

Cardiac Sciences Annual Report

2022–2023



UNIVERSITY OF CALGARY
CUMMING SCHOOL OF MEDICINE
Department of Cardiac Sciences



**UNIVERSITY OF
CALGARY**

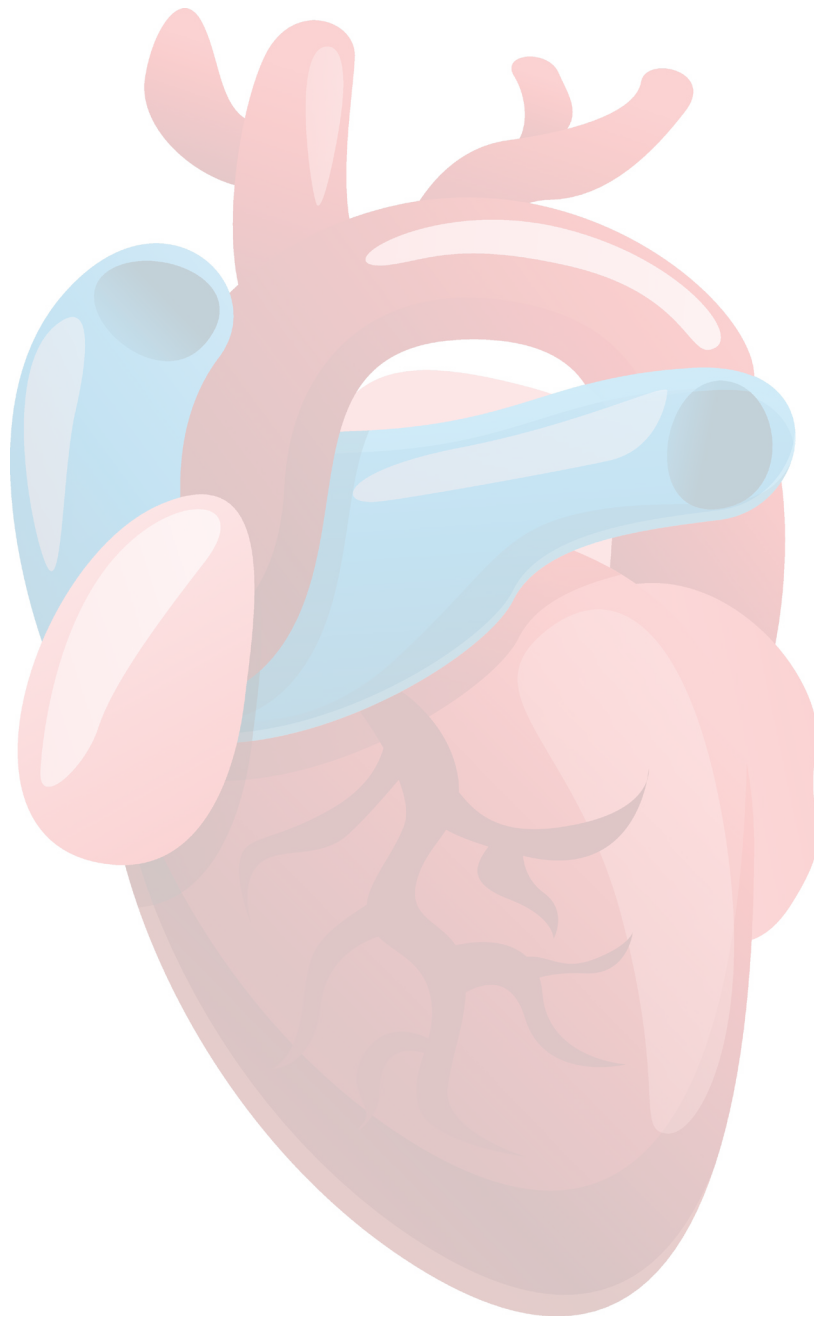


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Executive Summary

Congratulations to our Cardiac Sciences Department and Libin Cardiovascular Institute for achievements in clinical care, education, and research while still recovering from the challenges of COVID-19 pandemic. The Department of Cardiac Sciences provides advanced cardiac care to southern Albertans and to patients from adjacent provinces. As this population has grown over the last few years, we have seen continued increases in cardiac patient volumes and acuity. During the last few years, the health care system, like many other areas, has seen shortages of supplies and staff due to the pandemic. Some of the pivots that were made during COVID have been helpful and benefitted our department such as virtual care options for patients, along with innovative strategies to minimize hospital stays.

The biggest footprint for the Department is in the Foothills Medical Centre complex, however the Peter Lougheed Hospital, Rockyview General Hospital, and South Health Campus all play vital roles in the care of cardiac patients in Southern Alberta, along with many of our members that also work in the community. We have been fortunate to have many great recruits to help keep up with the growing clinical workload but also to help with academic growth. The plans and recruitment for a Women's Cardiovascular Health Clinic and program are in place to start in early 2024 and will help to focus further on women's cardiovascular health.

Education and research are important pillars of our department. As shown by all our Royal College of Physicians and Surgeons accredited programs (Cardiology, Cardiac Surgery, and Electrophysiology) all are doing well in their Royal College review in the Fall of 2023. We continue to develop new fellowship programs such as in Advanced Aortic and Amyloidosis. Our members all recognize the value of education and enjoy preparing our trainees for the future. The passion for education is evident from our many members who are in important academic positions in the University of Calgary including Assistant Dean and Associate

Dean positions but also the Dean of Medicine.

Research has always been a key strength of our departments. Many of our members are internationally recognized for their research and academic contributions. We continue to punch above our weight for clinical productivity and impact when compared to larger departments. The strong connection to Libin Cardiovascular Institute with our department has been an immense benefit for all in the academic front.

We continue to increase our work in the realms of Physician Wellness and Equity, Diversity, Inclusion, and Access. By working with organization such as Well Doc Alberta, and resources through Libin Cardiovascular Institute, Alberta Health Services, and University of Calgary. To minimize burnout and to ensure a safe environment for all is vital for the success of our department.

Overall, we have a superb and caring team of clinicians, educators, researcher, administrators, trainees, administration staff, and health care workers that make me look forward to coming to work every day and hopeful about our future. Please enjoy the annual report from the Department of Cardiac Sciences.



Departmental Structure & Organization

The Department of Cardiac Sciences is within the Cumming School of Medicine, University of Calgary and Alberta Health Services. The Libin Cardiovascular Institute is a joint entity of the University of Calgary and Alberta Health Services. The Department of Cardiac Sciences and Libin Institute work together on education, research, and clinical care.



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 over 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. Life-saving cardiovascular procedures (open-heart surgery, percutaneous coronary interventions, and others) are delivered to more than two million Albertans across three adjacent zones in Southern Alberta.



UNIVERSITY OF CALGARY
CUMMING SCHOOL OF MEDICINE
Department of Cardiac Sciences

The membership of the **Department of Cardiac Sciences** is primarily composed of cardiologists and cardiac surgeons. Our 67 cardiologists have a mix of clinical, research, education, and leadership/administrative responsibilities. The growing team of 11 clinical cardiac surgeons, which also hold a mix of academic responsibilities and clinical interests, are a source of pride for the Department. While cardiology and cardiac surgery represent the Department's primary sections, the Department is a fully integrated team providing a cardiovascular service line. As such, the Department

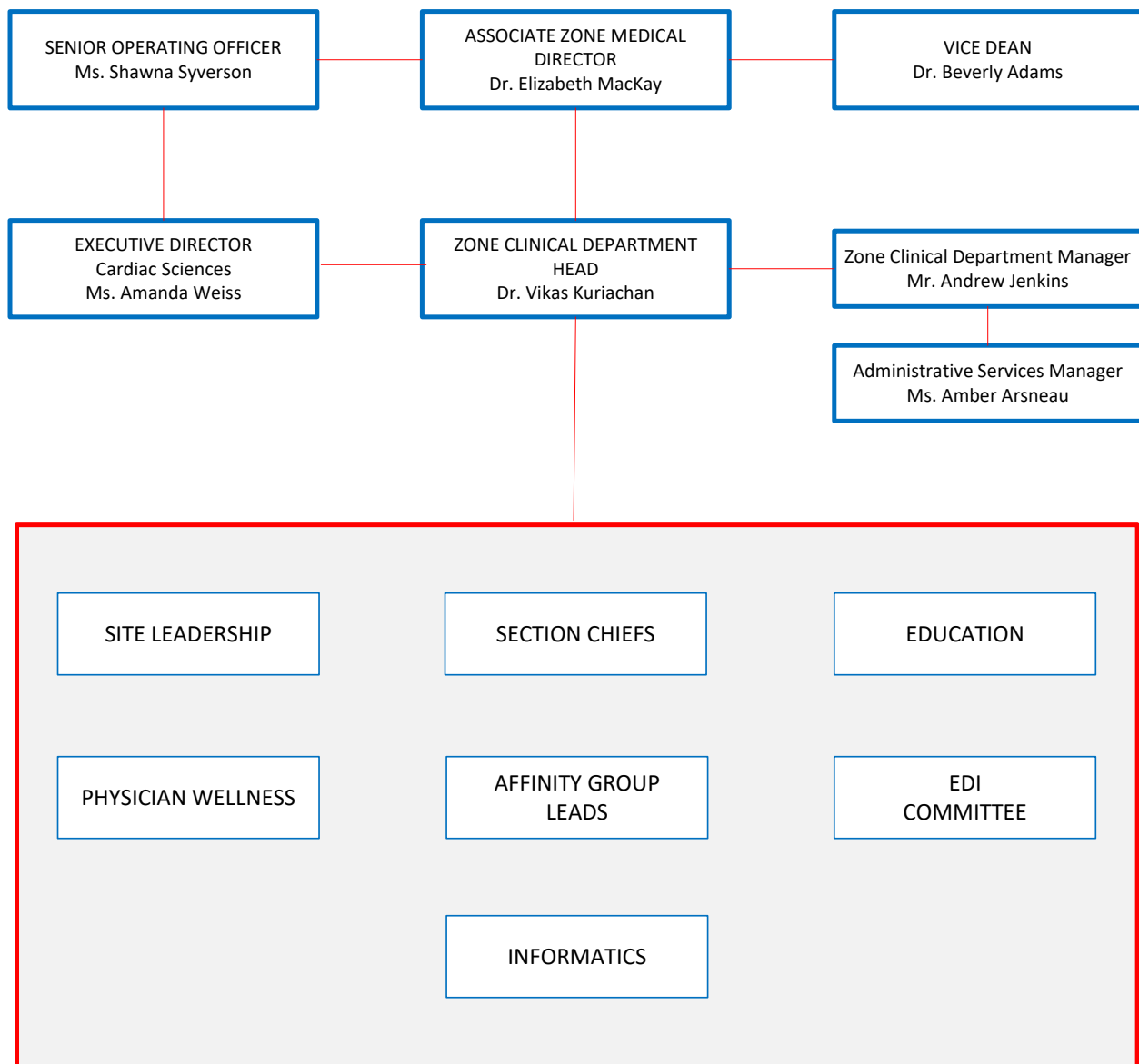
has affiliated membership with Cardiac Anaesthesia and Cardiac Intensive Care colleagues. The cardiovascular service line delivery model's integrated nature represents a fundamental value proposition of the Department's organizational leadership. Our members deliver clinical services to the health region 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 of Cardiac Sciences provides the majority of cardiovascular care throughout the vast health region. Community private practice outpatient ambulatory cardiac clinics also play an essential role in delivering outpatient ambulatory and diagnostic care in partnership with Department members. Many of these community physicians are affiliated members of the Department.



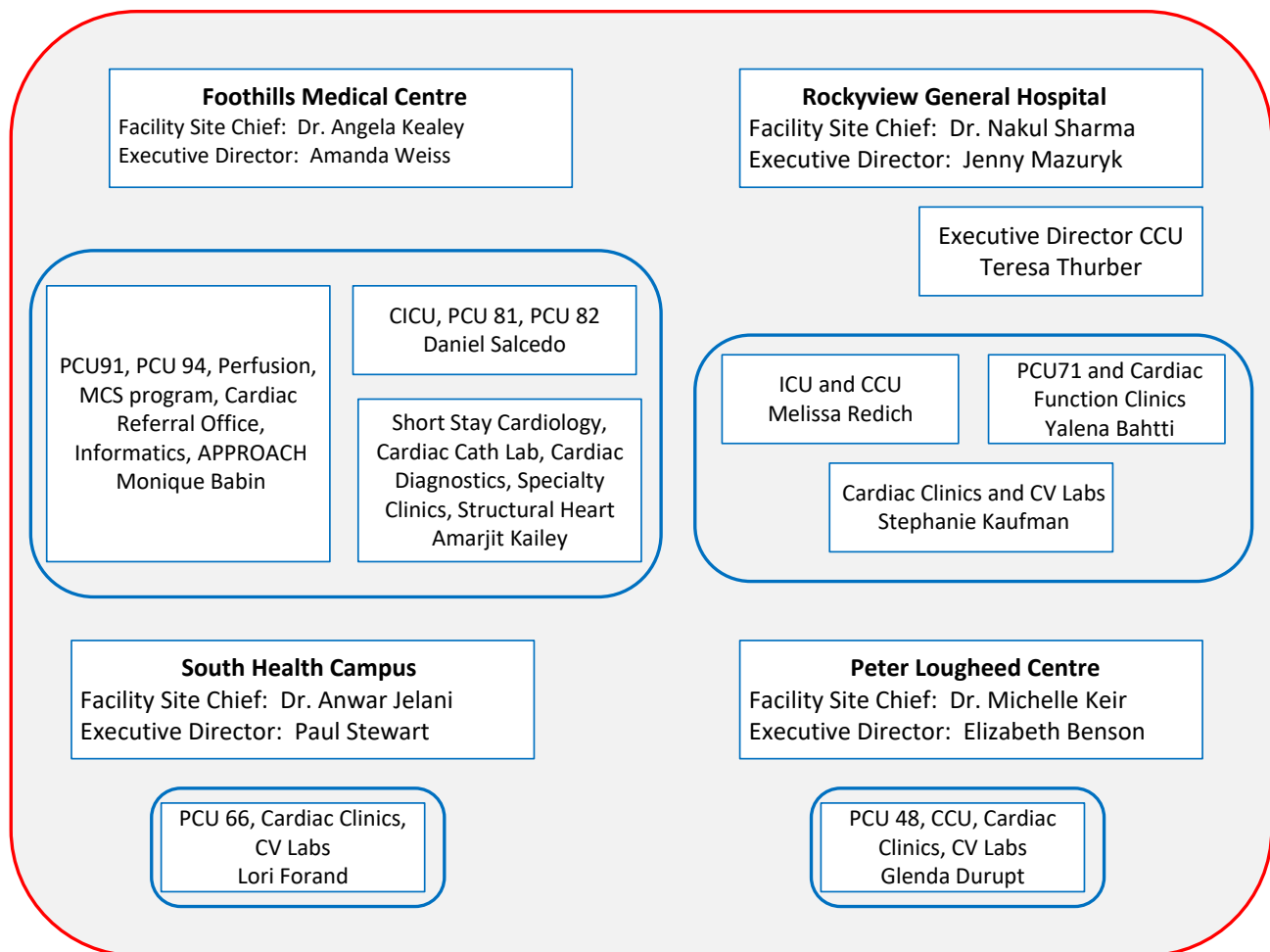
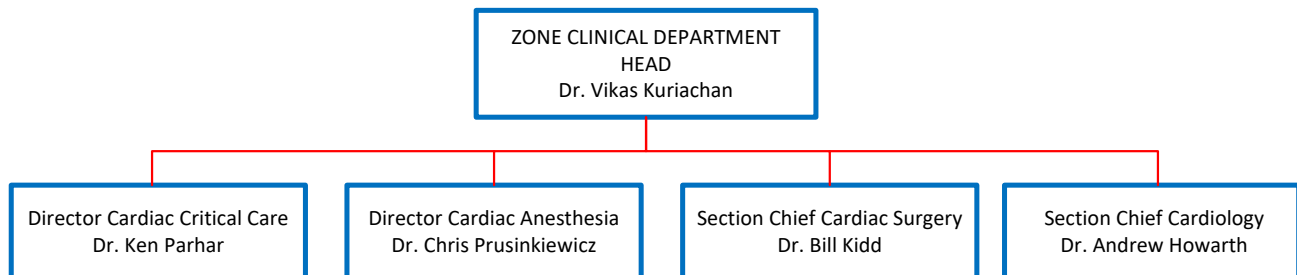
The **Libin Cardiovascular Institute (LCI)** is a joint entity of the University of Calgary and Alberta Health Services. The Institute coordinates all cardiovascular health care, education and research throughout the University of Calgary and the Calgary Zone of Alberta Health Services. The LCI is a 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.

Governance

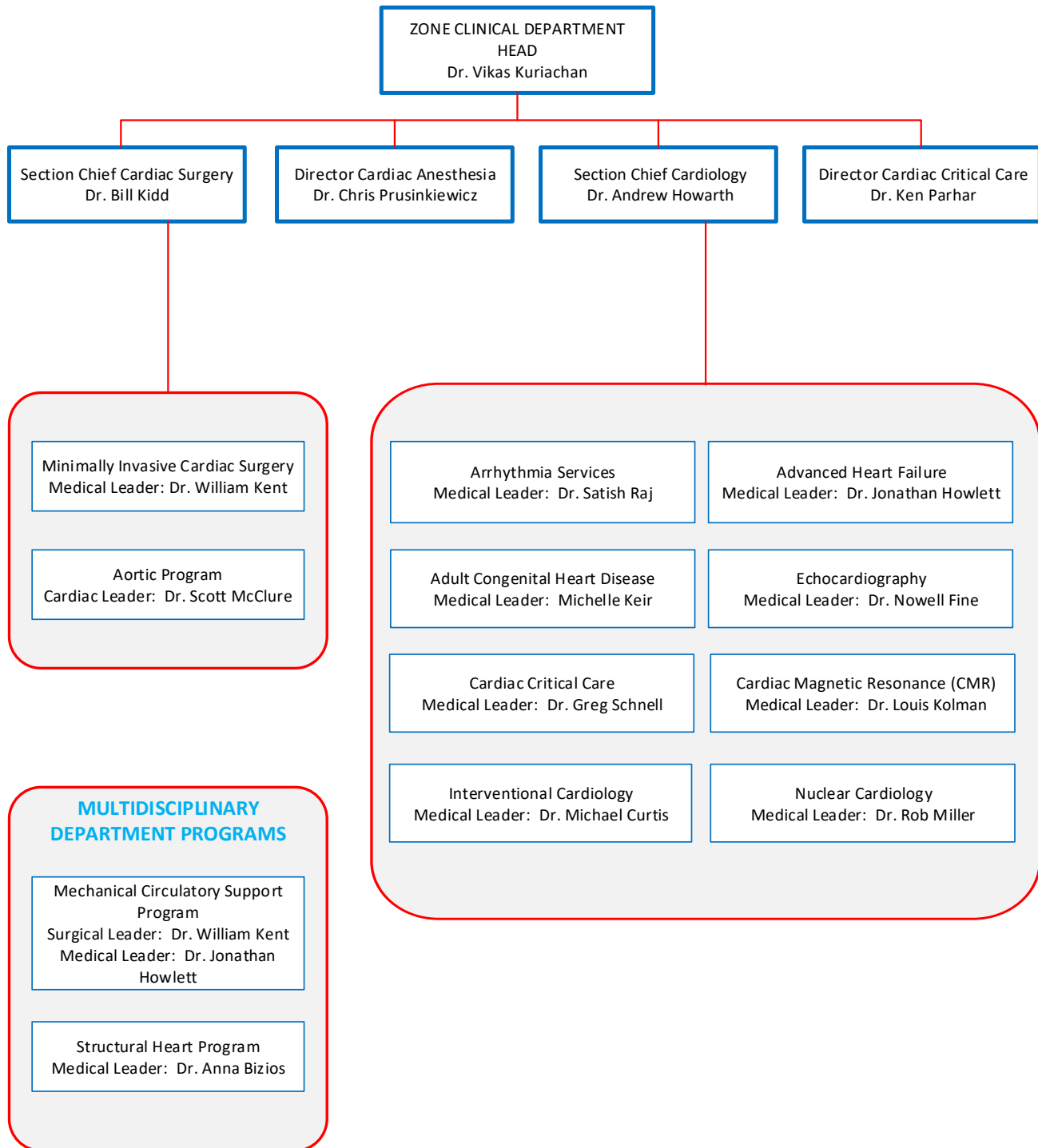
CORE LEADERSHIP DEPARTMENT OF CARDIAC SCIENCES



