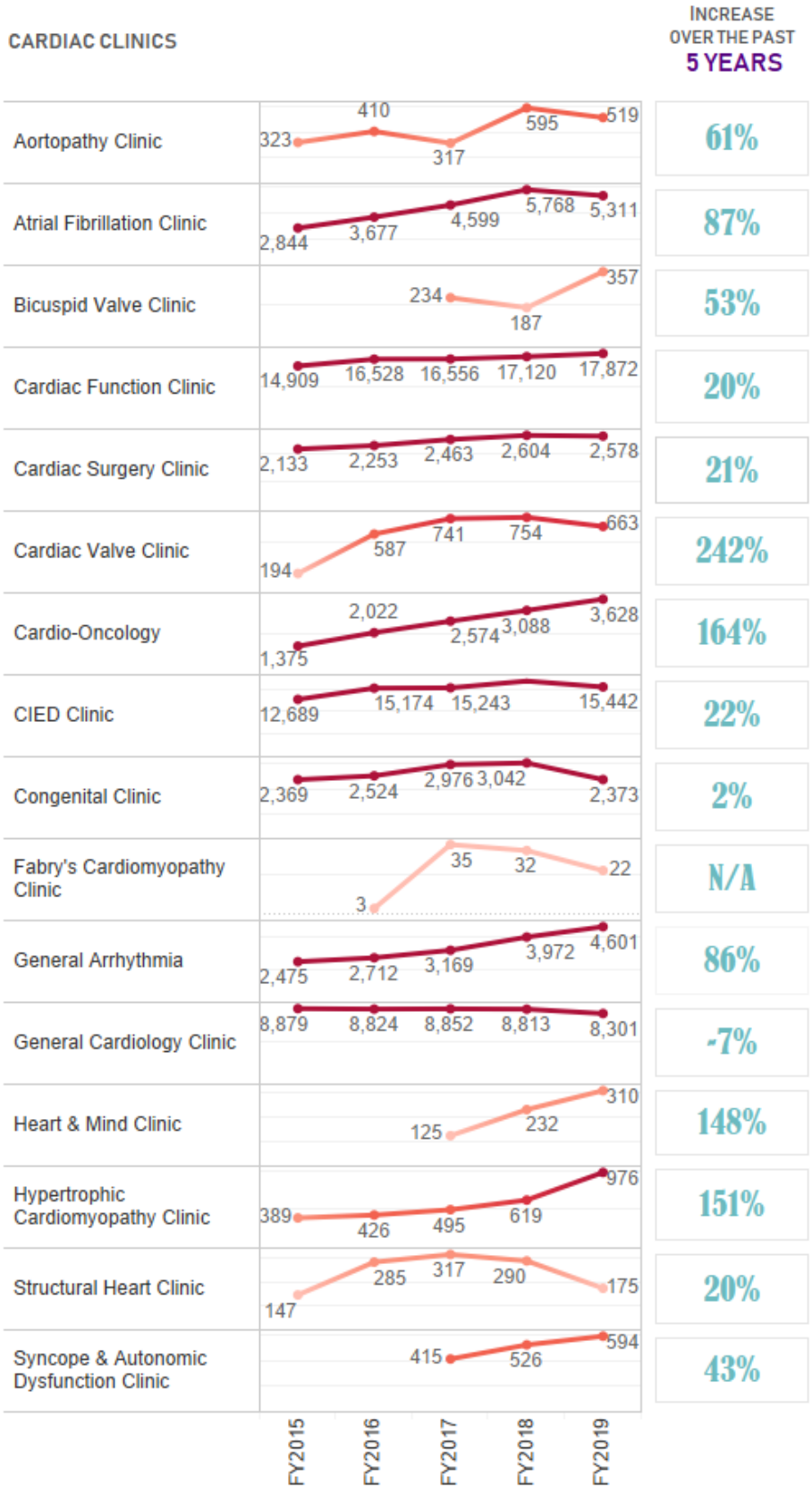
INCREASE OVER THE PAST 5 YEARS

<18	18-30	31-40	41-50	51-60	61-70	71-80	>80
24%	-1%	27%	10%	2%	31%	28%	20%



CARDIAC CLINICS BY THE NUMBERS

A pattern of growth



FY2019/20

***

TOTAL NO. OF SITE CLINICS

25

***

TOTAL NO. OF VISITS

63,722

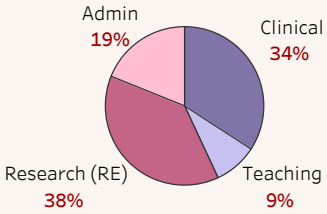
*Included face-to-face visits, phone/virtual visits.