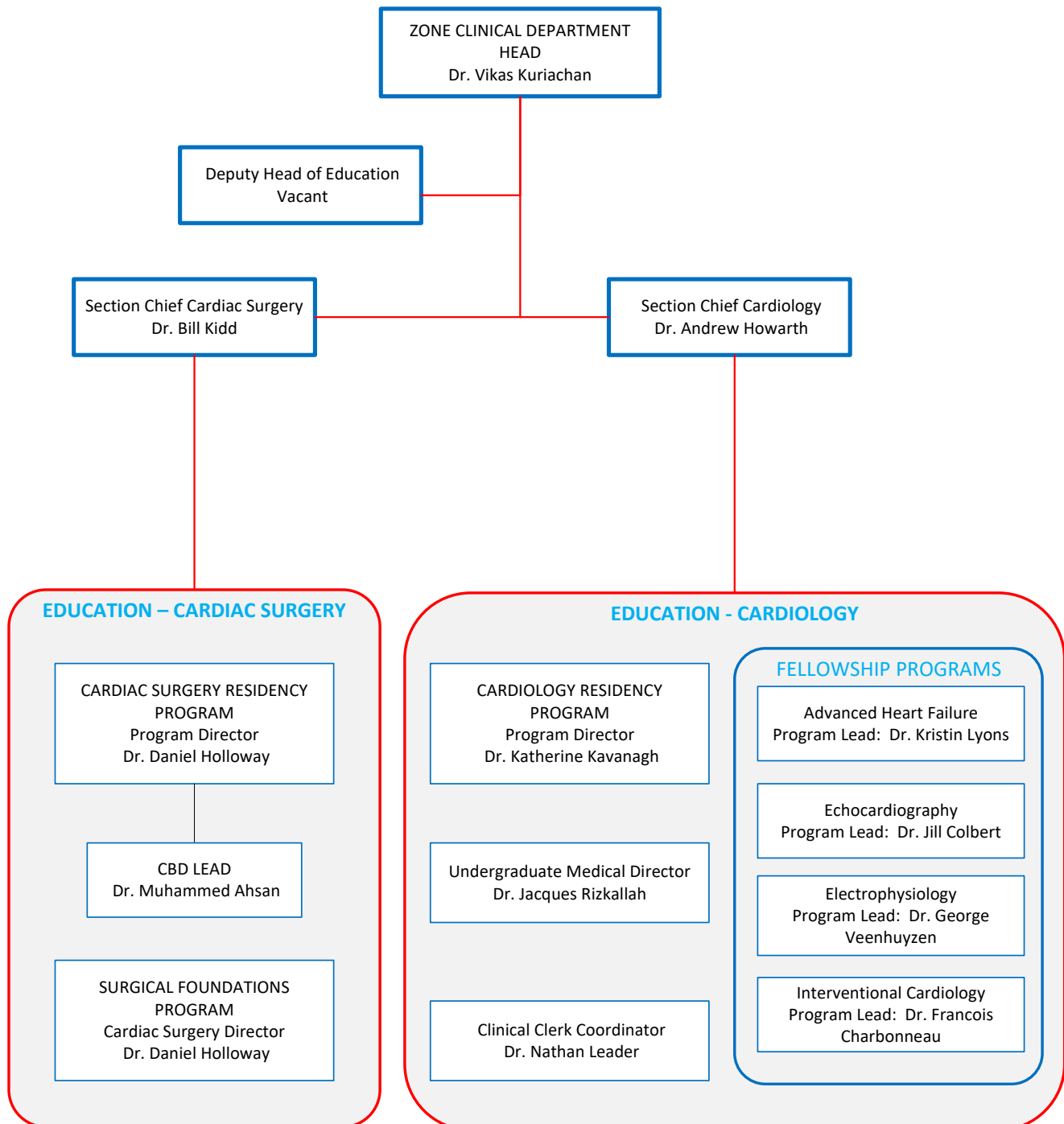
SITE LEADERSHIP
DEPARTMENT OF CARDIAC SCIENCES

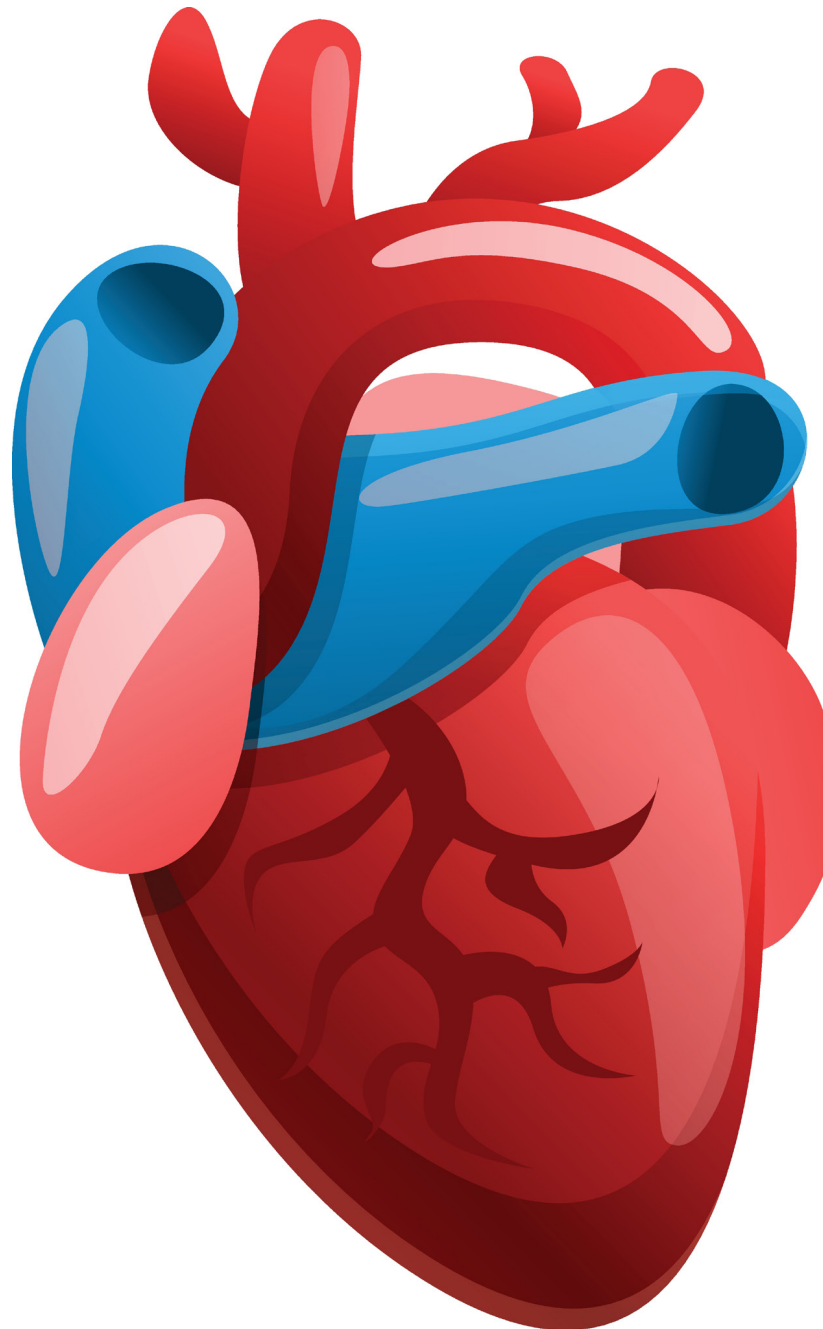


PROGRAM LEADERSHIP
DEPARTMENT OF CARDIAC SCIENCES



EDUCATION
DEPARTMENT OF CARDIAC SCIENCES





Sections

The Department of Cardiac Sciences has four components: Cardiology, Cardiac Surgery, Cardiac Anesthesiology, and Cardiac Critical Care.

CARDIOLOGY

The Section of Cardiology is a unique program in Canada that operates as a citywide care model, delivering cardiac care at all acute care sites in Calgary in an integrated model. The Section provides both un-differentiated cardiac care and specialized care in all hospitals and numerous clinics around the city with specialties that include arrhythmia, atrial fibrillation, adult congenital heart disease, aortopathies, cardio-oncology, cardiac implantable electronic devices, hypertrophic cardiomyopathy, valve, cardiac rehabilitation, heart failure and transplant, syncope and autonomic dysfunction, neuromuscular and cardiology rapid access clinics. Section members also provide primary cardiology care and diagnostic testing that include exercise testing, echocardiography, myocardial perfusion imaging, CT angiography, cardiac MRI and coronary angiography. Highly specialized care is provided at the Foothills Medical Centre with the regional coronary catheterization lab and additional specialized cardiology inpatient services as well as a quaternary care level CCU. All other hospitals in the Calgary zone offer undifferentiated cardiology inpatient services including CCU capacity (SHC, PLC, RGH).



Dr. Andrew Howarth
Section Chief, Cardiology

CARDIAC SURGERY

The Section of Cardiac Surgery is composed of 12 active members, 11 of whom are onsite Clinical appointments and Associate Professorships with the University of Calgary. One is a Full-time Professor and clinical surgeon in our Section.

We are excited to have recruited Dr. Holly Smith. She completed Medical School at McMaster University, and then graduated from our cardiac surgery residency program. She then pursued an advanced fellowship in Aortic and Structural Heart Surgery at the University of Texas in Houston. In addition, she has also completed a Master of Business Administration at the University of Chicago Booth School of Business.

offer congratulations to Dr. William Kent for successful promotion to the academic rank of Clinical Associate Professor of Medicine, Cumming School of Medicine



Dr. William Kidd
Section Chief, Cardiac Surgery

CARDIAC ANESTHESIOLOGY

In 2022, the cardiac anesthesiology group gained formal recognition from Alberta Health Services (AHS) and became the Cardiac Anesthesiology Section (CAS). The newly formed CAS is grateful for the efforts and support of numerous individuals towards achieving this milestone, including Dr. Gary Dobson (Zone Head, Department of Anesthesiology, Perioperative, and Pain Medicine), Dr. Keith Anderson (Section Chief, Foothills Medical Centre) and Andrew Jenkins (Zone Clinical Department Manager), along with many others in both the Departments of Anesthesiology and Cardiac Sciences. The benefits of section status include sustained administrative funding for the CAS as well as representation on additional AHS committees. The CAS consists of ten sub-specialty trained anesthesiologists who hold primary appointments in the Department of Anesthesiology, Perioperative and Pain Medicine with joint membership in the Libin Cardiovascular Institute. Section members also hold clinical appointments with the University of Calgary. All section 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 current CAS Chief is Dr. Chris Prusinkiewicz. Multiple section members hold leadership positions including Dr. Alex Gregory (Director of both Cardiac Anesthesiology Research and the Cardiac Anesthesiology Fellowship Program), Dr. Doug Seal (Cardiac Anesthesiology Lead for Perioperative Blood Conservation), and Dr. Nicole Webb (Cardiac Anesthesiology Rotation Resident Coordinator).

Dr. Michael Gysel joined the CAG in 2021, following the successful completion of a cardiac anesthesiology fellowship at Duke University. He will be taking a leading role in the development of quality assurance and quality improvement programs in cardiac anesthesia.



Dr. Chris Prusinkiewicz
Director, Cardiac Anesthesia

CARDIAC CRITICAL CARE

The Cardiovascular Intensive Care (CVICU) provides high quality care for post cardiac surgery patients. This is only possible through the amazing dedication, teamwork, and collaboration of the departments and multidisciplinary teams involved in the journey of the cardiac surgery patients. The unit has 22 beds on two separate units (U94 and U104). Sixteen of these beds are funded.

The CVICU at the Foothills Medical Centre supported more than 1,400 cardiac surgery patients in 2021. The CVICU specializes in post-operative open-heart surgery with most cases being Coronary Artery Bypass Graft (CABG) and valve repair or replacement. The CVICU also cares for patients with the following advanced surgeries: 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.



Dr. Ken Parhar
*Director, Cardiovascular
Intensive Care Unit*

Accomplishments & Highlights

CARDIOLOGY

Section Chief – Dr. Andrew Howarth

The Section of Cardiology is a citywide entity, providing clinical care and innovation in all major clinical and diagnostic areas of cardiology. The Section is organized into administrative structures supporting both individual hospitals as well as zone wide affinity groups in specialized areas of expertise. There are 58 Active Cardiologists in AHS in the Calgary Zone, making the Section among the largest in the country, recognized nationally as a leader in several fields.

The wealth of data that cardiology collects on cardiac patients in a way that can improve care and identify new more personalized approaches to patient management. This program leverages the somewhat unique integration of cardiac services found in Calgary and is destined to be a center of innovation for us.

Led by Dr. Ayaaz Sachedina, the interventional cardiology group undertook the inaugural CathSHOCK Conference this year. This innovative and multidisciplinary meeting aims to improve the delivery of advanced cardiac care to our most vulnerable patients during their time of great need. This meeting helps establish Calgary as a national center in the delivery of cutting edge cardiac critical care.

The structural interventional cardiology group operates our innovative TAVI program, which is a joint effort between interventional cardiology and cardiac surgery. Currently 160 TAVIs are being implanted on a yearly basis and the TAVI clinic, led by Dr. Anna Bizios, is implementing a streamlined TAVI assessment that includes evaluation of frailty. Other catheter based structural procedures, such as PFO and LAA closures, have also continued to grow and new procedures are on the horizon. This is an area of active development in cardiology, and Calgary is well placed to translate these innovations to the local community.

Our Hypertrophic Cardiomyopathy Clinic, led by Dr. Grant Peters, has seen great success over the past year with the introduction of new therapeutic options for patients as well as better utilization of diagnostic tools for this disorder. Through this clinic's centralized care, it allows Calgary to be at the forefront of innovation for this chronic and life-threatening condition.

Our Section is also fortunate to have world class expertise in infiltrative cardiomyopathies. Dr. Nowell Fine and Dr. Rob Miller, experts in both heart failure and cardiac imaging, have built successful research programs in this area and continue to translate their findings to the clinic.

Our Electrophysiology group has long been one of the bright lights within the Section. With a history of practice changing research, this team produces world class innovation in both cardiac arrhythmias and in the wide array of pacemakers and other implantable electrical devices that have become available. As part of this group, Dr. Satish Raj leads a highly productive team in cardiac syncope and autonomic dysfunction research that continues to be internationally recognized with multiple awards.

As in all areas, the COVID-19 pandemic impacted operational activities of Cardiology citywide. Most diagnostic and clinic activities have now been restored to pre-pandemic levels. However, manpower challenges have remained because of the dislocation in careers that occurred during the disruption. We continue to work to address these challenges with the goal of developing an inclusive and supportive working environment.

The Wellness committee and Equity Diversity and Inclusion work group led by Dr. Michelle Keir continues to provide important support and insight into systemic discrimination. Well Doc Alberta conducted a second survey of our group and presented the findings at our annual retreat alongside the W21C team who helped the section explore improvements into the delivery of inpatient cardiac care.

Cardiac Sciences Grand Rounds is the educational flagship of the Department and is highly successful with high level local and international speakers participating (see Appendix B). This is a cornerstone of the CME programs offered by the section for both our members and affiliated groups.

Advanced Heart Failure

Lead – Dr. Jonathan Howlett

The Advanced Heart Failure (HF) service group comprises seven ASH cardiologists and, in collaboration with 22 nurse clinicians, continues to provide top quality care for over 500 inpatients and 2500 outpatients annually. This includes over patients with 130 orthotopic cardiac transplantation and 25 with mechanical cardiac support as well as participation in the SHOCK Team framework and the reinvigoration of the Implantable Hemodynamic Program. The AHF group continues to shoulder the major portion of patients followed in one of the four cardiac function clinics, and Southern Alberta Amyloid Program, the newly created Multidisciplinary Neuromuscular Cardiac Centre of Excellence and contributes to other specialty clinics. This group also leads the citywide Heart Failure Pathway initiative and, in collaboration with TotalCardiology Rehabilitation, the Early Ambulatory Reduction in HF Clinic.

Highlights Over the Past Year

Under the leadership of Dr. Nowell Fine, the Amyloid Program of Calgary Centre of Excellence continues to grow. In addition, they have just announced the initiation of the **Amyloid Heart Disease Fellowship**, the first of its kind in Canada.

Dr. Omid Kiamanesh, fresh off of his first year on Staff, has led the development of the Multidisciplinary Neuromuscular Cardiac Centre of Excellence. Under his leadership, a heretofore rare and little known group of complex cardiac conditions will now receive state of the art treatment and have an opportunity to participate in ground breaking research. Already the clinic boasts a roster of over 250 patients. Excellent Omid!

Dr. Robert Miller received the 2022 Hank Duff Mentorship Award and the 2022 Todd Anderson Cardiovascular Research Award. He has also led re-initiation of the largest implantable heart failure monitoring program in Western Canada. Congratulations Robert! Dr. Brennan Ballantyne successfully completed his Heart Failure Fellowship (lead Dr. Kristin Lyons) Well done to you both!

Development of a Patient Mentorship Program for potential cardiac transplant and mechanical support recipients, and a Patient Return Program to create opportunities for follow up of critically ill patient journeys, led by our cardiac transplant and mechanical assist nurse clinicians. Take a bow, Pam Demarbe, Collette Gibson, Jill Roy, Sarah Araneta, Julie Davidson, Lori-Ann Barre!!

Research productivity continues to increase, with the group contributing 71 original publications, eight (five ongoing and three new) peer reviewed grants as primary investigator (totaling \$1,100,000) and 12 as coinvestigators (>\$10M). In addition, members have together accounted for 39 invited presentations at national or international meetings/events, chaired or co-chaired four national level meetings and participation on > ten editorial boards. This is the 5th straight year of increased activity of our group.

Ongoing Individual Commitments Include:

Dr. Nowell Fine:

- Co-chair of the CCS/CHFS Joint Position Statement on the Evaluation and Management of Patients with Cardiac Amyloidosis;
- Lead, Amyloid Program of Calgary;
- co-chair, Annual Amyloid Update; Co-Lead, Canadian Amyloid Registry;
- Lead Department of Cardiac Sciences ECHO service affinity group;
- Clinical Care Lead Libin

Dr. Jonathan Howlett:

- Chair CCS Guidelines Committee;
- Co-Chair, SCN Provincial HF Working Group and the Calgary and Provincial HF Pathway Initiative;
- Co-Chair CHFS Annual Heart Failure Update, Affinity Lead, Advanced Heart Failure;
- Associate Editor, Merck Manual

Dr. Debra Isaac:

- Section and Division Head Transplant Medicine;
- National COVID Transplant Committee

Dr Omid Kiamanesh:

- Medical Director, Peter Lougheed Hospital Cardiac Function and Neuromuscular Cardiac Centre of Excellence

Dr. Kristin Lyons:

- Director RGH echo group;
- Program Director Advanced Heart Failure Fellowship Program;
- Member, Canadian Cardiovascular Society Council; Alberta Provincial Drugs and Therapeutics Committee;
- Member, Alberta SCN POCUS Committee

Dr. Robert Miller:

- Lead, Cardiac Sciences Nuclear Cardiology and Cardiac CT Affinity Group;
- Heart Transplant Advisory Committee, Canadian Blood Services, Research and Registry Committees, CCTN, Planning Committee, HF Update Meeting

Dr. Nakul Sharma:

- Cardiac Lead and Director Heart Failure Clinic, Rockyview Hospital;
- Section member Section of Cardiology Executive;
- Medical Co-Lead Calgary Zone HF Pathway Initiative.

HIGHLIGHTS

- Clinical innovation with the development the Neuromuscular Cardiac Centre of Excellence, expansion of the Early Heart Failure Continuity Clinic and Rapid Titration Algorithm safety clinic
- Newly formed Cardiac Amyloid Fellowship
- Expansion of the invasive monitoring program
- Development and Implementation of a provincial Heart Failure Pathway
- Over 70 publications and for AHF members, consistent increase over the past years

AWARDS

2022 Hank Duff Mentorship Award – Dr. Robert Miller
 2022 Todd Anderson Cardiovascular Research Award – Dr. Robert Miller

Arrhythmia & Autonomics**Lead – Dr. Satish Raj****CIED Medical Lead – Dr. Glen Sumner****Electrophysiology Lab Medical Lead – Dr. Russell Quinn****Electrocardiography/Holter Monitor Medical Lead/ AF****Clinic Medical Lead – Dr. Russell Quinn**

The group provides highly specialized services for the region and on-site clinics (atrial fibrillation [AF], Cardiac Implantable Electrical Device [CIED], Genetic/Inherited Arrhythmia, General Arrhythmia, and Syncope) at South Health Campus (SHC) and Foothills Medical Centre (FMC), Alberta Children's Hospital (ACH; Pediatric Arrhythmia) and the Peter Lougheed Center (PLC; Adult Congenital Arrhythmia).

HIGHLIGHTS

- Our device program has performed almost 1200 device implantation in the fiscal year, including over 300 implantable defibrillator procedures and over 800 pacemaker procedures. Enhanced use of remote monitoring for our cardiac implantable electrical device (pacemaker and implantable defibrillator) patients to provide more care without making the patients come to hospital.
- Dr. Derek Exner has led Canadian implantation efforts of a novel, dual chamber leadless pacemaker.
- Expansion of the use of “conduction system pacing” as both a primary method for resynchronization pacing and as a potential alternative to conventional left ventricular lead based biventricular pacing. This technique leads to normalization of the ventricular activation time compared to standard right ventricular pacing and is applied as an option for resynchronization pacing in addition to the practice of implantation of a left ventricular coronary sinus lead. In 2023, this group will participate in the international, multicentre randomized trial, “Left vs. Left”, which will compare a strategy of conduction system pacing to standard left ventricular coronary sinus lead pacing in people with a standard indication for resynchronization pacing.
- Our device clinic has closely collaborated with the province-wide Connect Care cardiac device working group to facilitate the transition to the Epic electronic medical record in November 2022. This has been a relatively efficient, fluid process which has led to refinement of the booking and procedural codes for novel device implants such as leadless and conduction system pacing. It has also required the integration of data from our legacy device clinic record, PaceArt, into the Connect Care/Epic platform. The outcome of the transition to Connect Care will ultimately lead to a more robust collection of clinical data which will potentially improve quality improvement and research initiatives in our device clinic in the long term.
- The group is performing record numbers of procedures, without any additional lab time, thanks to efficient scheduling and usage of available time. However, the wait list has lengthened significantly, and the group is still working on long-term solutions to the wait-time problem. Ultimately, we need more capacity to perform ablations.
- The group has been performing more cases without the need for fluoroscopy (X-Ray), including the first complex pulmonary vein isolation (PVI) cases. This approach has potential advantages for both operator safety and patient safety.
- The mapping technology used in the two EP labs has been updated to the latest versions, to help with rapid & accurate diagnosis of complex dysrhythmias.
- A patient information video regarding AF ablation has been developed by the Cardiac Nurse Educator, Allana Fantin, with input from Drs. Wilton & Quinn. This is available on the “Patient Resources” section of the Libin website and is an excellent resource for patients undergoing this procedure, helping them understand what happens before, during and after their ablation.
- The Department has updated its ECG carts and has successfully been linked with Connect Care for upload of results.
- Holter reading is now done in Connect Care and this transition has been relatively smooth.
- A program of education for the ECG Technologists has been developed by Allana Fantin, with support from the cardiac electrophysiologists and fellows.

- Working with colleagues in diagnostic imaging and radiation oncology, Dr. Vikas Kuriachan has performed stereotactic radioablation procedure for VT in Alberta. In selected patients, this procedure can be performed in less than 30 minutes compared to several hours for traditional ablation procedures. This novel approach has won awards for innovations in clinical care.
- The AF Clinic at the FMC has embraced the switch to Connect Care, with templates to streamline workflow and communication.
- In an initiative led by Dr. Quinn, an Atrial Fibrillation Primary Care Pathway has been developed, with involvement from the AF Clinic, family doctors, cardiologists and electrophysiologists. This document is based on the latest CCS guidelines and contains care algorithms and advice for optimal management of AF patients in the primary care & outpatient setting. The Care Pathway is available on the Alberta Specialist Link website and has been very positively received. It is a valuable resource for all practitioners caring for patients with AF. This has helped rationalize some referrals to the AF Clinic, which can be redirected to outpatient care, supported by the pathway.

RESEARCH HIGHLIGHTS

Device Program

- Dr. Derek Exner was the local principal investigator for the Aveir DR investigational device. This device is the first-to-market dual component, dual chamber leadless pacemaker. Because this device has independent atrial and right ventricular lead components, it is the first and only current leadless pacemaker platform with atrial pacing capabilities. The Aveir DR study and Dr. Exner were featured in a regional television and print media story which has increased the public awareness about the availability of leadless pacemaker technology. Dr. Exner and colleagues published their initial analysis of the LEADLESS-2 study in *Circulation* in 2022. Our implant group remains one of the highest volume leadless pacemaker programs in Canada.
- Dr. Glen Sumner was the local principal investigator for the LEADR study, an industry-sponsored evaluation of a novel defibrillator lead design and delivery system. He is also a principal investigator in an ongoing study, an interrupted time series analysis of all device patients in Alberta, that compares cardiovascular outcomes in patients with and without remote monitoring.
- Dr. Satish Raj is the local principal investigator for the ongoing VIRTUES-RPM-CIED study which is evaluating the role of exclusively remote follow up for cardiac implantable device patients.

- Dr. Derek Chew has been leading our health economic efforts and presented his work as a Late-Breaking Clinical Trial at the Heart Rhythm Society Scientific Sessions in May 2022.

Atrial Fibrillation and Ablation

- Drs. Stephen Wilton and Robert Rose are leading an innovative national study to look at biochemical predictors of success with atrial fibrillation ablations.
- Dr. Jacques Rizkallah is leading efforts to bring the “physiology” back into the cardiac electrophysiology lab. He is trying to help us to better align pacing maneuvers to help us to understand and manage arrhythmias.

Syncope and Autonomics

- Dr. Robert Sheldon is leading a multicenter, international, placebo-controlled randomized trial of atomoxetine vs. placebo for the treatment of vasovagal syncope. This is a novel pharmacological treatment approach for this potentially disabling disorder.
- Dr. Satish Raj and colleagues reported on the largest series of autonomic testing data in patients suffering from ongoing symptoms following a COVID infection (“Long COVID”).

AWARDS

- Dr. Anne Gillis received the 2021 Lifetime Achievement Award from the Canadian Heart Rhythm Society. **(See story in Appendix C).**
- Dr. Jacques Rizkallah received a Teaching Excellence Award for his work as the Course 3 Director for the Cardiovascular Section for the medical students. His teaching excellence has been recognized, and he will have a prominent role in medical student education in the revised curriculum starting in the summer of 2023.

RECRUITMENT

We were fortunate to be able to recruit Dr. Michael Fridman. Michael is a pediatric cardiology with a strong interest in inherited arrhythmias. He is partnering with Dr. Erkan Ilhan to provide an innovative family based inherited arrhythmia clinic that can serve both adults and children. Michael is also a gifted teacher to our trainees.

Echocardiography

Zone Medical Director – Dr. Nowell Fine
Foothills Medical Center Site Lead – Dr. Sarah Weeks
FMC Sonographer Supervisor – Lisa Tolton
Peter Lougheed Center Site Lead – Dr. Jill Colbert
PLC Sonographer Supervisor – Deborah Poku Rockyview
General Hospital Site Lead – Dr. Kristin Lyons RGH
Sonographer Supervisor – Sandra Strang
South Health Campus Site Lead – Dr. Patrick Champagne
SHC Sonographer Supervisor – Michelle Elliot
Clinical Fellowship Program Director – Dr. Jill Colbert
Education Director – Dr. Stephen Reynolds

MEMBERS UPDATE

The Echocardiography (Echo) laboratories in the country, with more than 20,000 tests performed citywide. The Lab offers comprehensive services including inpatient and ambulatory transthoracic echo, transesophageal echo, exercise and pharmacologic stress echo, contrast echo, and pericardiocentesis. The Echo Lab offers 24-hour per day, seven days per week service to the AHS Calgary Zone.

Dr. Cvetan Trpkov was recruited to join the Section of Cardiology as an attending echocardiologist in July 2022. He also has an interest in POCUS and is also an attending physician in the Cardiac Intensive Care Unit.

Dr. Sudhir Nishtala was recruited to join the Section of Cardiology as an attending echocardiologist in July 2022. He also has an interest in Cardio-Oncology.

Dr. Nathan Leader was recruited to join the Section of Cardiology as an attending echocardiologist in July 2022. Dr. Leader has an interest in medical education.

Dr. Jessica Patzer will be completing her level III echocardiography fellowship in June 2023. Dr. Patzer completed adult cardiology residency training in Calgary and completed adult congenital heart disease fellowship training in Toronto.

HIGHLIGHTS

Dr. Omid Kiamanesh (member-at-large), Ms. Heather Cooley (sonographer member) are members of the Canadian Society of Echocardiography (CSE) Board of Directors. They, along with Dr. Fine, presented at the CSE Annual Echo Weekend 2023.

The RGH Echo Lab is participating in the 'Combining Intraplaque Neovascularization with Risk Stratification by Carotid Stress Echocardiography (CIRCE) Study', a CIHR-funded national clinical trial and Dr. Omid Kiamanesh is the site-Principal Investigator.

Dr. Kristin Lyons is a member of the Provincial Drugs and Therapeutics Committee Member, in addition to the Point-of-Care Ultrasound (POCUS) Committee for the Cardiovascular Strategic Clinical Network of Alberta Health Services.

RGH will be getting a new fleet of Epic echocardiography machines (Philips Ultrasound) in 2023. Congratulations to the RGH Echo Lab!

Dr. Michelle Keir is Director of the Adult Congenital Heart Disease Program, Co-Director of the Calgary Aortic Program, Section of Cardiology Site Lead for the Peter Lougheed Center, and lead for the Department of Cardiac Sciences and Libin Cardiovascular Institute Ethnicity, Diversity and Inclusion Committee.

Dr. Jill Colbert will be stepping down as the Echo Fellowship Training Program Director after being in the role for four years. Dr. Colbert has trained four fellows to become echocardiologists, and all four are currently staff at the Libin Cardiovascular Institute!

Nazmi Said has been a sonographer at FMC since 2010 and will be retiring in 2023 after a remarkable career in echocardiography. Nazmi has had a very important role in education since his arrival at our Echo Lab. In addition to coordinating regional Echo Educational Rounds and other activities, Nazmi is perhaps best known for training new Cardiology Training Program residents how to scan patients, a critical component of their training to become cardiologists. Nazmi has trained an amazing 58 residents over the years, of which 28 have gone to careers as practicing echocardiologists! He leaves a tremendous legacy at our Echo Lab and will be greatly missed. Congratulations Nazmi and thank you for all the great work you have done for our Echo Lab. All the best for your future endeavors.

Foothills Interventional Cardiology Service (FICS)

Lead – Dr. Michael Curtis

The major focus of the Cardiac Catheterization Laboratories and FICS group has been coping with the loss of Catheterization Lab 6 which has been inoperable since August of 2020 with its expected replacement hopefully sometime this fall. It is important to reiterate and emphasize that the waitlist continues to expand far beyond accepted guidelines and we now approach year three waiting for this lab to be replaced and pray one of the remaining labs does not suffer a similar fate while waiting. Unfortunately, the relief will be brief as immediately we will embark on the replacement of room 2. The invasive and interventional cardiologists have worked expanded hours, regular Saturday shifts in addition to providing 24/7 coverage to Southern Alberta in an effort to keep pace.

Nuclear

Lead – Dr. Robert Miller

MEMBERS UPDATE

The Nuclear Cardiology/CT group has continued to provide its clinical services across the city and provides both nuclear and CT testing at the Foothills Medical Centre and South Health Campus. The group performs more than 1900 nuclear tests annually. In spite of radiotracer and CT contrast shortages we performed a similar number of hospital-based myocardial perfusion scans and coronary CT angiograms as we have in previous years.

Additionally, we have continued to expand capacity for technetium pyrophosphate testing, which is a highly accurate method for identifying patients with transthyretin cardiac amyloidosis. Our technetium pyrophosphate imaging program is one of the largest in the country and we are leveraging our expertise to help centers in western Canada to improve image acquisition and interpretation. Members have presented on methods to improve technetium pyrophosphate image acquisition and interpretation as well as on applications of artificial intelligence for myocardial perfusion imaging at national and international meetings.

LEADERSHIP POSITIONS

Our group plays an integral role in professional societies nationally and internationally. Dr. Mustapha Kazmi is the outgoing president of the Canadian Society of Cardiovascular Nuclear and CT Imaging. Dr. Robert Miller is the incoming president of the Canadian Society of Cardiovascular Nuclear and CT Imaging. Dr. Miller also holds committee positions within the American Society of Nuclear Cardiology and helped write the 2022 Hot Spot Imaging in Cardiovascular Disease: Joint Position Paper of the SNMMI, ASNC, and EANM.

RESEARCH ACTIVITIES

- Running the multicenter, Canadian Pyrophosphate Registry (CAPER) which aims to improve disease diagnosis and risk stratification in patients with transthyretin cardiac amyloidosis.
- Participation in the NIH-funded, international multi-center REgistry of Fast Myocardial Perfusion Imaging with NExt generation SPECT (REFINE SPECT), which aims to improve disease diagnosis and risk stratification following SPECT MPI
- More than 20 manuscript publications. A few recent manuscripts include:
 - Explainable Deep Learning Improves Physician Interpretation of Myocardial Perfusion Imaging: Journal of Nuclear Medicine
 - Relationship between Early Revascularization versus Medical Therapy, Inducible Myocardial Ischemia, and Mortality among Patients with Normal and Reduced Left Ventricular Ejection Fraction. Journal of the American College of Cardiology
 - Direct Risk Assessment From Myocardial Perfusion Imaging Using Explainable Deep Learning. JACC Cardiovascular Imaging

TRAINEE PUBLICATIONS

Dr. Waseem Hijazi: External Validation of the CRAX2MACE score. Journal of Nuclear Cardiology
 Dr. Waseem Hijazi: Eosinophilic Myocarditis Complicated by Massive Right Ventricular Thrombus. Circulation: Cardiovascular Imaging
 Dr. Waseem Hijazi: Framework for Evaluating and Comparing Risk Models. Journal of Nuclear Cardiology
 Dr. Golnaz Roshankar: Steroid Sparing Immunosuppression in Management of Cardiac Sarcoidosis: A Systematic Review. Health Sciences Reviews

Adult Congenital Heart Disease

Lead – Dr. Michelle Keir

MEMBER UPDATE

The Adult Congenital Heart Disease clinic has continued to expand to accommodate an increase in the number of adults with complex congenital heart disease in Southern Alberta. With funding from the Alberta Children's Hospital Research Institute and the Libin Cardiovascular Institute, the group has conducted focus groups with CHD patients to determine research priorities and developed a participatory action research network. We are now investigating the role of advance-care planning in ACHD care.

Cardiac Magnetic Resonance (CMR)

Lead – Dr. James White

OVERVIEW

The cardiac MRI program of the Stephenson Cardiac Imaging Centre has undergone significant evolution throughout this past year with leadership changes and active scientific growth. Clinical services across our two dedicated facilities of FMC and SHC currently provides over 3,400 cardiac MRI studies per year across a full spectrum of clinical indications, inclusive of stress perfusion imaging, adult congenital heart disease, cardio-oncology, cardiomyopathy, and viability imaging studies. The clinical service supports two clinical fellows from the departments of cardiac sciences and diagnostic imaging, as well as an expanding number of graduate and post-graduate students. The Centre will soon benefit from the strategic recruitment of a cardiac MRI physicist through long-standing collaborations with Siemens, providing support for this position, while simultaneous need for clinical recruitment is appreciated with the migration of a cardiology reader to the US.

LEADERSHIP and MEMBERSHIP

The Stephenson Centre is transitioning to new leadership with two cardiology members migrating to new leadership positions. In September, Dr Andrew Howarth, Clinical Co-Director – Cardiology for the Stephenson Centre, assumed his new role as Chief of Cardiology. In November, Dr James White, the Director of the Stephenson Centre, assumed his new role as Director of Precision Medicine for the Libin Cardiovascular Institute. Dr Howarth's role will soon be taken over by one of the existing members of the Stephenson Centre (announcement to be made shortly) and Dr White's role will be migrated through the external international recruitment of a new Scientific Director for the Centre. We thank Dr Carmen Lydell, Clinical Co-Director – Radiology for her commitment to maintaining clinical leadership through this transition period.

We are excited by this opportunity to bring new talent into leadership roles at the Stephenson Cardiac Imaging Centre and look forward to ensuring ongoing success for this flagship program of the Libin Cardiovascular Institute.

Dr Bobby Heydari recently announced plans to return to Boston to rejoin his prior training mentors and collaborators. His departure provides expanded incentive for our recruitment of a new academically focused clinician to the Stephenson Centre over the upcoming year.

ACADEMIC HIGHLIGHTS

High impact publications: • More than 30 publications over the past 18 months Example recent publications:

Chow, K, Hayes G, Flewitt J, Feutcher P, Lydell C, Howarth A, Pagano J, Kellman P, White JA. (2022). Improved accuracy and precision with three-parameter simultaneous myocardial T1 and T2 mapping using multiparametric SASHA. *Magnetic Resonance in Medicine*. 87(6): 2775-2791

Alena Yakimenka, Dina Labib, Steven Dykstra, Yoko Mikami, Alessandro Satriano, Jacqueline Flewitt, Patricia Feutcher, Sandra Rivest, Andrew G. Howarth, Carmen P. Lydell, Russell Quinn, Stephen B. Wilton, James A. White. (2022). Influence of Sex-based Differences in Cardiac Phenotype on Atrial Fibrillation Recurrence in Patients Undergoing Pulmonary Vein Isolation. *Frontiers in Cardiovascular Medicine*.

Shirin Alibadi, Alizera Sojoudi, Murad Bandali, Michael Bristow, Carmen Lydell, Paul Fedak, James A. White, Julio Garcia. (2022). Intra-cardiac Pressure Drop and Flow Distribution of Bicuspid Aortic Valve Disease in Preserved Ejection Fraction. *Frontiers in Cardiovascular Medicine*.

Ashifa Hudani, Safia Ihsan Ali, David Patton, Kimberley A. Myers, Nowell M. Fine, James A. White, Steven Greenway, Julio Garcia. (2023). Characterization of Pulmonary Flow in Repaired Tetralogy of Fallot Using 4D Flow MRI. *Applied Sciences*. 13(5): 1280-.