Annual Report 2019-20 Cardiac Science

ANNUAL FTEs [2]

	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 [1.1]
CSM	500	508	518	517	526	526
Basic Sciences	126	129	136	141	143	142
Clinical w/out AARP	153	157	157	161	165	162
Clinical w. AARP	221	222	225	215	218	220
Cardiac Science	19	17	20	19	19	18

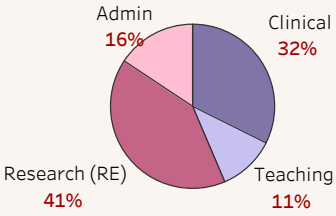
Cardiac Science [3.1]



ANNUAL REs [3]

	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
CSM	199.6	201.4	209.0	223.1	230.5	225.0
Basic Sciences	66.8	67.9	72.9	79.6	81.4	80.6
Clinical with AARP	81.5	81.0	83.8	86.4	89.9	87.2
Clinical wout AARP	51.2	52.5	52.3	57.1	59.2	56.5
Cardiac Science	7.3	6.3	7.9	8.1	8.0	6.9

Clinical with AARP [3.1]



TOTAL RESEARCH REVENUE [4]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	$167.1M	$164.0M	$198.3M	$213.4M	$213.8M
Basic Sciences	$43.7M	$41.6M	$52.3M	$59.7M	$62.3M
Clinical w AARP	$65.6M	$62.9M	$70.1M	$76.8M	$66.0M
Clinical w/out AARP	$24.2M	$27.6M	$30.1M	$34.5M	$36.4M
Cardiac Science	$8.8M	$7.8M	$9.5M	$8.3M	$8.9M

RESEARCH REVENUE PER RE [4.1]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	$0.84M	$0.81M	$0.95M	$0.96M	$0.93M
Basic Sciences	$0.65M	$0.61M	$0.72M	$0.75M	$0.76M
Clinical with AARP	$0.80M	$0.78M	$0.84M	$0.89M	$0.73M
Clinical without AARP	$0.47M	$0.53M	$0.58M	$0.60M	$0.61M
Cardiac Science	$1.21M	$1.25M	$1.20M	$1.02M	$1.12M

TOTAL CIHR REVENUE [5]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	$30.4M	$33.0M	$38.7M	$45.3M	$46.7M
Basic Sciences	$14.6M	$14.6M	$16.6M	$18.1M	$19.4M
Clinical w AARP	$12.5M	$13.1M	$14.9M	$19.0M	$16.3M
Clinical w/out AARP	$3.3M	$5.2M	$7.2M	$8.3M	$11.0M
Cardiac Science	$1.40M	$1.00M	$1.07M	$1.41M	$0.89M

CIHR REVENUE PER RE [5.1]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	$0.15M	$0.16M	$0.19M	$0.20M	$0.20M
Basic Sciences	$0.22M	$0.22M	$0.23M	$0.23M	$0.24M
Clinical with AARP	$0.15M	$0.16M	$0.18M	$0.22M	$0.18M
Clinical without AARP	$0.06M	$0.10M	$0.14M	$0.15M	$0.19M
Cardiac Science	$0.19M	$0.16M	$0.14M	$0.17M	$0.11M

TOTAL CLINICAL RESEARCH REVENUE [6]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	$23.2M	$58.9M	$68.0M	$67.3M	$47.9M
Basic Sciences	$1.8M	$6.7M	$8.8M	$6.7M	$4.6M
Clinical w AARP	$16.1M	$34.9M	$44.3M	$45.2M	$30.8M
Clinical w/out AARP	$3.9M	$16.9M	$13.7M	$14.2M	$11.7M
Cardiac Science	$2.00M	$4.59M	$5.73M	$4.72M	$4.97M

CLINICAL RESEARCH REVENUE PER RE [6.1]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	$0.12M	$0.29M	$0.33M	$0.30M	$0.21M
Basic Sciences	$0.03M	$0.10M	$0.12M	$0.08M	$0.06M
Clinical with AARP	$0.20M	$0.43M	$0.53M	$0.52M	$0.34M
Clinical without AARP	$0.08M	$0.32M	$0.26M	$0.25M	$0.20M
Cardiac Science	$0.28M	$0.73M	$0.72M	$0.58M	$0.62M