Steven Dykstra, Alessandro Satriano, Aidan K Cornhill, Lucy Y Lei, Dina Labib, Yoko Mikami, Jacqueline Flewitt, Sandra Rivest, Rosa Sandonato, Patricia Feutcher, Andrew G Howarth, Carmen P Lydell, Nowell M Fine, Derek V Exner, Carlos A Morillo, Stephen B Wilton, Marina L Gavrilova, James A White. (2022). Machine learning prediction of atrial fibrillation in cardiovascular patients using cardiac magnetic resonance and electronic health information. *Frontiers in Cardiovascular Medicine*

Aidan K. Cornhill, Steven Dykstra, Alessandro Satriano, Dina Labib, Yoko Mikami, Jacqueline Flewitt, Sandra Rivest, Rosa Sandonato, Andrew G Howarth, Carmen Lydell, Cathy A. Eastwood, Hude Quan, Nowell Fine, Joon Lee, James A. White. (2022). Machine Learning Patient-Specific Prediction of Heart Failure Hospitalization Using Cardiac MRI-based Phenotype and Electronic Health Information. *Frontiers in Cardiovascular Medicine*

Heydari B, Satriano A, Jerosch-Herold M, Kolm P, Kim DY, Cheng K, Choi YL, Antiochos P, White JA, Mahmod M, Chan K, Raman B, Desai MY, Ho CY, Dolman SF, Desvigne-Nickens P, Maron MS, Friedrich MG, Schulz-Menger J, Piechnik SK, Appelbaum E, Weintraub WS, Neubauer S, Kramer CM, Kwong RY. (2022). 3-Dimensional Strain Analysis of Hypertrophic Cardiomyopathy: Insights From the NHLBI International HCM Registry. *JACC Cardiovasc Imaging*

CIROC REGISTRY & PERSONALIZED DIAGNOSTICS PROGRAM (PDP)

- The CIROC Registry turns eight years old this year, this research program now tracking more than 28,000 patients with cardiovascular disease (19,000 undergoing Cardiac MRI, 7,000 undergoing Cardiac CTA). To date, CIROC has accumulated over 100,000 patient years of clinical follow-up in partnership with AHS analytics.

- The Registry provides consented access to CMR-defined 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), cardiac amyloid, muscular dystrophy.

- Academic partnerships established with major international research institutes throughout Canada, USA, and Europe.

- The PDP is an applied data science research program aimed at leveraging data resources of the CIROC Registry for the delivery of personalized cardiovascular care. Led by Dr White, this program has established strategic partnerships with data science investigators from the University of Calgary, University of Alberta, and leading international programs to leverage contemporary artificial intelligence-based techniques to deliver disease classification and risk prediction models. The program is currently leading international studies evaluating the performance of MRI and CT based “digital twins” to provide autonomous cardiomyopathy diagnosis and patient-specific risk modelling. External grant funding of the PDP currently supports 1 post-doctoral fellow, 2 PhD students, 2 Masters students, and a research intern.

PRE-CLINICAL RESEARCH STUDIES

- Numerous CIHR, HSF and industry-sponsored grants are active, focused on investigation of deep-learning based disease diagnosis and prognostication; multi-organ effects of COVID-19; microvascular disease in women (INOCA); Fabry cardiomyopathy; and cardiac amyloidosis.

- Ongoing involvement in multi-national NIH-funded studies investigating the role of CMR in the management of Hypertrophic Cardiomyopathy and Bicuspid Aortic Valve Disease.

- Collaborative studies exploring the role of CMR to study cardiovascular disease in patients with Postural Orthostatic Tachycardia Syndrome (POTS); Radiation effects of esophageal radiation; and autonomic instability in cervical spine cord injury.

4D-FLOW RESEARCH PROGRAM

- Lead: Dr. Julio Garcia
- Students: one PhD student, two master's students
- This research program is leveraging >1,000 4D Flow MRI studies performed in patients with bicuspid aortic valve disease, mitral valve disease, congenital heart disease, and atrial fibrillation.

Hypertrophic Cardiomyopathy Program

Program Lead and Medical Director – Dr. Grant Peters
Program Research Director – Dr. Bobby Heydari

Hypertrophic Cardiomyopathy (HCM) is a genetically determined cardiomyopathy caused by mutations in one of several sarcomeric genes. This typically causes hypertrophy in a variety of patterns and morphologies causing a wide spectrum of clinical manifestations, hemodynamic abnormalities and clinical outcomes.

The Libin Cardiovascular Institute Hypertrophic Cardiomyopathy Program is based at South Health Campus. This program is one of the largest in Canada and has been serving patients for over 25 years. Currently, our team evaluates and treats over 750 adults with hypertrophic cardiomyopathy each year and this number is rapidly increasing. Until recently, this was only clinic in Alberta that solely focused on HCM and the increasing array of therapeutic options available for patients with this condition.

As a program we have developed a collaborative multi-disciplinary team dedicated to the management of patients with hypertrophic cardiomyopathy. This team includes dedicated cardiologists with HCM expertise, electrophysiologists, imaging specialists, cardiac surgery, genetic specialists and expert nurse clinicians. Our multi-disciplinary team meets regularly to discuss complex patients to ensure the best care possible.

In addition to medical treatment, the nurses, genetic counselors and doctors in the Hypertrophic Cardiomyopathy Clinic provide ongoing education and support to all our patients. The plan of care includes interval clinical assessment and follow-up by a cardiologist and the services provided include:

- Assessment, diagnosis, treatment, and education for people who have hypertrophic cardiomyopathy
- Risk stratification
- Exercise prescription
- Management of routine and specialized prescription medications
- Ongoing patient teaching
- Lifestyle recommendations
- Coordination of necessary specialist referrals
- Education on cascade screening of family members
- Genetic testing & counseling
- Imaging such as echocardiography, cardiac MRI, holter monitoring, and exercise stress testing

- Invasive cardiovascular tests
- Surgical myectomy, mitral valve modification surgery
- Placement of implantable cardioverter-defibrillator (ICD)

Highlights

- We have worked hard to develop a hypertrophic cardiomyopathy program model rather than a single physician clinic model. This involved developing a robust multi-disciplinary team of dedicated physicians and nurses knowledgeable in the care of HCM.
- Currently have four primary hypertrophic cardiomyopathy cardiologists (Dr. Grant Peters, Dr. Lou Kolman, Dr. Jacksy Zhao, and Dr. Bobby Heydari). These individuals attend HCM specific meetings/ educational events, educate other physicians, collaborate with other HCM programs nationally and internationally, participate in research and contribute to advisory boards. All members also bring imaging expertise to our program.
- We have two dedicated nurse clinicians (Rosa Sondonato and Sarah Urton) who have specific expertise in the management of HCM patients.
- We are fortunate to have a dedicated cardiac surgeon (Dr. William Kent) with clinical expertise in managing patients with HCM. Although some patients only require a simple myectomy procedure for obstructive disease, the anatomical complexities often demand additional procedures. There are often concurrent papillary muscle, mitral valve and chordal abnormalities requiring mitral valve/chordal modifications. In more rare instances, we have sent patients to the Mayo Clinic for apical muscle resections.
- Currently have two electrophysiologists (Dr. Erkan Ilhan and Dr. Glen Sumner) who work directly with the clinic providing expertise in the prevention of sudden cardiac death and arrhythmia management. This may include ICD implantation in higher risk patients.
- As a multi-disciplinary team (includes all physicians and nurses) we meet regularly to do a comprehensive review of complicated cases to ensure we provide the best care possible. These meetings will also include discussions and reviews of the literature.
- Excited to have a new pharmacologic agent (Mavacampten) currently approved for the management of patients with obstructive hypertrophic cardiomyopathy. This medication requires close monitoring and follow up to ensure appropriate therapeutic outcomes are achieved and complications are avoided. All aspects regarding the care of patients on this medication will be provided for patients within our program.
- The Libin Cardiovascular Hypertrophic Cardiomyopathy program doctors conduct research in genetics, new diagnostic tests and treatments for hypertrophic cardiomyopathy. We are excited to be actively involved in four new research studies for which we are actively enrolling patients. These include HIRO-HCM, Odyssey-HCM, CV027-1088, and Maple-HCM.
- We are actively pursuing becoming a center of excellence in the management of patients with hypertrophic cardiomyopathy.

CARDIAC SURGERY

Section Chief – Dr. Bill Kidd

The Section continues to thrive in all areas including clinical, teaching and research. In addition to adult cardiac surgery, the section members in a team-based approach perform minimally invasive valve surgery, transcatheter aortic valve replacement, Maze procedure, standard and complex aortic surgery, ventricular assist device insertions, pacemakers, arterial revascularizations for CAD, PDA ligations, and others. The residency program is one of the best in Canada with many highly qualified applicants, a program known for an environment of collaboration, and a culture of diversity and inclusivity. Research is up-and-coming with a quarterly meeting and many surgeon/resident-led projects.

The Section and its leadership are committed to a culture of collaboration and teamwork. The Section is also indebted to the Libin Cardiovascular Institute for its ongoing support in many areas.

Minimally Invasive Cardiac Surgery (MICS)

Lead – Dr. William Kent

This innovative program continues to expand, with cardiac surgeons Drs. Holly Smith, Ganesh Shanmugam, Daniel Holloway, Corey Adams and William Kent all specializing in leading-edge minimally invasive surgical techniques. As the program has increased its volume, minimally invasive aortic valve replacement and mitral valve repair is now offered for most patients in Calgary. By using sternum-sparing small incisions and thoroscopic instrumentation, valves are repaired or replaced, and atrial septal defects are closed. Minimally invasive coronary artery bypass surgery (MIDCAB) was successfully introduced this year, offering LITA to LAD grafting via left mini-thoracotomy. With these minimally invasive approaches, patients gain the benefits of less pain, less rhythm disturbances, less blood transfusion, less time in hospital, and a quicker return to normal activity.

This past year, we became the first centre in Canada to establish a series of beating heart NeoChord procedures, an innovative technique to repair the mitral valve through a left mini thoracotomy without the use of cardiopulmonary bypass. Our centre hosted the second annual Western Canadian Minimally Invasive Valve meeting, which was attended by surgeons interested in minimally invasive techniques.

Our dedicated Valve Clinic at the South Health Campus has expanded with the support of cardiologists Drs. Jill Colbert and Cvet Tripkov. Together with Nurse Clinicians Deborah Lundberg and Stacey Charest, and we are expanding our clinical research contributions by participating in several important valve surgery clinical trials. We have also initiated a prospective trial measuring both conventional quantitative outcome measures, in addition to qualitative outcomes like quality of life, pain and postoperative mobility after minimally invasive surgery.

Aortic Program

Co-leads – Drs. Scott McClure, Randy Moore, Michelle Keir, Eric Herget

The Calgary Aortic Program (CAP) represents a multidisciplinary team of clinicians and researchers invested in the management of complex aortic disease. The citywide zonal initiative draws upon the expertise of several specialties: cardiac and vascular surgery, cardiology, interventional radiology, anaesthesia, intensive care, genetics, biomedical engineering, and others, all focused on the improvement of aortic health within the Calgary Zone.

Now in its fourth year, CAP continues to grow. The multidisciplinary Aortic Clinic now follows over 500 patients with year over year increases in patient referrals. All aspects of aortic care – best practice medical therapies, genetic screening, long-term surveillance planning, open aortic arch and thoracoabdominal surgeries and innovative endovascular procedures – are available through the CAP clinic with multispecialty input to provide optimal patient care strategies.

CAP has become a national leader with respect to less-invasive endovascular therapies for aortic arch and thoracoabdominal disease. CAP has the largest experience in Canada with newly available endo-arch technologies and this case volume continues to increase. We were proudly selected as the first Canadian centre to implant both the Gore TBE endovascular arch branch device and the Terumo Relay® Branch total endovascular aortic arch device. We were also the first centre in North America to implant the Terumo Thoracoflo® hybrid device for thoracoabdominal disease. CAP's repeated selection as a pilot site for new devices in Canada is a testament to industries' support of our multidisciplinary philosophy to aortic care. Coinciding with these successes, open thoracoabdominal aortic volumes are also on an upward trajectory at our centres. Providing broad expertise for both complex open and endovascular care is the fundamental premise behind the CAP approach.

We are also proud to announce the start of our Advanced Aortic Surgery Fellowship under the CAP umbrella, with our inaugural fellow set to start July 1, 2023. Designed to train cardiac and vascular surgical trainees on a rotating basis through the same integrated training track, this 12-month clinical fellowship will provide focused surgical and endovascular training in the management of complex aortic disease.

With an emphasis on aortic arch, descending thoracic and thoracoabdominal pathologies, the intention is to cross-pollinate skillsets for incoming trainees across the specialties, to create true aortic specialists for the workforce of the future. Projecting forward, efforts to develop similar aortic focused training tracks for cardiology/vascular medicine trainees and interventional radiology trainees, for those who have an aortic interest, would be the ultimate goal.

There are also several clinical and basic science research initiatives currently underway at CAP that are showing great promise. Overall, it has been a very successful year for the program.

MULTIDISCIPLINARY DEPARTMENTAL PROGRAMS

MECHANICAL CIRCULATORY SUPPORT

Medical Lead – Dr. Jonathan Howlett
Surgical Lead – Dr. William Kent

Patients with advanced heart failure represent a growing population and the Mechanical Circulatory Support Program, led by Cardiologist Dr. Jonathan Howlett 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, patients with end-stage heart failure 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 Foothills Medical Centre was the first centre in Canada to implant the HeartMate 3 left ventricular assist device (LVAD) with a bilateral mini-thoracotomy approach. The HeartMate 3 is the latest generation of durable LVAD, which allows patients to continue active lives until a heart transplant becomes available. The program also uses ECMO and Impella devices to support 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 procured.

Patients with advanced heart failure represent a growing population and the Mechanical Circulatory Support Program, led by Cardiologist Dr. Jonathan Howlett and Cardiac Surgeon Dr. William Kent, provides both medical and surgical therapy for these critically ill patients. Using The Mechanical Circulatory Support Program applies a team-based multi-disciplinary approach to the care of heart failure patients. The group is presently involved in many clinical trials. 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 damaged myocardium of heart failure patients.

Transcatheter Aortic Valve Implantation (TAVI)

Surgical Lead - Dr. Anna Bizios

The TAVI (Transcatheter Aortic Valve Implantation) Program continues to serve patients with severe aortic stenosis or failing bioprosthetic aortic valves.

In addition to high and prohibitive risk surgical candidates, low and intermediate risk patients aged 75 years and older are considered for TAVI as per national and international recommendations.

A total of 196 TAVIs were performed last year. This included 178 transfemoral and 18 alternate access cases. Carotid access TAVI is now also being performed locally, expanding treatment opportunities for patients who have contraindications to transfemoral approach.

Multidisciplinary TAVI team rounds are held weekly with an emphasis on collaborative and patient-centred decision making. Optimized post-procedural patient care pathways have also been instituted to streamline care after TAVI.

In addition to the TAVI program, there were 31 atrial septal defect (ASD)/patent foramen ovale (PFO) percutaneous closures performed this year. These structural interventions thrive on the ongoing multidisciplinary collaboration with the Stroke Prevention Clinic, Congenital Heart Clinic, Echocardiography and Cardiac Anesthesia.

Looking forward, further imminent expansion of the TAVI program is anticipated to help meet the already significant and further growing demands for the procedure.

CARDIAC ANESTHESIOLOGY

Director – Dr. Chris Prusinkiewicz

CAS members work in a multidisciplinary environment to provide anesthetic care for a complex patient population. Caseload includes: on and off-pump coronary artery bypass grafting, aortic reconstruction with or without deep hypothermic circulatory arrest, thoracoabdominal aortic surgery with left heart bypass, total endovascular aortic repair, mechanical assist device support, 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, 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 preadmission clinic, while inpatients receive preoperative assessments by cardiac anesthesiologists on an on-going basis.

NEW TECHNOLOGIES

The last academic year was full of technological change. The Connect Care computer system came to the cardiac operating rooms, and while not seamless, the transition was relatively smooth thanks in large part to the efforts of superusers including CAS member Dr. Michal Gysel and

FMC Section member Dr. Lorraine Chow. As part of the transition, the process of designing and distributing the cardiac operating room slate was altered. This process continues to undergo optimization in conjunction with the FMC Surgical Booking Office. The software for reporting perioperative echocardiography was changed with the introduction of Connect Care, and likewise requires further optimization. Other new technologies being currently introduced include the QGenda scheduling system for Anesthesia and the HaemoBank blood management system.

TEAMWORK AND BUILDING BRIDGES

Strong interdisciplinary relationships within the perioperative cardiac program are an immeasurably valuable asset for the CAS. Clinical disciplines with whom the CAS works closely include cardiac surgery, cardiovascular ICU, cardiology, nursing, respiratory therapy, and perfusion.

The committees on which the CAS is represented include the Zone Anesthesia Executive Committee, the Cardiac Sciences Executive Committee, the Cardiac Sciences Clinical Services Committee, the Libin Cardiovascular Institute Leadership Committee, and the Combined Operating Room Committee – among others. CAS representatives have been invited to sit on Cardiac Surgery and Cardiovascular ICU hiring committees, and we have reciprocated in kind.

Cardiac anesthesiologists are part of the SHOCK Team, which provides mechanical support through the use of Extra-Corporeal Membrane Oxygenation (ECMO) for critically ill patients in cardiogenic shock. CAS members are also engaged in the ICU ECMO program for patients with respiratory failure who are failing traditional ICU ventilator therapy.

Patient care provided by the FMC cardiac surgery program has a reach outside of Alberta. The program periodically sends a team for medical mission work to a hospital in Nicaragua. Dr. Duc Ha has been the cardiac anesthesiologist involved with the medical mission this year.

EDUCATION

CAS members strive to provide the highest standard of clinical education and numerous members have been recipients of teaching accolades over the years. Most recently, Dr. Rosa Chun was a recipient of the Cumming School of Medicine Honour Roll Award for Teaching in Anesthesia Clerkship and Dr. Chris Noss was awarded the Department of Critical Care Medicine Off-Service Preceptor Award.

Anesthesia residents complete two blocks of cardiac anesthesia in their fourth year, plus a block in the cardiac surgical ICU. Off-service trainees rotating with the CAS include fellows from critical care medicine, cardiology, and perioperative ultrasound, as well as residents from cardiac surgery. CAS members also 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.

The CAS offers a fellowship in cardiovascular anesthesia and perioperative echocardiography. Interviews for the 2024 – 2025 academic year are currently underway.

RESEARCH AND QUALITY IMPROVEMENT

The CAS has an active research program. Over the last academic year, publications by CAS members have appeared in the Journal of Thoracic & Cardiovascular Surgery; Journal of Cardiac Surgery; Blood; Anesthesiology; and Current Opinion in Anesthesiology. An article on the perioperative optimization of the cardiac surgical patient, which was published in the Canadian Journal of Cardiology, was notable as a collaborative effort between multiple CAS members.

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 CAS member, and was developed to promote research in the areas of cardiac anesthesia, patient outcomes and quality improvement.

Ongoing research and quality improvement projects with CAS involvement include:

1. TITAN SvS: Treatment in thoracic aortic aneurysm comparing surgery vs surveillance
2. NEWTON-CABG: Effect of Evolocumab on saphenous vein graft patency following coronary artery bypass surgery
3. REVERSE-IT: Bentracimab (PB2452) in TiCAsrelor-treated patients with uncontrolled major or life-threatening bleeding or requiring urgent surgery or invasive procedure
4. Role of valve-mediated hemodynamics on bicuspid aortopathy
5. PREPARE Trial: Exercise before surgery to improve recovery in older people with frailty
6. On-X aortic prosthetic heart valve low dose warfarin post approval clinical registry study
7. Timely Hip Fracture Care Pathway for Patients on Pre-injury Oral Anticoagulation Project
8. Use of point of care coagulation testing in cardiac surgery to decrease blood product wastage, save system costs, and improve patient outcomes: quality improvement project

Recently completed research projects with CAS involvement, currently undergoing data analysis or manuscript preparation, include:

1. Impact of heparin and cardiopulmonary bypass on platelet function determined by procoagulant membrane dynamics analysis
2. ERAS-CV: Enhanced recovery following cardiac surgery, a pilot study of implementing a new clinical pathway and retrospective cohort analysis
3. Prioritization of patient reported outcomes in cardiac surgery

PERIOPERATIVE BLOOD MANAGEMENT

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 is ongoing 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. Dr. Seal is the cardiac anesthesia blood conservation lead and works closely with personnel from the citywide perioperative blood conservation program.