RESEARCH SUPPORT FUND [14]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	$4.92M	$5.56M	$5.85M	$6.04M	$6.34M
Basic Sciences	$2.89M	$3.10M	$3.04M	$2.93M	$2.97M
Clinical with AARP	$1.40M	$1.69M	$1.92M	$2.06M	$2.18M
Clinical w/out AARP	$0.62M	$0.75M	$0.87M	$1.02M	$1.18M
Cardiac Science	$0.14M	$0.16M	$0.17M	$0.15M	$0.14M

RESEARCH SUPPORT FUND per RE [14.1]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	$29.3K	$32.8K	$33.4K	$32.2K	$32.5K
Basic Sciences	$43,200	$45,710	$41,632	$36,844	$36,421
Clinical with AARP	$27.5K	$33.5K	$37.4K	$39.2K	$39.9K
Clinical w/out AARP	$12.4K	$14.6K	$17.2K	$18.5K	$19.9K
Cardiac Science	$19.8K	$26.0K	$20.9K	$18.0K	$17.8K

NOTES and Definitions

1

201920 Cardiac Science Annual Report
This is the Department annual report, where Citations for 2019 have only been added for Cardiac Science. The rest of CSM will be added on a later date.

1.1 **Year 2020-21**
Snapshot of Faculty Counts, as of June 30 2020. This is the definition used by HR Systems and Reporting and the OIA Fact Books.

2 **FTEs**
Full-time Academic Staff with Ranks of Professor, Associate Professor or Assistant Professor, Instructor, Senior Instructor, as of June 30 of the previous year (e.g. 2020 FTEs are as of June 30 2019)
Department Groups Defined as Follows:
a) Basic Sciences (Biochemistry & Molecular Biology, Cell Biology & Anatomy, Community Health Sciences, Microbiology Immunology & Infectious Diseases, Physiology & Pharmacology)
b) Clinical with AARP (Cardiac Sciences, Clinical Neurosciences, Family Medicine, Medicine, Paediatrics)
c) Clinical without AARP (Anaesthesia, Critical Care Medicine, Emergency Medicine, Medical Genetics, Obstetrics & Gynaecology, Oncology, Pathology & Laboratory Medicine, Psychiatry, Radiology, Surgery)

Source:
Annual Factbook by the UCalgary Office of Institutional Analysis

3 **REs**
Average Research Time Allocation, divided by 100 and multiplied by the number of FTE faculty (see Note 2).
Note: To account for CSM Academic Staff members with no time allocations reported in the ARO, the previous year's time allocation is used. If the previous year's time allocation is also blank, then the department average is assigned.

Source:
Academic Report Online

3.1 **Time Allocation**
Average Time Allocation (as reported in ARO) for FTE faculty (see Note 2).
Note: To account for CSM Academic Staff members with no time allocations reported in the ARO, the previous year's time allocation is used. If the previous year's time allocation is also blank, then the department average is assigned.

Source:
Academic Report Online

4 **Total Research Revenue**
Annual Research Revenue for Projects assigned to CSM
- Revenue is assigned to a Department/Comparator Group based on the Project Department.
- CSM total includes Project Departments not part of the 20 CSM Departments (e.g. Dean's Department - Operations)
* Of the ~$34 million dollar increase in CSM Research Revenue from 2016-17 to 2017-18, ~$21.5 million is grant revenue and ~$10.5 million is donation related.

Source:
Enterprise Reporting\Research & Trust Accounting datamart

4.1 **Research Revenue per RE**
Annual Research Revenue (See note 4) divided by the number of Research Equivalents in the same year (See note 3)
* For the CSM Total, Revenue assigned to Project Departments not part of the 20 CSM Departments is excluded (e.g. Dean's Department - Operations revenue is excluded)

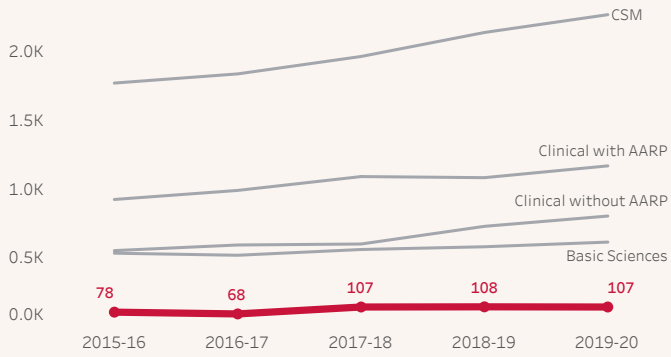
5 **CIHR Revenue**
Research revenue export (see Note 4), where:
IF Account Description = ("CIHR Grants" OR "CIHR Authorized Transfers")
OR
Tri-Council Source = "CIHR" AND Account Description ("CIHR Grants" OR "CIHR Authorized Transfers")