LEADERSHIP IN MINIMALLY INVASIVE SURGERY AND PERIOPERATIVE PAIN MANAGEMENT

The cardiac surgical program in Calgary is continuing to excel in minimally invasive heart surgery. Over the last year, the Minimally Invasive Direct Coronary Artery Bypass program was developed with lead anesthesia support provided by Drs. Chris Noss and Doug Seal. Previously established initiatives including the Minimally Invasive Mitral Valve Surgery program and the Mitral Valve NeoChord program continue to grow.

The expansion of minimally invasive cardiac surgical procedures has resulted in an increased use of mini-thoracotomy incisions in patients. To help manage pain and improve patient satisfaction in this surgical population, the CAS employs nerve block techniques and indwelling local anesthetic catheters. These interventions carry on the commitment of the CAS to improving patient satisfaction.

CARDIAC ANESTHESIOLOGY SECTION ON-GOING AND FUTURE CHALLENGES

1. Expand the cardiac anesthesia regional pain program.
 2. Support the continued growth of the CAS research and quality programs.
 3. Be partners in the development of new cardiac surgical and interventional procedures in Calgary.
- Cardiac Anesthesiology Section On-Going and Future Challenges
1. Help our short-staffed non-cardiac anesthesia colleagues meet critically high manpower demands in non-cardiac surgery.
 2. Maintain the wellness of CAS members in the setting of long workdays and a citywide anesthesiologist shortage.
 3. Adapt to the challenges posed by the rapid introduction of new technologies into perioperative care.

CARDIAC CRITICAL CARE

DIRECTOR – Dr. Ken Parhar

OVERVIEW

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 (U. 94 and 104) with 16 of these beds currently funded.

The CVICU at the Foothills Medical Centre serves Southern Alberta with approximately 1500 cardiac surgery cases in 2022. The CVICU specializes in post-operative open-heart surgery with the majority of cases being coronary artery bypass graft (CABG) and valve repair or replacement. Other advanced surgeries cared for in the CVICU include complex thoracic aortic surgery, minimally invasive valve surgery including alternate access approaches to

Transcatheter Aortic Valve Replacement (TAVR), as well as Extracorporeal Life Support (ECLS) for both temporary heart and lung support (VV/VA ECMO), and Ventricular Assist Devices (VAD) which provides more durable heart support.

PATIENT CARE

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

The CVICU consists of a large multidisciplinary team including registered nurses, registered respiratory therapists, cardiac surgeons, cardiac anesthesiologists, cardiovascular intensivists (many of whom have advanced training in ECHO and ECLS), physiotherapists, and clinical pharmacists as well as many allied health care providers (unit clerks, healthcare aids, housekeeping staff, social workers). CVICU has the highest number of advanced certifications in critical care including IABP, CRRT, three VAD devices, pulmonary artery catheters, advanced pacing, lumbar drains as well as other ICU advanced certifications.

QUALITY IMPROVEMENT AND RESEARCH

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

- Improving the quality of care for minimally invasive cardiac surgery patients through the development and implementation of a care pathway to optimize recovery.
- Relaunch of the Patient Flow Project – Optimizing patient flow from CVICU to cardiac surgery ward Unit 91. The goal is to improve the flow of patients from the CVICU to unit 91.
- Ongoing recruitment for the SMART-BP study which is examining the use of wireless non-invasive real time blood pressure monitoring and comparing it to invasive blood pressure monitoring.
- Ongoing participation in the Venting Wisely initiative which is a pan-provincial initiative to optimize the care provided to patients who are mechanically ventilated with hypoxemic respiratory failure and ARDS using a multidisciplinary evidence informed care pathway.
- Creation of a high-resolution (5D-ICU) quality improvement database for patients who are postoperative Cardiac Surgery to try and eliminate unnecessary variability in care.

EDUCATION

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

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

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 Centre (FMC)

Executive Director – Amanda Weiss

Site Lead - Dr. Angela Kealey

Medical Cardiology – Units 81 & 82

There has been a change in management and leadership with the teams that has resulted in a new level of staff engagement. 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, the number of patient days within the Cardiac Intensive Care Unit has decreased for specific patient populations thanks to the recently expanded telemetry monitoring capacity in the Cardiac High Observation Area. The team continues to discuss the future of remote monitoring of high-risk patients and innovative approaches to further decrease the length of stay for various patient populations served within Medical Cardiology.

Cardiac Intensive Care Unit – Unit 103A, 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. DCD helps increase the number of kidneys and other organs available for transplant.

CICU continues to support the trans-aortic valve replacement (TAVI) program, and the team is seeing more patients coming to CICU post implant. These patients are mobilized early after admission and many can go home one day post-op.

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.

Ongoing projects include working with PCU 91 on streamlining transfer processes from PCU91 to CVICU, 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 after cardiac surgery. The process Keep Your Move In the Tube promotes greater use of upper extremities while limiting range of motion. PCU 91 continues to work on Quality Improvement, formalizing a committee and key performance indicators for 2021. PCU91 has also been engaged in functional programming as a preliminary phase to expanding the telemetry services available on the unit to achieve greater CV surgery volumes.

Peter Lougheed Centre (PLC)

Executive Director - Emma Folz

Site Lead - Dr. Michelle Keir

Wave 4 Connect Care Launch

The PLC was very successful with the Wave 4 implementation of Connect Care which launched on May 28, 2022. Despite delays related to pandemic and other things, the PLC was diligent in getting the work done and leading the Calgary Zone along with the Alberta Children's Hospital with implementation.

Unit 48 – Coronary Care Unit (CCU)

Unit 48 is a six-bed stand-alone CCU. Due to the pandemic response, as well as overall cardiology acuity and occupancy, Unit 48 occupancy has been quite high this past year with multiple instances where the unit was required to open and staff the four unfunded spaces within the unit. PLC CCU worked in collaboration with the PLC Intensive Care Unit and provided support in specific instances for appropriate patients. This allowed additional space for expansion of the ICU to care for critically ill patients with Covid19, and to support general site capacity.

Unit 48 is participating in recruitment of participants for current research related to black, indigenous and persons of color and how they experience their cardiac related healthcare journey.

Unit 49 – Medical Cardiology

Unit 49 is a 32-bed inpatient medicine unit with a specialty mix of medical cardiology and internal medicine. Unit 49 is participating in the Quality improvement project for physician handover, and also the recruiting participants for current research related to black, indigenous and persons of color and how they experience their journey within cardiac sciences health care.

The PLC site will be participating in a collaboration with the medicine strategic clinical network over the next year related to quality improvement – ACBI (Acute Care Bundle Implementation). The intent is for this work to spread throughout the Calgary Zone and province once Connect Care is fully implemented. The Edmonton participating site in this exciting work is the Royal Alex.

CV Labs

During the 2022 – 2023 year, we have secured funding for and created a Cardiac clinic for patients with neuromuscular disorder. We are very excited for the opportunities for research, education and improved clinical care, and patient outcomes for this patient population.

The Cardiac Function clinic has been very busy over the past year providing care to a growing patient population. With the departure of one of our long-term staff members, we have been able to recruit into that position. As a site, we continue to advocate for staffing growth within this clinic to provide specialized care to an even larger patient population.

The Congenital Heart Clinic continues to see growth in its patient base. Over the last year, aortopathy referrals have grown significantly in number and complexity due to improvements in genetic testing. The congenital heart team has seen great success and growth in the multidisciplinary congenital clinic. Numerous disciplines in this clinic include nursing, congenital cardiology, hepatology, pulmonology, and social work. The congenital clinic has put efforts into improvement of Goals of Care discussions with our patients. We have recently developed a video for patients in partnership with the Libin Cardiovascular Institute and are currently enrolling patients for a research study related to goals of care and end of life planning.

In the areas of Echocardiography, similar to other sites in the zone, the team is working creatively to support retention of casual staff and overall recruitment of sonographer staff members to the Calgary zone. We continue to be the zonal location that supports all echo testing of the adult congenital heart population.

Rockyview General Hospital (RGH)

Executive Director – Jenny Mazuryk
Executive Director, CCU – Teresa Thurber
Site Lead – Dr. Nakul Sharma

CV Labs

The Echocardiology team completed CPSA accreditation in October of 2022. They have obtained funding for four new EPIQ Echocardiography machines. The new equipment

will be in place prior to Connect Care launch with expected arrival in early April 2023. Quality improvement work in Echocardiology has focused on streamlining the management of ambulatory TEEs with strong involvement of all stakeholders.

The ECG team has managed a steady volume of inpatient and emergency department ECGs, as well as ambulatory procedures and testing. They are working collaboratively with the FMC to obtain funding for new CASE systems used during stress testing.

Unit 71- Cardiac Medicine

Unit 71 is a 32-bed cardiac medicine unit, with an additional two Acute Cardiac Unit (ACU) step-down beds. These beds continue to be in place to support site and zonal CCU capacity.

The unit has had many changes in the last year, including a new management team and preparation for launch 6 of Connect Care. Continued staff training and education support are top priorities to ensure a smooth transition to a new health record.

On top of the current work, the team continues prioritizing quality improvement initiatives led by the unit's quality council team. Areas of focus have been working with heart failure optimization and education alongside the Cardiac Function Clinic (CFC) within site. A pilot study is underway on the unit to align patient education resources with CFC to assess continuity of care and see the effects on patient engagement and learner retention. If successful, the goal will be to disseminate the work with like units and clinics to enhance quality patient care.

RGH Cardiac Function Clinic (CFC):

The CFC team is excited to launch Connect Care (CC) and have the clinic fully transferred to an electronic healthcare system; this will allow for faster data collection and metrics to assess patient care and engagement.

Its partnership with Unit 71 for the Congestive Heart Failure (CHF) education resource pilot study intends to increase the number of education modalities in the clinic during patient education and align resources with the inpatient unit.

CCU

RGH CCU continues to be very involved in the planning and now build of our new ICU and CCU which is anticipated to be ready for our patients and teams in fall 2024. The unit has is completing a refresh of Cardiac skills for Nursing staff. New faces are joining the ICU/CCU team with the recruitment of transitional graduate nurses.

The RGH CCU NPs have been accepted to attend and present at the Canadian Cardiovascular Nursing (CCCN) Conference hosted in Quebec City May 26-27th.

Connect Care Launch 6 will include RGH CCU on May 6, 2023.

South Health Campus (SHC)

Executive Director – Paul Stewart

Site Lead - Dr. Anwar Jelani

Cardiac Clinics and Diagnostic Services are fully open post Covid slow downs. SHC has been very busy preparing for our Connect Care Launch on May 6, 2023. The launch of this system will have a significant impact on Ambulatory and Diagnostic services across the province as we will now have similar processes and patient information can cross services and sites.

There are ongoing challenges with recruitment in some areas, especially with Nurse Practitioners. The site has been without a Physician site lead for much of the year. Most clinic and Diagnostic areas have stabilized with their staffing, with only the occasional challenge with recruitment.

Inpatient and Emergency Department capacity continue to provide significant challenges for the site.

TotalCardiology

TotalCardiology Rehabilitation has been providing secondary prevention of cardiovascular disease services through its rehabilitation program to residents of Alberta Health Services for over 26 years. The program also offers screening and primary prevention services for those who either self-refer or are referred by a physician. The foundation of the program continues to be early access, quality patient education, health coaching, and timely medical intervention. The team continues to strive for the highest quality clinical care, patient education, and research as evidenced below.

TotalCardiology Rehabilitation continues to have great success with the Early Cardiac Access Clinic (ECAC). STEMI, NSTEMI, and ACS patients continue to be assessed within four to ten 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 graduate from an individualized program. In the period of January 1 to December 31, 2022, the team had 2,109 patient separations, which is comparable with the previous year, and meets our contracted quota.

TotalCardiology continues to offer a hybrid in-person and home-based exercise and health coaching program. All patients are offered a minimum of six onsite supervised exercise sessions, with the potential for extension based on their progress and clinical indicators. During these sessions patients are supported with risk factor management and health behaviour change. The sessions are augmented by follow-up over the phone and virtual group education. Additionally, in 2022 we resumed onsite supervised exercise for special populations including LVAD patients, and those with PAD and POTS.

Patient education materials have been mobilized online, including the creation of four guides and associated video modules with concise information on core health behaviour topics (heart disease, exercise, nutrition, and stress). In 2022 we also introduced virtual weekly education classes offered through Microsoft Teams on exercise, nutrition, and stress. Through collaboration with the Calgary Co-Op Pharmacy team we were able to develop and offer a medications class that is taught virtually by one of their pharmacists and offered monthly.

Partnerships with hospital and community groups have allowed us to expand services to new populations. In 2022 we concluded the Heart Failure Continuity Clinic (HFCC) pilot and have incorporated this service into our program model which helps facilitate participation of these patients in cardiac rehabilitation. TotalCardiology also continues to foster medical education within the clinic and coordinated rotations for those physician residents specializing in internal medicine, cardiology and physiatry as well as Masters of Kinesiology students.

Our research committee, the TotalCardiology Research Network (TCRN), has continued to produce high-quality research and mentor junior researchers within the cardiac research community. Over the past year, the committee published two peer-reviewed papers and one conference abstract. Topics of these publications cover clinically-relevant topics within the context of cardiac rehabilitation and were published in a variety of journals such as "Mayo Clinic Proceedings" and the "International Journal of Cardiology."

AWARDS AND PROMOTIONS

CLINICIAN OF THE YEAR AWARD – Dr. Michelle Keir

Awarded annually to a primary member of the Department of Cardiac Sciences who has made outstanding contributions to the Department by displaying excellence in the area of patient-centered care.

DEPARTMENT ACHIEVEMENT & APPRECIATION AWARD – Ms. Karen Ko

Awarded annually to recognize a non-physician member of Department, such as nurses, clinical assistants, IT staff, technologists, operational leadership, unit clears and administrative, who have displayed excellence in activities that improve patient-centered care.

PETER RUSSELL AWARD – Dr. Kimesh Chetty

Presented annually to the clinical fellow who is considered to best exemplify Dr. Russell's passion for medicine and patients. Dr. Russell was the first graduate of the Clinical Cardiology Training Program at the University of Calgary in 1983.

PRECEPTOR AWARDS-

Dr. Jeff Shaw Cardiology Preceptor of the Year, Dr. Bill Kidd Cardiac Surgery Preceptor of the Year & Dr. Jessica Patzer Teacher of the Year/Excellence in Teaching as a Sub-specialty Cardiology Fellow and is awarded to physicians who exemplifies teaching and mentoring of clinical trainees and is selected by residents.

HENRY J DUFF LIBIN CARDIOVASCULAR INSTITUTE RESEARCH MENTOR OF THE YEAR AWARD – Dr. Satish Raj

Awarded to a basic and/or clinician scientist that is a member of the Libin Cardiovascular Institute who provides exemplary research mentorship.

TODD ANDERSON CARDIOVASCULAR RESEARCH AWARD – Dr. Vaibhav Patel

Awarded annually to an early-career researcher in the areas of cardiovascular health and disease. The recipient will be a primary member of the Libin Institute.

THE LB MITCHELL FELLOW RESEARCH AWARD – Dr. Waseem Hijazi

Created in recognition of the significant contributions of Dr. L. Brent Mitchell to cardiovascular health in Calgary. In addition to his research career in clinical cardiac electrophysiology, Dr. Mitchell served as a leader and mentor to colleagues and students and a dedicated provider of care to his patients. The award is open to cardiology and cardiology sub-specialty fellows and cardiac surgery residents.

LIBIN RESEARCHER OF THE YEAR – Dr. Robert Rose

Awarded annually in recognition of a primary member of the Libin Institute who has made outstanding research contributions, displaying excellence in research productivity or academic innovation.

UNIVERSITY OF CALGARY JERSEY AWARD - Dr Jacques Rizkallah

Award given by medical students for being one of the most influential educators during Course 3

EXTERNAL AWARDS**Dr. Paul Cartier Surgery Resident Award – Vishnu Vasanthan**

This Canadian Society of Cardiac Surgeons (CSCS) award is to be given to a Cardiac Surgery Resident who has made an outstanding contribution to the field of cardiac surgery through basic science or clinical research and who has demonstrated promise for a distinguished academic career in cardiac surgery

ACADEMIC PROMOTIONS

Dr. Angela Kealey & Dr. Louis Kolman were promoted to the rank of Clinical Associate Professor

EDUCATION

UNDERGRADUATE MEDICAL EDUCATION**Cardiovascular Course Chair - Dr. Jacques Rizkallah**

Many members of the Section of Cardiology have been actively involved in undergraduate medical education for years at University of Calgary especially when it comes to teaching the cardiovascular curriculum in Course 3. Course chairs included Dr. Sarah Weeks, Dr. Andrew Grant, Dr. Michael Slawnych, and most recently Dr. Jacques Rizkallah. The dedication of educators from the Section of Cardiology has been well received by students as highlighted by many favorable reviews and awards over the years. This year, Dr. Jacques Rizkallah was recognized by the medical students with the University of Calgary Jersey Award for being one of the most influential educators during Course 3.

POSTGRADUATE MEDICAL EDUCATION**Cardiology Training Program****Program Director - Dr. Katherine Kavanagh**

The major achievement this year was the Royal College fully accrediting our Cardiology Program for the next eight years. The reviewers were very impressed with our program and indicated they would love to join. Even more impressive, 42 of our Cardiologists attended the faculty session at the review.

Four new trainees joined us in July: Kaitlin McGrath (U of C), Golnaz Roshanker (U of C), Andrew Bond (U of C), Tauben Averbuch (McM). CARMS interviews were again virtual. The team completed 48 interviews and successfully filled the program's four Ministry funded spots. Mannat Dhillon (U of C), Firas Ahmed (Western), Jacob Abadem (McGill), John Paydar (Ottawa), Sulaiman Alnasser (Visa Trainee, Saudi Arabia) will join in July.

As a result of COVID, many of our educational programs and rounds continue to be virtual/hybrid with rich content and generally good attendance. Most longitudinal clinics have returned to the traditional face-to-face clinics. We continue to support our two online educational programs (ACC CardioSource Plus and Knowledge to Practice (K2P) from the Mayo Clinic).

Because of events in our Department this year, we had to arrange several special sessions with our trainees to address the issues and support them. Additionally, our RPC Retreat guest speaker was Dr. Sam Sears. Dr. Sears is Professor of Health Psychology at East Carolina University. In view of COVID and our department issues, we asked him to do a workshop with our trainees and RPC members addressing such concerns. He also gave a talk "Slow Burn: Agility in Coping". Our retreat was supposed to be face-to-face, however, two days prior Dr. Sears was diagnosed with COVID. We quickly switched to a virtual retreat which he did from his Calgary hotel room.

Together with seven other Cardiology Programs across Canada, and for the first time, we had a two-day virtual boot camp for our new C1 trainees. Each of the Program Directors including myself did talks on the common stressful scenarios that they might experience early in their training. The evaluations showed this was well received and appreciated by all the C1s. Our 2022 graduates are all enrolled in subspecialty programs. Dr. Ahmed Moustafa is doing EP at Western, Dr. Nabila Mahdi is doing Interventional in Calgary, Dr. Alexei Savtchenko is doing an Echo in Toronto.

Trainee Publications

Hijazi W, Vandenberg B, MD PhD, Elissa Rennert-May MD MSc, Amity Quinn PhD, Sumner G MD MSc, Chew D, MD MSc. Cost Effectiveness Analyses in Electrophysiology: Basic principles applied to growing technologies. *Frontiers in Cardiovascular Medicine*. Accepted to *Frontiers in Cardiovascular Medicine*.

Hijazi W and Miller R. Deep Learning to Automate SPECT MPI Image Reorientation. Accepted in *J Nucl Cardiol* 2023.

Jordan Gibson, Robert Miller, **Kaitlin McGrath**, Glen Sumner, and Brian Clarke. Ambulatory pulmonary artery pressure monitoring reduces costs and improves outcomes in symptomatic heart failure: a single center Canadian experience, *CJC Open*, 2023, 5, 237-249.
2. Robert Yao, Jordan Gibson, Christine Simmons, and Margot Davis. Management strategies and clinical outcomes in breast cancer patients who develop left ventricular dysfunction during trastuzumab therapy. *Cardio-Oncology*, 2021, 7(12), <https://doi.org/10.1186/s40959-021-00099-7>.