5.1 **CIHR Revenue per RE**
Annual CIHR Research Revenue (See note 5) divided by the number of Research Equivalents in the same year (See note 3)
* For the CSM Total, CIHR Revenue assigned to Project Departments not part of the 20 CSM Departments is excluded (e.g. Dean's Department - Operations revenue is excluded)

6 **Clinical Research Revenue**
Research revenue export (see Note 4), where" Purpose of Funds = "Clinical Trials" OR "Clinical Research"
- In 2016-17, all revenue assigned to projects involving 'Grant Sponsored Clinical Trials' was classified as 'Clinical Research'. In 2015-16, only 47% of revenue assigned to projects involving 'Grant Sponsored Clinical Trials' was classified as 'Clinical Research'. This led to a large increase in 'Clinical Research' revenue in 2016-17 from 2015-16

2015-19 FTE BIBLIOMETRICS Cardiac Science [1]

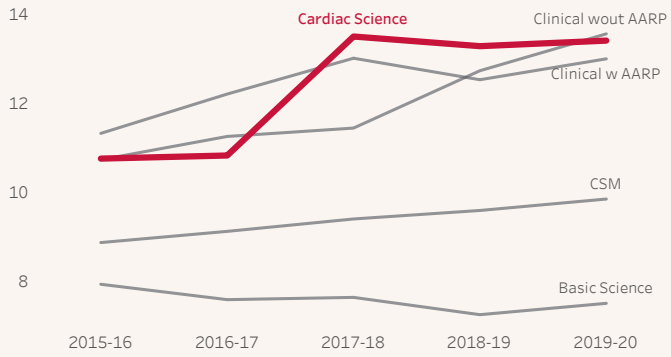
PUBLICATIONS [7]



PUBLICATIONS PER FTE [8]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	3.5	3.6	3.8	4.1	4.3
Basic Sciences	4.2	4.0	4.1	4.1	4.3
Clinical with AARP	4.2	4.5	4.8	5.0	5.4
Clinical without AARP	3.6	3.8	3.8	4.5	4.9
Cardiac Science	4.1	4.0	5.4	5.7	5.6

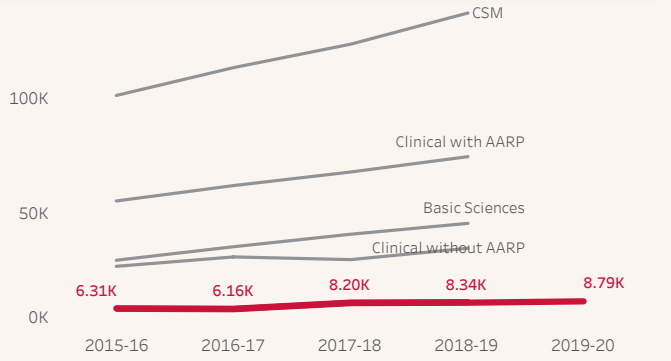
PUBLICATIONS PER RE [9]



PUBLICATIONS PER RE [9]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	8.9	9.1	9.4	9.6	9.9
Basic Science	7.9	7.6	7.7	7.3	7.5
Clinical w AARP	11.3	12.2	13.0	12.5	13.0
Clinical wout AARP	10.7	11.3	11.4	12.7	13.6
Cardiac Science	10.8	10.8	13.5	13.3	13.4

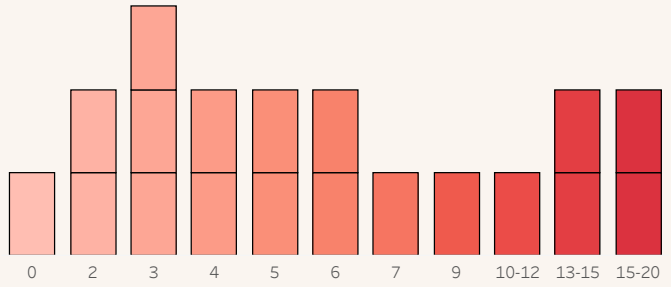
ANNUAL CITATIONS [10]