Robert Yao, **Jordan Gibson**, Christine Simmons, and Margot Davis. Management strategies and clinical outcomes in breast cancer patients who develop left ventricular dysfunction during trastuzumab therapy. *Cardio-Oncology*, 2021, 7(12), <https://doi.org/10.1186/s40959-021-00099-7>.

Trainee Presentations

Jordan Gibson, Mae Sumrain, Robert Miller, Kristin Lyons, Nowell Fine, Omid Kiamanesh, Nakul Sharma, Debra Isaac, Sandeep Aggarwal, and Jonathan Howlett. Novel HFrEF algorithm demonstrates a safe and effective strategy for rapid GDMT titration. Poster-presentation at the 2023 American College of Cardiology Meeting.

Jordan Gibson, **Kaitlin McGrath**, Andrew Mardell, Robert Miller, Glen Sumner, and Brian Clarke. Ambulatory Pulmonary Artery Pressure Monitoring in Symptomatic Heart Failure: A Single-Centre Canadian Experience. Oral presentation at Libin Research Day, University of Calgary, Jun. 20, 2022.

Kaitlin McGrath, **Jordan Gibson**, Andrew Mardell, Robert Miller, Glen Sumner, and Brian Clarke. Ambulatory pulmonary artery pressure monitoring reduces costs and improves outcomes in symptomatic heart failure: A single-centre Canadian experience. Oral presentation at the Virtual Canadian Cardiovascular Congress.

Poster Presentation at CCS

Benefit of Beta-Blockers In Patients Following Acute Coronary Syndrome – Stratified According To Left Ventricular Ejection Fraction. **Kimesh Chetty**, Bryan Har, S. Hassan, D. Malebranche, M. Fung, E. Youngson, Z. Liang, E. Tao, M. MacDonald, T. Anderson, and Robert JH Miller.

THE STRUGGLE IS REAL: HOW TO MANAGE ACS WHEN THE EVIDENCE YOU WANT AND NEED JUST ISN'T THERE. **Kimesh Chetty**, Greg Schnell workshop segment on the role of routine preloading with DAPT in ACS. at CCS

Cardiac Surgery Training Program

Program Director - Dr. Daniel Holloway

CBD Lead - Dr. Muhammad Ahsan

The cardiac surgery program continues to be highly productive and successful. Eight residents are enrolled in the program, which is supported by 12 dedicated adult cardiac surgeons, making it one of the largest cardiac surgery training programs in Canada. The surgical program remains highly desirable for cardiac surgery training. All members of the Section of Cardiac Surgery are committed to residency education and work to provide a superior training environment. The program's academic curriculum consists of academic half days focused on didactic teaching, wet-labs, simulation, journal clubs, thoracic aortic rounds, M and M rounds, and cardiovascular triage rounds.

Along with all other residency programs at the University of Calgary, in 2022 the cardiac surgery program underwent the scheduled external review by the Royal College of Physicians and Surgeons of Canada. We are pleased to report that the program once again achieved full accreditation and was recognized as a strong training program in cardiac surgery.

The academic schedule is well partnered with the Department of Surgery curriculum, including critical thinking, surgical skills, Surgical Foundations, and CanMEDs. The program's 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, minimally invasive valve surgery, pacemakers, mechanical circulatory support, endovascular aortic surgery, complex aortic procedures, and transcatheter valve implantation. Opportunities in clinical outcomes, basic science, and translational research are also supported. Residents continue to be highly productive in research and have successfully presented their work at many national and international meetings.

The program is planning to participate in Carms 2023 for selection of another outstanding candidate to join the team in 2024.

Overall, the cardiac surgery training program is doing very well. We are training excellent residents to be cardiac surgeons to serve our patients in Alberta and beyond.

AWARDS

CSCS Dr. Paul Cartier Surgery Resident Award – Vishnu Vasanthan

Electrophysiology

Program Director - Dr. Yorgo Veenhuyzen

The Adult Cardiac Electrophysiology Fellowship 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.

The Program underwent a favorable external review by the Royal College in September 2022 and was cited for innovation due to the inclusion of a "Flexweek" in every month of training that permits mature learners to tailor their educational experience as needed.

Drs. Kyle Murray and Brennan Ballantyne will be completing their training this June while Dr. Rory Dowd from the UK and Dr. Liane Arcinas from the University of Manitoba will be completing the first of two years of training in Adult Electrophysiology. Dr. Nicholas Kerr joined the program for 18 months of training from Sydney, Australia.

Interventional Cardiology

Program Director - Dr. Francois Charbonneau

For the last 40 years, the Foothills Interventional Cardiology Service (FICS) has trained more than 80 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 2021 – 2022, the Interventional Cardiology program included three fellows. Dr. Meshal Alhajeri completed his training in June 2022 and returned to his home country, Kuwait, to establish his practice.

Dr. Sarah Woolridge will complete her interventional training in October 2022, after a short but productive interruption to welcome her wonderful daughter, Florence! Finally, Dr. Nishant Sharma will continue training in 2022-2023, assuming the position of senior fellow and assisting the three new fellows who started in July 2022.

Echocardiography

Program Director - Dr. Jillian Colbert

The Adult Echocardiography Fellowship Program at the Libin Cardiovascular Institute is a 12-month program with a strong clinical focus. It has capacity for one fellow per year. Over the last year, Dr. Nathan Leader has graduated from the program, and is now a staff cardiologist with the Libin

Cardiovascular Institute. In July of 2022, we welcomed Dr. Jessica Patzer as our Echo Fellow. Dr. Patzer has contributed to clinical care and teaching of junior residents, with a long-term plan to stay and work in Calgary as an echocardiographer and clinical cardiologist, with advanced training in adult congenital heart disease. Dr. Patzer is funded by the Arthur E. Child Fellowship for cardiology trainees.

Heart Failure

Program Director - Dr. Kristin Lyons

The Advanced Heart Failure Fellowship Program did not have a fellow for the 2022 – 2023 academic year but we do have a Fellow joining us for the upcoming academic year.

Cardiac Sciences Grand Rounds

Cardiac Sciences Grand Rounds runs from September until June. Grand Rounds continued in a virtual format from April to September and moved to a hybrid format in the fall, with speakers being in-person when available and attendees both in-person and online. Attendance has remained steady with 35-100 attendees weekly, including physician staff, trainees, researchers and nursing staff that include members from the divisions of cardiology at the University of Alberta and University of British Columbia. The program continues to attract world-class national and international speakers, which has been facilitated by the virtual format. Despite the clear limitations imposed by the pandemic, the strong support of the pharmacological industry and the Libin Cardiovascular Institute has been instrumental in maintaining the high quality of Cardiac Sciences Grand Rounds. Please see the **Appendix B** for a complete list of speakers.

WORKFORCE PLANNING

See Table 1 below for a list of retirements and recruitments

CARDIOLOGY

SUMMARY OF RECRUITMENT CARDIOLOGY

Health care, much like other organizations, is facing unprecedented challenges in the workforce since the COVID pandemic. This is further accentuated by a rapidly growing population in Calgary. Hence, recruitment of physician and health care workers remains a priority.

FUTURE NEEDS

- Adult Congenital Heart Disease July 2023 Dr. Patzer
- Women's Cardiovascular Disease Chair 2023
- Geriatric Cardiology July 2023
- General Cardiology seven to eight postings Ongoing
- Academic Advanced Heart Failure
- Academic GFT Section of Cardiology and AHS Zone Head Fall 2022

Table 1: Retirements and Recruitments

2022-2023 Retirements	2022–2023 Recruitment	2023–2024 Recruitment
<ul style="list-style-type: none"> Hank Duff Peter Giannoccaro 	<ul style="list-style-type: none"> Cvetan Trpkov – CICU Nathan Leader – Echocardiology Sudhir Nishtala – Echocardiography Holly Smith – Cardiac Surgery Anwar Jelani – SHC Site Lead Angie Kealey – FMC Site Lead Andrew Howarth - Cardiology Section Chief Vikas Kuriachan – Clinical and Academic Department Head, Cardiac Sciences 	<ul style="list-style-type: none"> Brennan Ballantyne - EP/ Heart Failure Juan Russo - Interventional/ CCU Rajesh Keshvara - Congenital/ Interventional Michael Chiu – CICU/ CVICU Jessica Patzer - Congenital Women’s CV Health Director Stephenson Cardiac MRI Director Program Director

CHALLENGES, OPPORTUNITIES, and FUTURE DIRECTIONS

CHALLENGES

- Increased demand for service and resources in a time of unprecedented fiscal restraint
- Insufficient infrastructure to meet specific type and volume of patient needs resulting in prolonged wait times.
- Physician and health care provider burnout
- Physician retention in acute care hospital service
- Funding for innovation and education

The Department continues to see need for growth in open and minimally invasive surgeries, percutaneous cardiac procedures, electrophysiology ablations, and the need for diagnostic testing and outpatient consultations. This increased demand comes at a time of increased fiscal restraint along with limitations in infrastructure, resources, and staff. This has been more pronounced since the COVID pandemic. To meet the growing demands, in a resource constrained environment, the Department tries to enhance efficiency, increase the appropriateness of procedures, and improve access to care through triage models. Central referral systems, for example, may increase accessibility to care for patients and improve appropriateness of procedures

The increasing growth and restrained resources in an environment of fiscal restraint throughout the Department are contributing to a decrease in physician wellness and increase in physician burnout. Such growth strains physician workloads, and we have experienced a resultant decrease in staff wellness; which then results in physicians modifying their clinical duties and even leaving hospital setting to work in community clinics. Consequently, the Department remains challenged to provide and effectively coordinate the human health resources necessary to safely cover the needs of the Calgary Zone. For example, the Department had seen increasing strain related to city-wide cardiology night coverage across the Zone to provide 24/7 care at all four acute care hospitals. However, in working with Alberta Health Services, recruitment of clinical assistants; as well as, using co-management strategies with other departments have been helpful. We view this as an opportunity to explore new ways to deliver care and alter service models. The Department will continue to dedicate resources and attention toward a culture of wellness for physicians.

Funding for new innovations and many fellowship programs remains a challenge in our health care system. Training future specialists is a vital mission for all academic centres. Bringing new technology and innovation does not always have a clear funding pathway. Hence, these will require ongoing collaborations between Alberta Health Services, University of Calgary, Libin Institute, Industry, and philanthropic organizations.

OPPORTUNITIES AND FUTURE DIRECTIONS

There opportunities and strategies that we will pursue to enhance patient care in the Department of Cardiac Sciences remain similar to prior years:

Embracing an effective multi-disciplinary “heart team” approach to clinical care by promoting a multi-disciplinary, collaborative approach to cardiovascular disease treatment

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 behavioral changes in referral patterns and practices. Focused leadership and service line philosophy of the Department of Cardiac Sciences will put it in an excellent position to be leaders in a collaborative approach to cardiovascular care. The Department believes 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.

Fostering the growth of the structural heart program (percutaneous catheter-based cardiovascular interventions)

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 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.

The Department believes that as we expand into structural heart interventions, it can decant some resource intensive open-heart surgeries and improve capacity and access to life-saving procedures. As well as being able to offer an intervention to patients that may not be candidates for open surgical procedures.

Enhancing efforts to reducing recovery time and promote early discharge to manage surgical demand, mitigate costs and enhance the overall patient experience

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 its 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 and is a key priority. The Section of Cardiac Surgery obtained outstanding results, and the Department is 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-centered metrics to confirm whether or not patients favor such approaches.

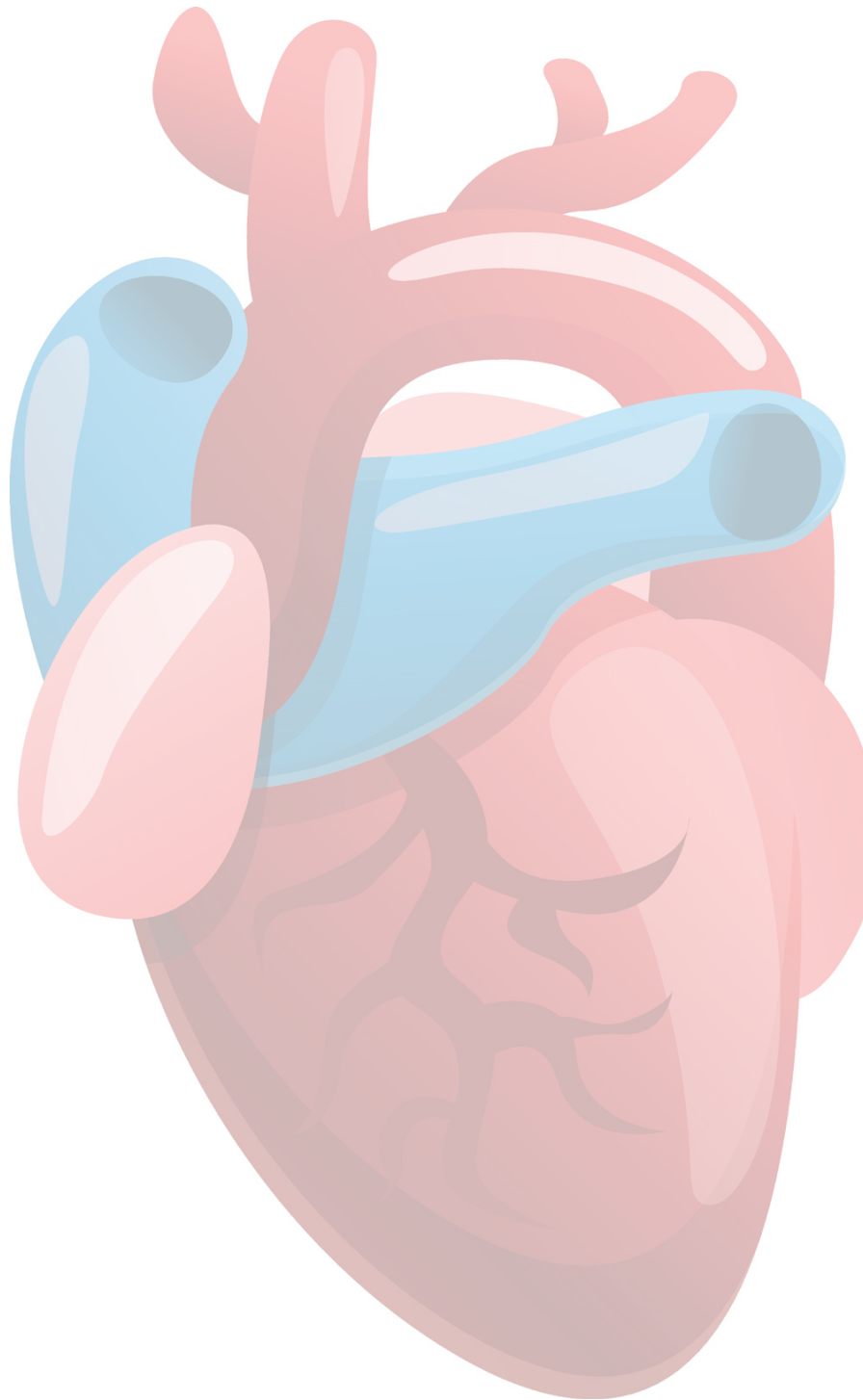
Utilizing the potential of existing AHS data platforms/ infrastructure to enhance real-time decision making and quality improvement

There is a significant opportunity to utilize existing data platforms to enhance real-time decision making and improve value-based patient-centered care. During the pandemic, the Department had an excellent experience using some AHS informatics platforms such as Tableau to link leadership and provide timely actionable data across the Zone. For example, it used a Tableau-based dashboard to show the status of all beds across all sites. 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, the Department will begin integrating its existing data assets and building physician capacity to utilize data to support clinical decision making.

Improving integration with the Libin Institute's people, platforms, and programs toward value-based innovations in clinical care (data science and precision medicine)

The Department and the Libin Cardiovascular Institute 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. We will better harness the research and health care modifying potential afforded by improved integration between the Department and the Institute. To that end, 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. 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-centered, 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.”*

We believe that collaboration between the Institute and the Department of Cardiac Sciences offers immense value to the community as it allows us to use 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 involves making significant investments in clinical data and further integration of 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).



CARDIAC SCIENCES HEALTH CARE PROVIDERS

Health Care Providers



66

Cardiologists



11

Cardiac
Surgeons



10

Cardiac
Anesthesiologists



9

Cardiac
Intensivists



750+

Nurses



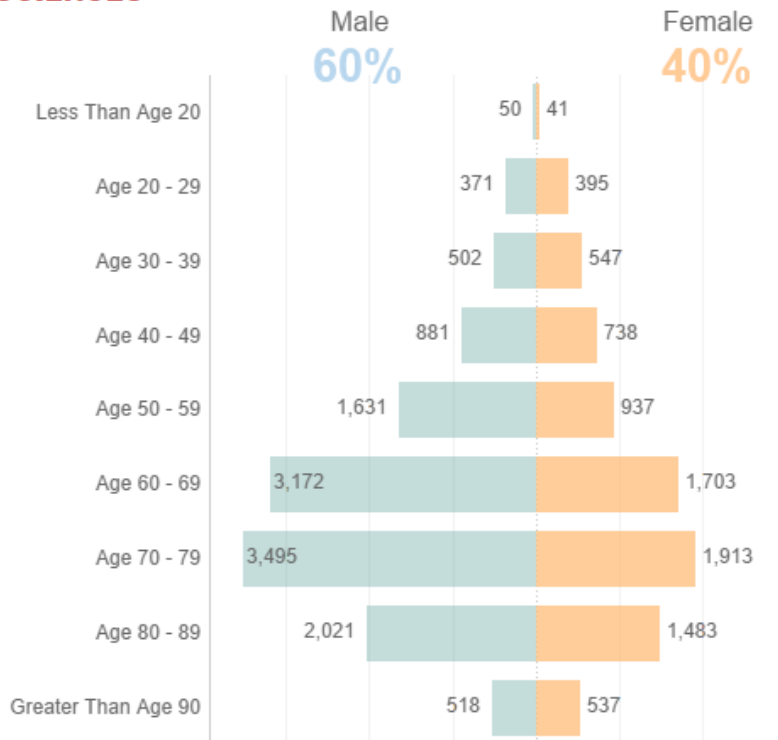
185+

Technicians

*Including Perfusionists, Cardiac
Surgical Assists and all procedural
technicians in Cardiac Sciences

CARDIAC SCIENCES

OUR PATIENT POPULATION IN FY2022/23



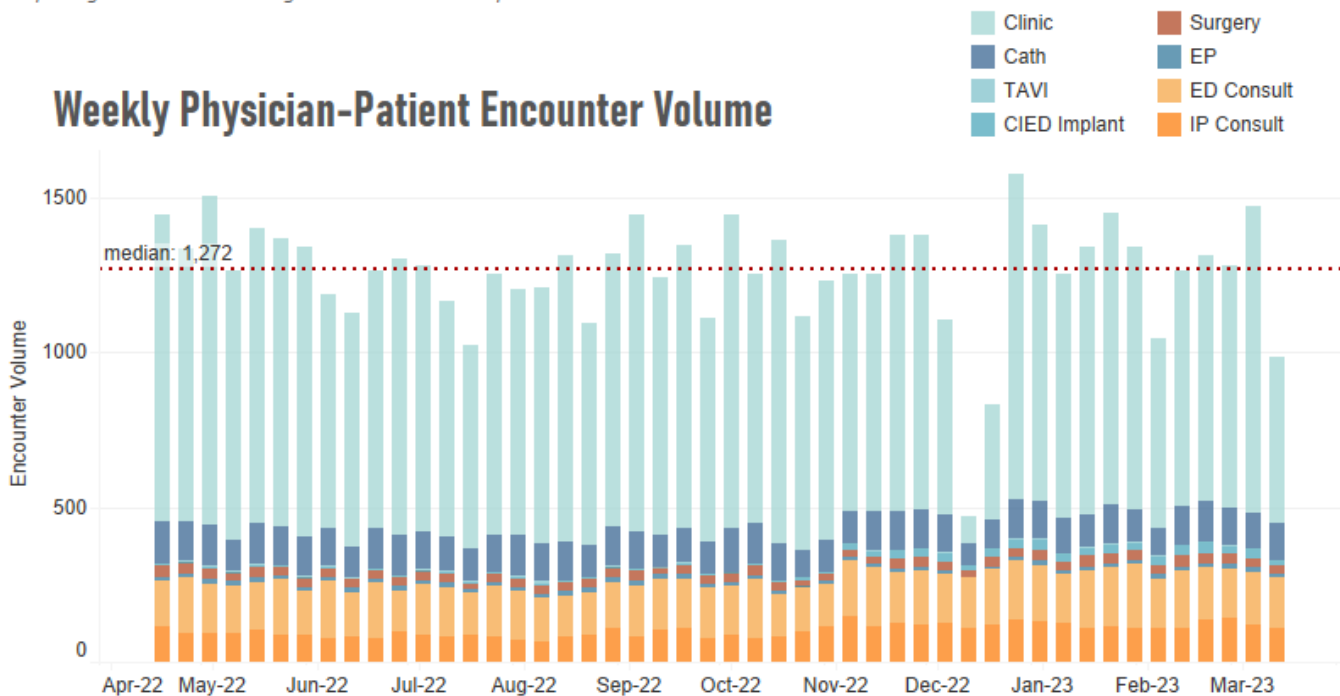
20,935
ACTIVE
PATIENTS

75% of Patients From Calgary
25% From Outside of Calgary

5,818
Inpatient
Cardiology Consults

**Patients are categorized by data available within ConnectCare -- Variable: Administrative Gender (legal sex). There are limitations with this variable in that the data are reported as a binary, and the definition conflates sex and gender. We recognize these limitations, but believe that stratified reporting of the available sex/gender information can provide valuable information across time.*

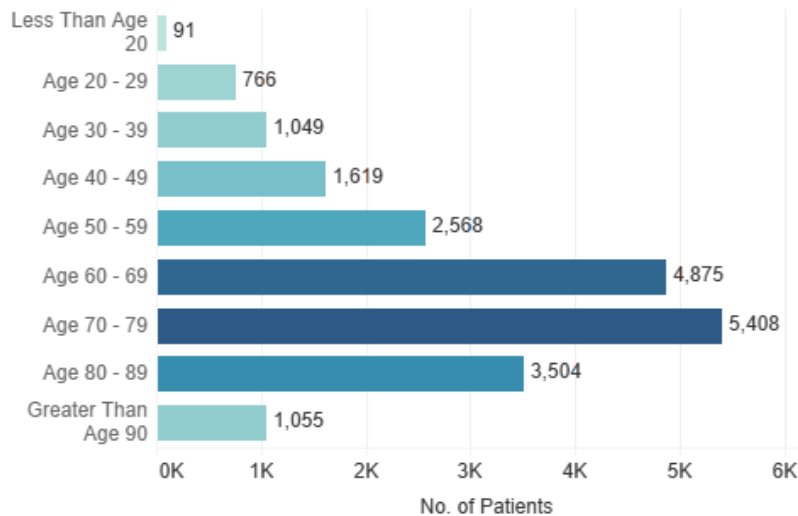
Weekly Physician-Patient Encounter Volume



Cardiac Sciences is committed to shifting collection and reporting of sex and gender variables to identify and address health inequities in women, and gender and sexual minorities in Alberta (or Calgary). For more information see: ([Lau, 2021](#)) and ([Clark et. al, 2022](#))

CARDIAC SCIENCES

OUR PATIENT POPULATION IN FY2022/23



20,935
ACTIVE
PATIENTS

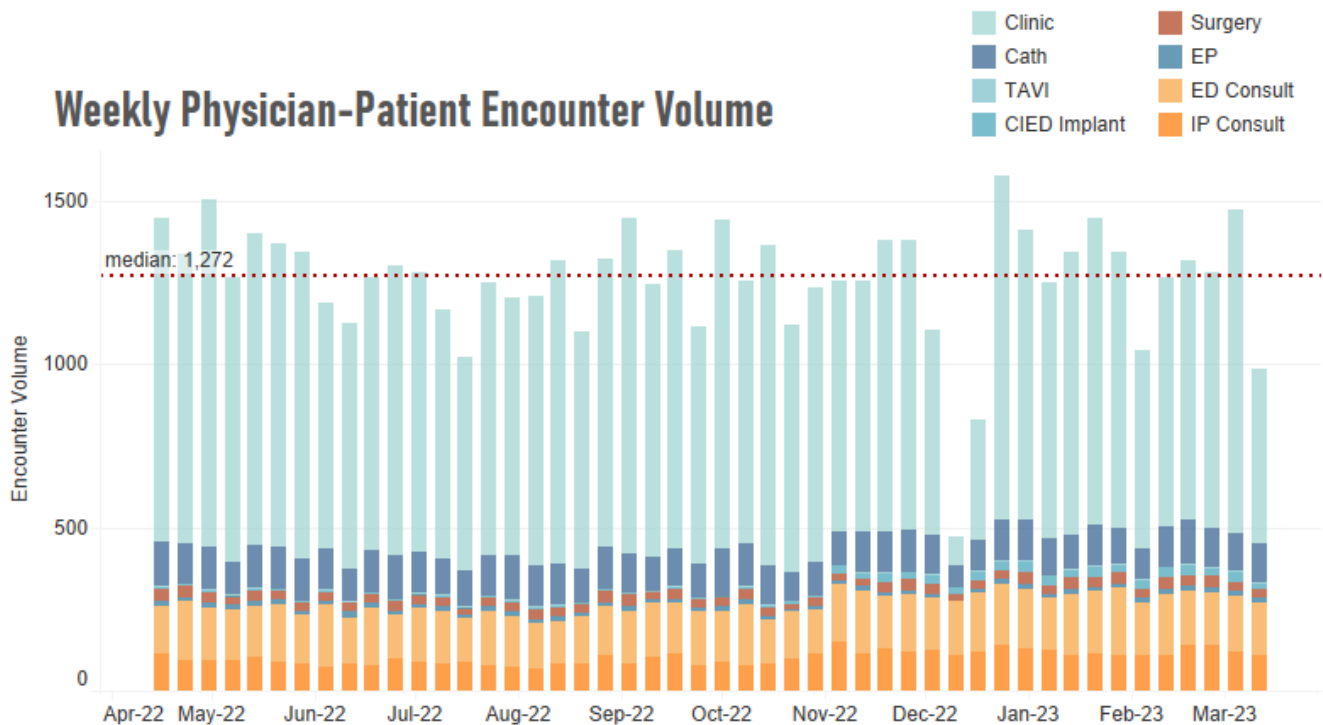
75% of Patients From Calgary
25% From Outside of Calgary

40% of Our Patient Population are **Women**



5,818
Inpatient
Cardiology Consults

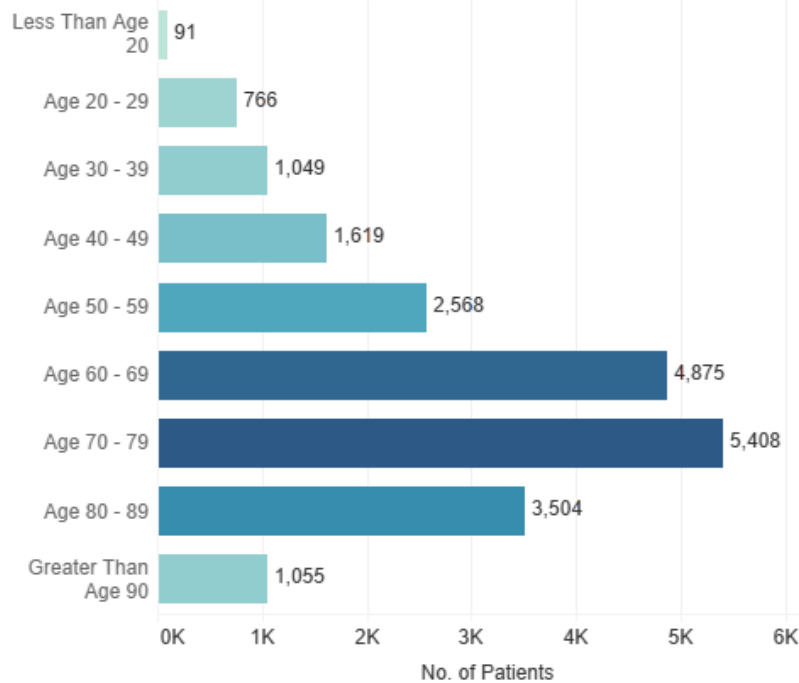
Weekly Physician-Patient Encounter Volume



CARDIAC SCIENCES

OUR PATIENT POPULATION IN FY2022/23

Our Patient Age Groups

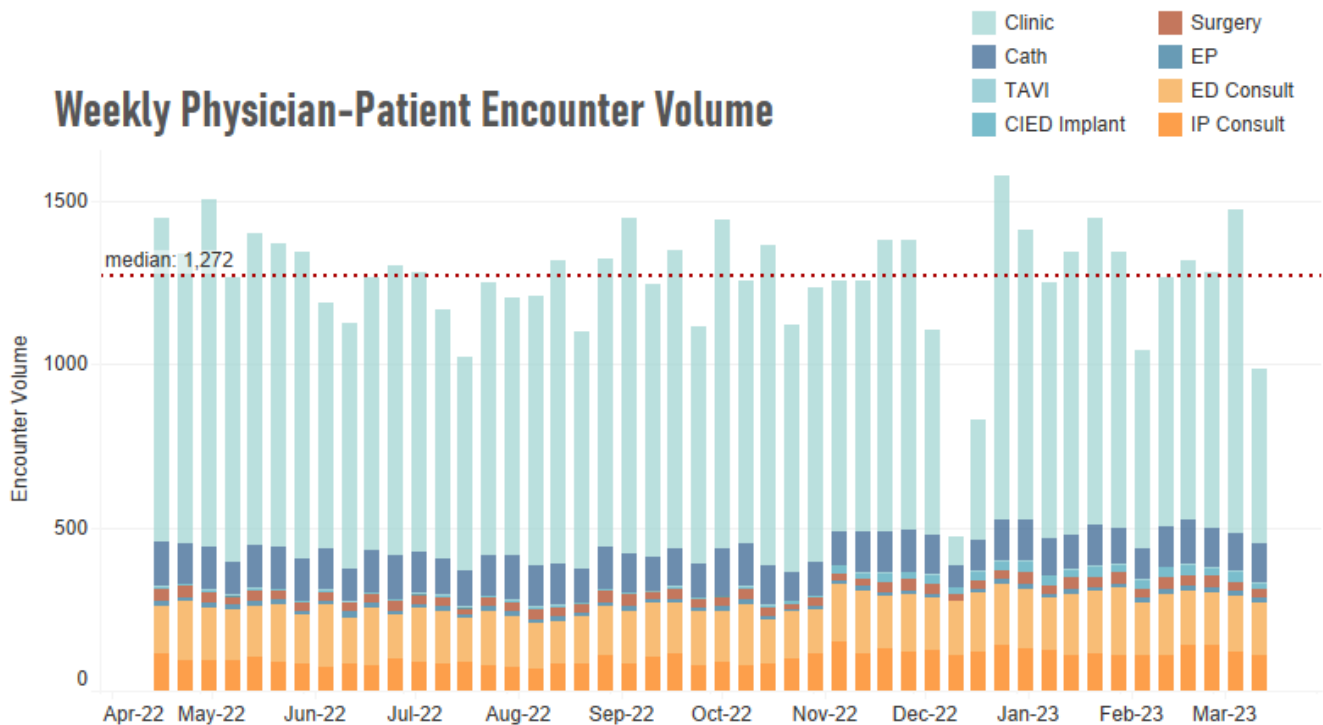


20,935
ACTIVE
PATIENTS

75% of Patients From Calgary
25% From Outside of Calgary

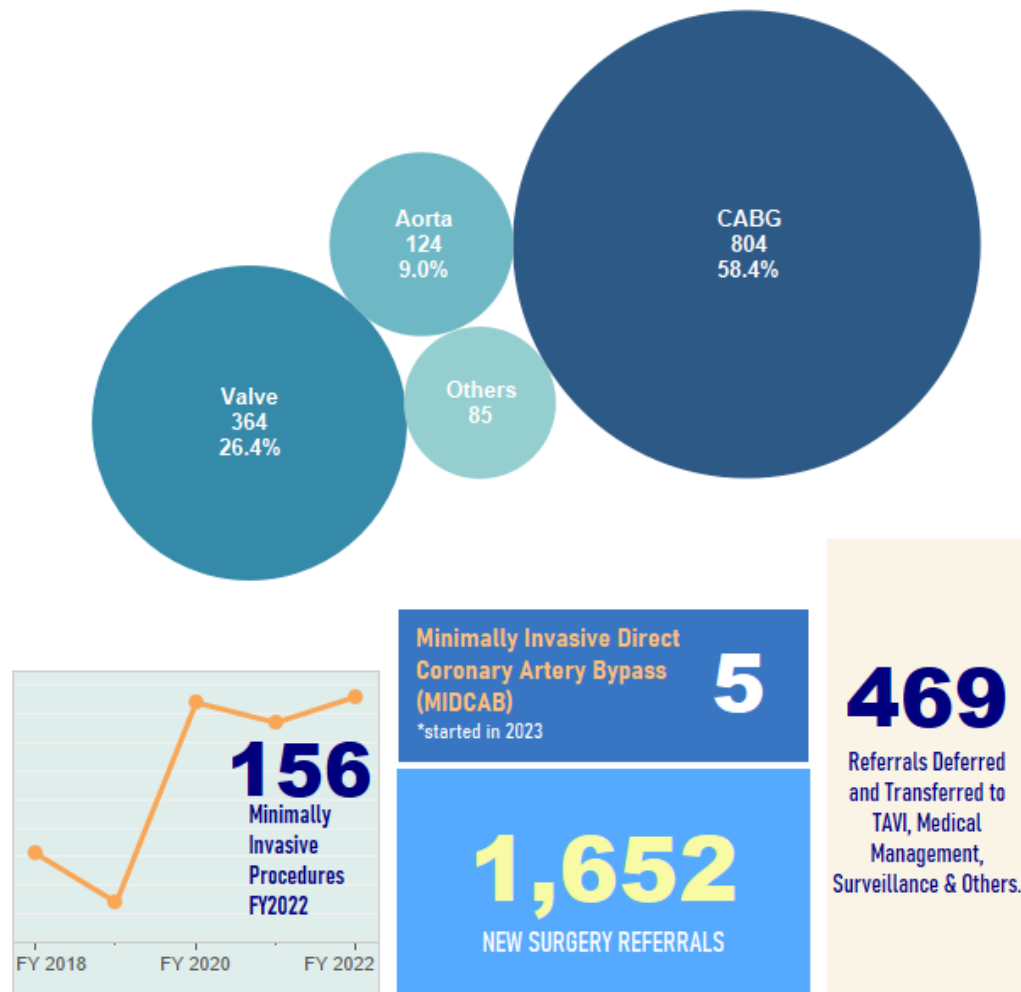
5,818
Inpatient
Cardiology Consults

Weekly Physician-Patient Encounter Volume

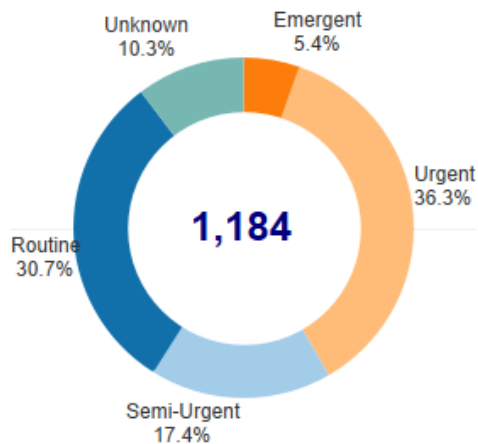


CARDIAC SURGERY

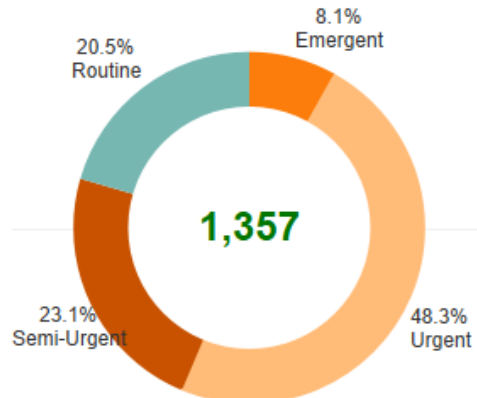
CARDIAC SURGERY PRIMARY CATEGORY



FY2022 Accepted Referrals



FY2022 Completed Surgeries

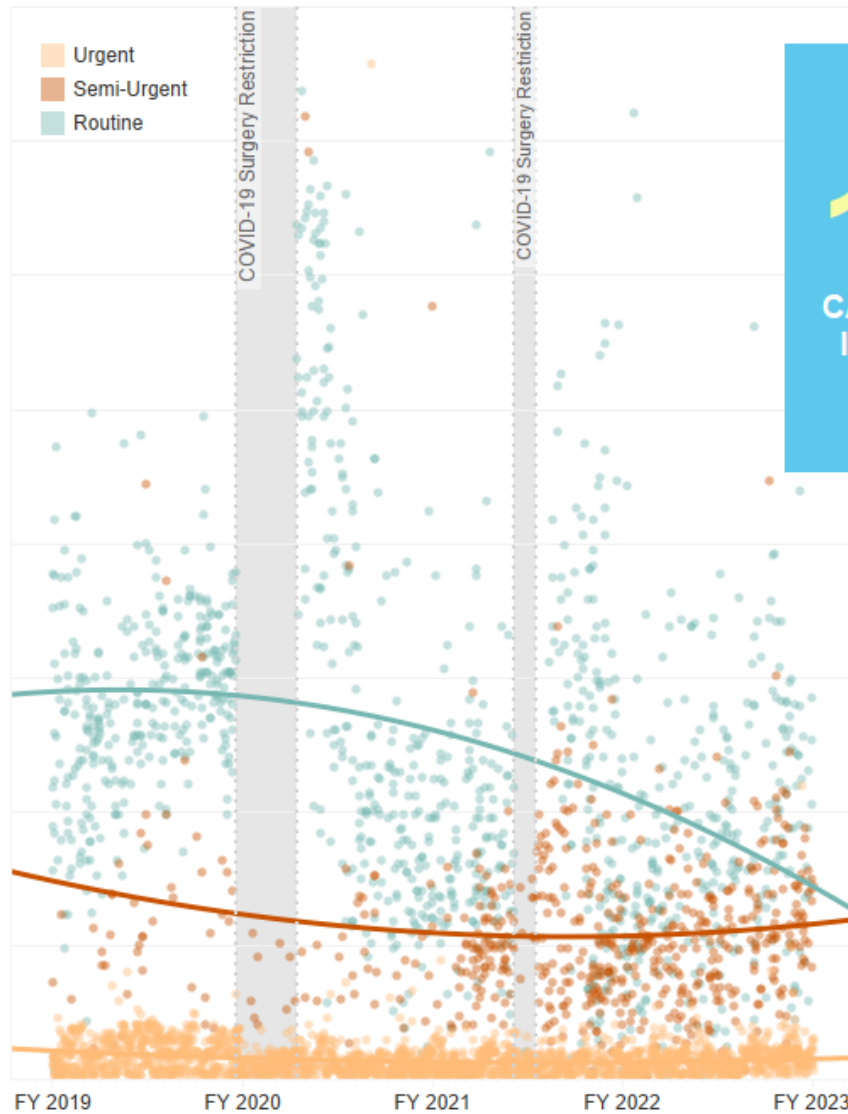


*Not all emergent and emergent savage priority cases are captured in referral process *Excluded: Re-Op Bleeding, PDA, TAVI