ANNUAL CITATIONS per FTE [11]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	204	225	241	267	
Basic Sciences	236	276	305	325	
Clinical with AARP	251	280	302	348	
Clinical without AARP	176	198	190	217	
Cardiac Science	332	362	410	439	462

PUBLICATIONS BY 2019/20 FTE FACULTY IN 2019 [12]



HOT PAPERS [13]

	2015-16	2016-17	2017-18	2018-19	2019-20
CSM	345	389	400	426	0
Basic Sciences	98	112	122	129	0
Clinical without AARP	86	110	92	109	0
Cardiac Science	28	24	32	27	25

NOTES and Definitions Cont'd

6.1 **Clinical Revenue per RE**
Annual Clinical Research Revenue (See note 6) divided by the number of Research Equivalents in the same year (See note 3)
* For the CSM Total, Revenue assigned to Project Departments not part of the 20 CSM Departments is excluded (e.g. Dean's Department - Operations revenue is excluded)

7 **Publications**
The number of unique papers published by FTE Faculty (see note 2) in the same publication year. (e.g. 2019-20 refers to the number of unique papers published by 2019/20 FTE faculty in the 2019 publication year)

- Only publications of Document Types "Article", "Review", "Editorial", "Case Report", "Clinical Trial" and "Book" are included;
- Papers co-authored by more than 1 FTE faculty member will be counted once within the same Group.

Source:
Web of Science; - CV from Authors sent to Office of Faculty Analysis (OFA) in 2015-20

8 **Publications per FTE**
Annual number of Unique Publications (see note 7) divided by the number of FTEs in the same year (see note 2)

9 **Annual Publications per RE**
- Annual number of unique Publications (see note 7) divided by the number of Research Equivalents in the same year (see note 3)

10 **Citations**
The number of times that unique publications by FTE Faculty of a given year have been cited in the same year
(e.g. 2018-19 refers to the number of times unique papers published by 2018/19 FTE Faculty were cited in 2018)

- Only publications of Document Types "Article", "Review", "Editorial", "Case Report", "Clinical Trial" and "Book" are included;
- Papers co-authored by more than 1 FTE faculty member will be counted once within the same Group.

Source:
Web of Science; - CVs from Authors sent to Office of Faculty Analysis (OFA) in 2015-20

11 **Citations per FTE**
Total citations in a year for all unique career publications by FTE faculty (see note 10) divided by the number of FTE Faculty in the same year (see note 3)

12 **# of Publications by 2019-20 Faculty in 2019**
Histogram of the number of papers published by 2019-20 FTE Faculty in 2019

13 **Immediate Impact Papers**
Unique publications cited > 49 times in a 5 year publication date window
(e.g. For 2018-19, sum of unique publications published between 2014-18 by 2018/19 FTE Faculty that were cited in 2014-18 greater than 49 times)

Research Support Fund

2016-20 UCalgary Research Support Fund Contribution
(Portion of Credits) / (Total UCalgary Credits) * (Annual UCalgary RSF)

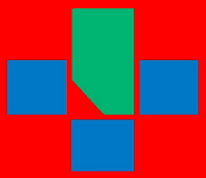
- RSF is credited to a Faculty/Department based on the the Primary Appointment of June 2020 UCalgary Faculty, or the oldest start date of UCalgary Faculty who only have multiple Secondary Appointments

Background:
14 In 2019-20 the University of Calgary was awarded a total of $13,581,364 in Research Support Funds. Research Support Funds (RSF) are awarded annually by the Tri-council Agencies to cover a portion of the indirect costs of research incurred by the University of Calgary (UC). The RSF amount awarded is based on the amount of CIHR/NSERC/SSHRC funding received by UC researchers. This dashboard shows the total RSF dollars given to the University for grants awarded to the named researchers in comparison to the RSF generated by other department/institute researchers. The table shows the awarding Tri-Council Agency and what role the researcher has on the grant. The information provided demonstrates that RSF earnings are generated for both the role of Principal Investigator and the role of Co-Investigator and highlights the benefit of being included as Co-Investigators on grant applications where the PI is external to the UC (because of the RSF dollars that will flow to UC) as well as being selective about who to include as Co-Investigators (if Co-Investigators are from the UC, the associated RSF dollars will remain at the UC; if Co-Investigators are from other institutions, a portion of the RSF dollars associated with the grant will be shared with these institutions).

Research Support Fund per RE

14.1 2016-20 Research Support Fund (see note 14) divided by the annual sum of Research Equivalents (see note 3)

UNIVERSITY OF CALGARY



Alberta Health Services