CARDIAC SURGERY

CARDIAC SURGERIES PERFORMED

Median Wait Time By Priority Plot



1,390
CARDIOVASCULAR
INTENSIVE CARE
Patient Admissions

1.3 DAYS
Average Stay in
Cardiovascular ICU

37
ECMO INSERTION

Percentage Difference of Surgery Wait Time in FY2021 and FY2022

	Semi-Urgent	Routine
FY2022	6.47%	-13.63%

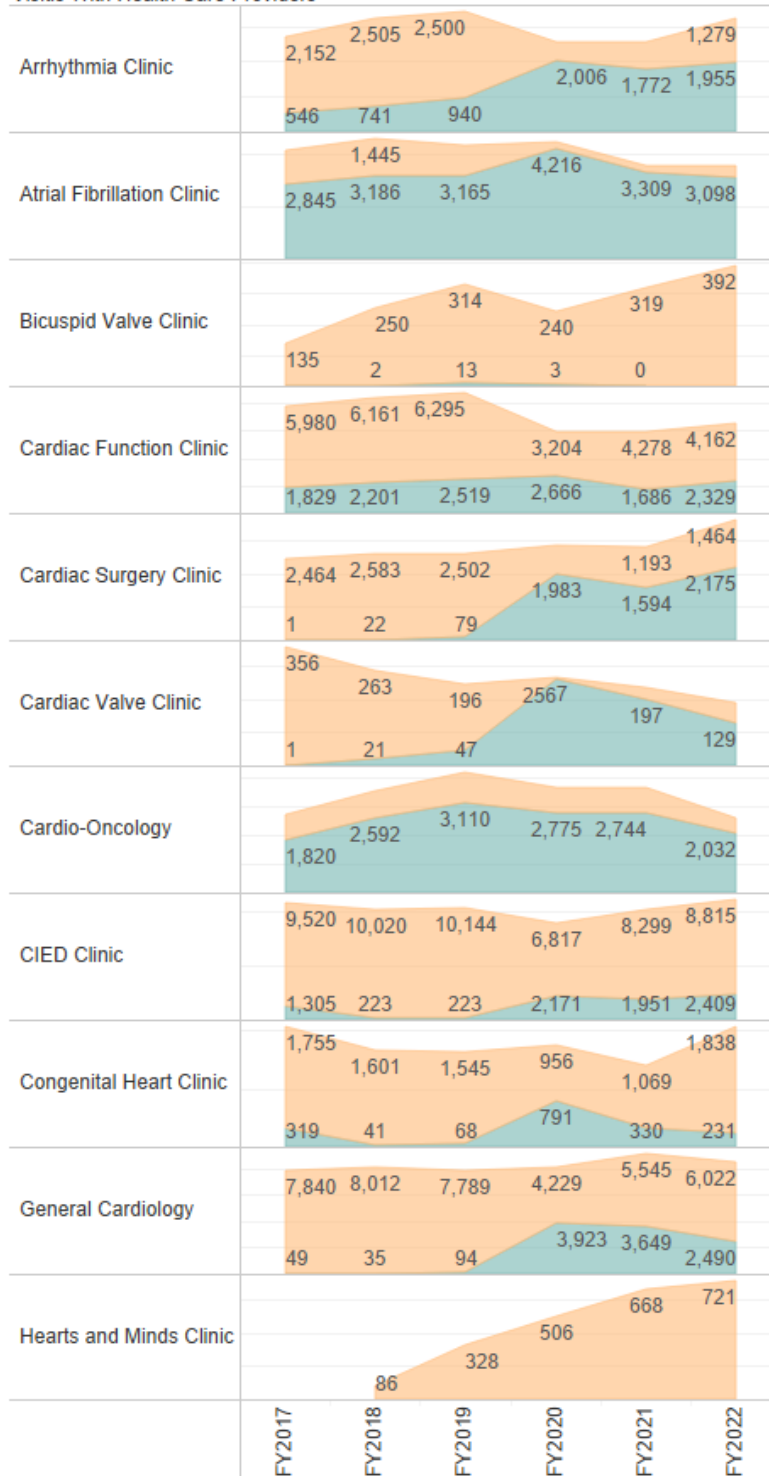
*Excluded: Re-Op Bleeding, TAVI, Procedures done in Cath Lab

CARDIAC CLINICS

CARDIAC CLINICS

In Person Visit Phone/Telehealth

Visits With Health Care Providers



60%
In-Person Visits

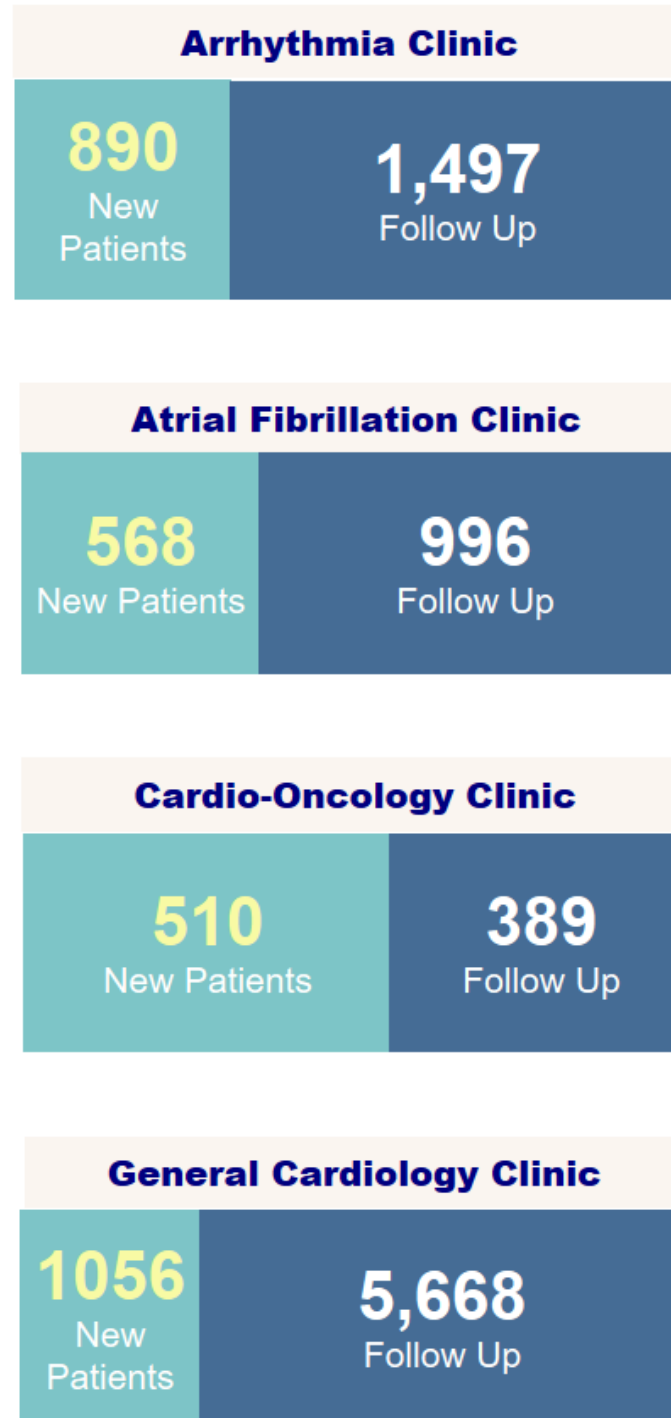
40%
Telehealth Visits

*Data Source from Millennium Scheduler and Connect Care. Documentation from clinics to clinics are variable

CARDIAC CLINICS

CARDIAC CLINICS

No. of New Patients and Follow Up Patients in Outpatient Clinics



**Visits With Health Care Providers

*Data Source from Millennium Scheduler and Connect Care

CARDIAC DIAGNOSTIC IMAGING

CARDIAC DIAGNOSTIC IMAGING

ECG

202,198

HOLTER

9,189

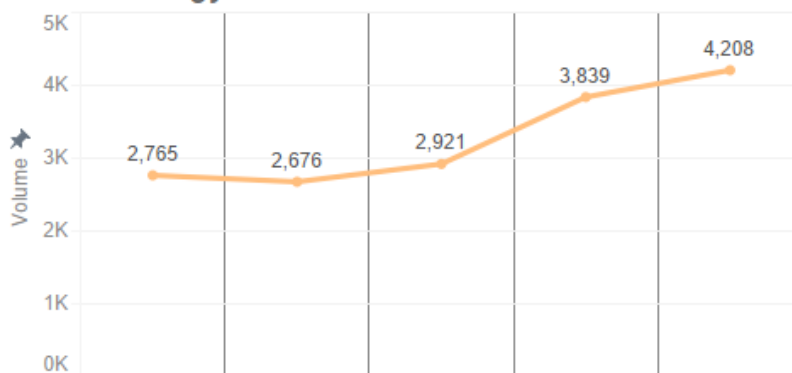
ECHO

22,195

STRESS

1,514

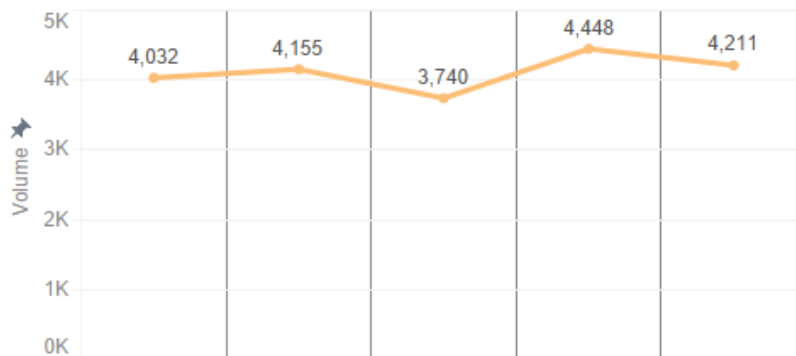
Nuclear Cardiology



Change From
Last Year

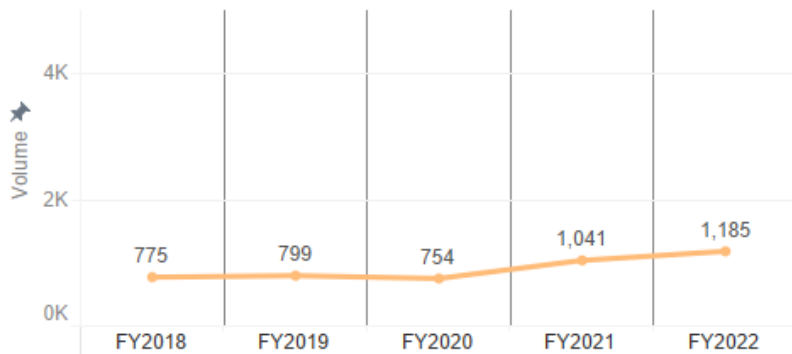
9.6%

Cardiac MRI



-5%

Cardiac CT



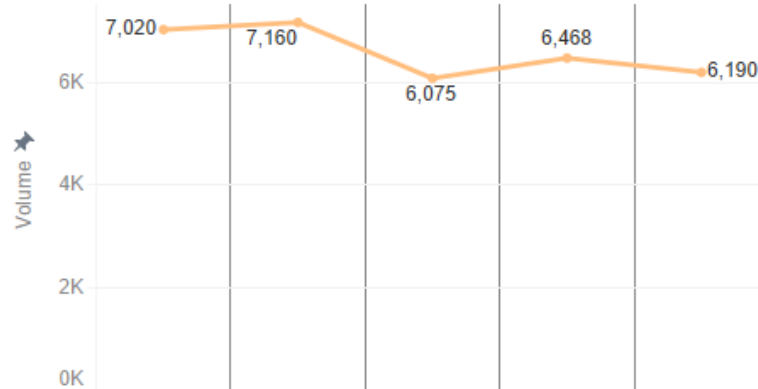
14%

*Excluded DI CT

CARDIAC SCIENCES

CATHETERIZATION PROCEDURES

Catheterization

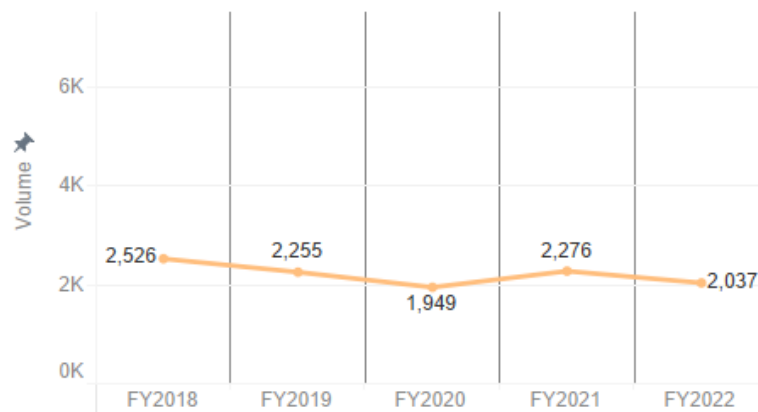


Change From
Last Year

9%

2,803
No. of Stents
Deployed

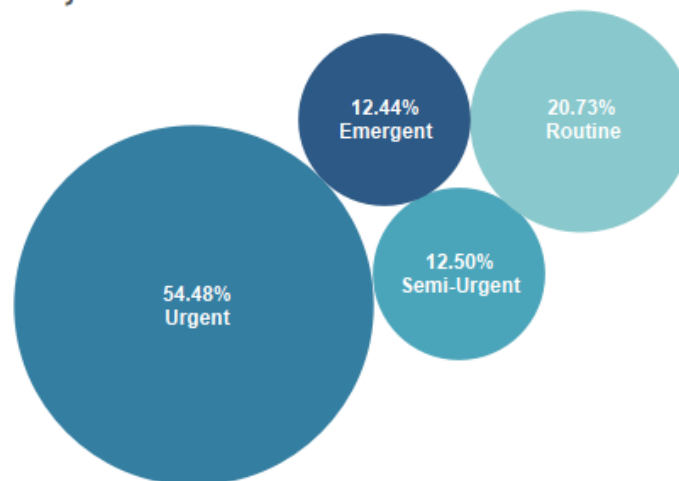
PCI (Angioplasty)



-11%

861
STEMI
Cases
via
Cath Lab

Urgency Priority %

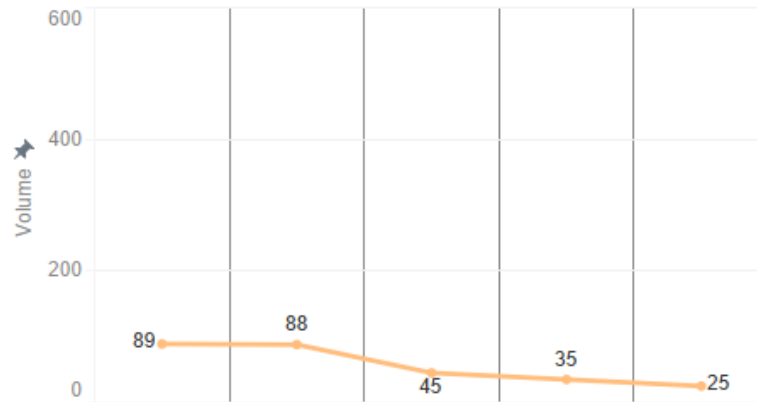


*Due to data format changes with connect care all inpatient cath procedures have been grouped as urgent unless otherwise stated

CARDIAC SCIENCES

ELECTROPHYSIOLOGY PROCEDURES

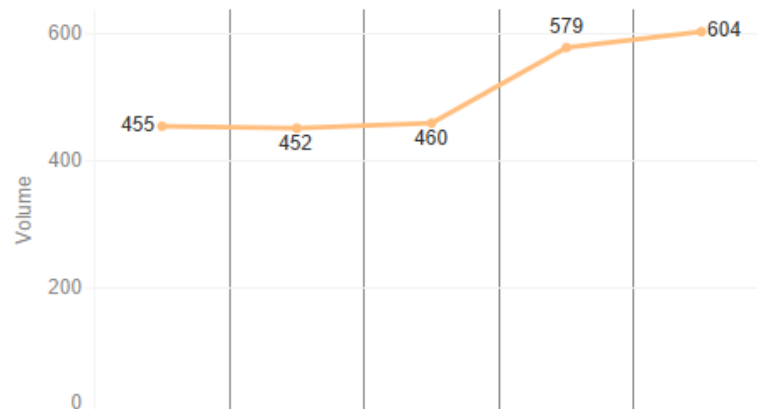
Standard Ablation



674

No. of Patients with
an EP Procedure

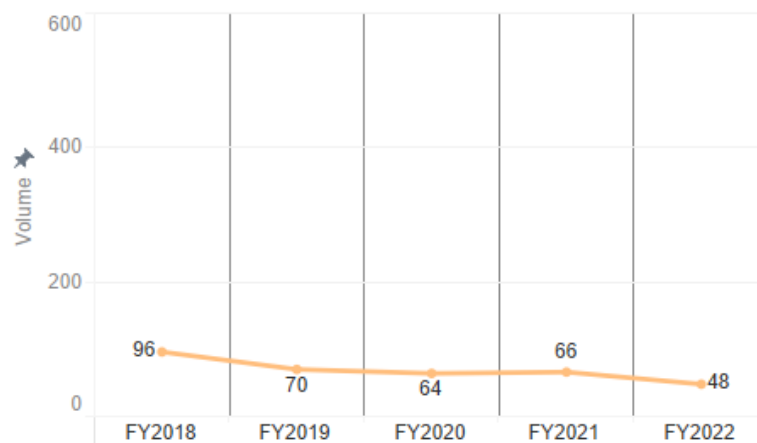
Complex Ablation



+3%

No. of Patients with
an EP Procedure
over Previous Year

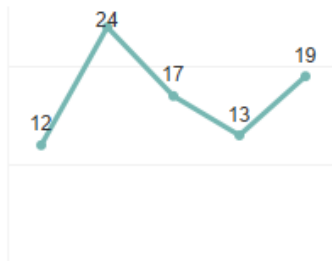
Ablation Other (EPS/Proc/Epi)



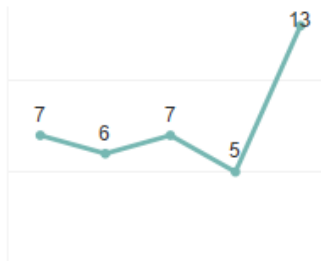
CARDIAC SCIENCES

STRUCTURAL HEART PROCEDURES

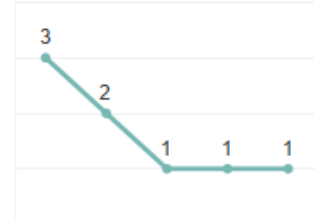
PFO



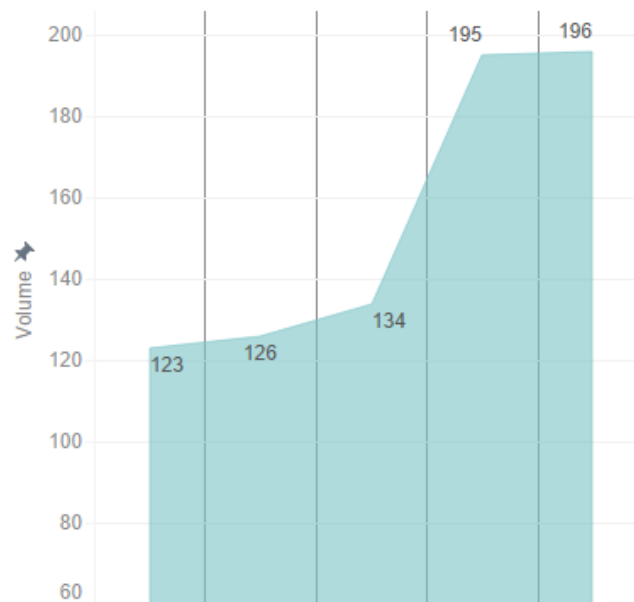
ASD (Cath Lab only)



Perivalvular Leak Repair



TAVI



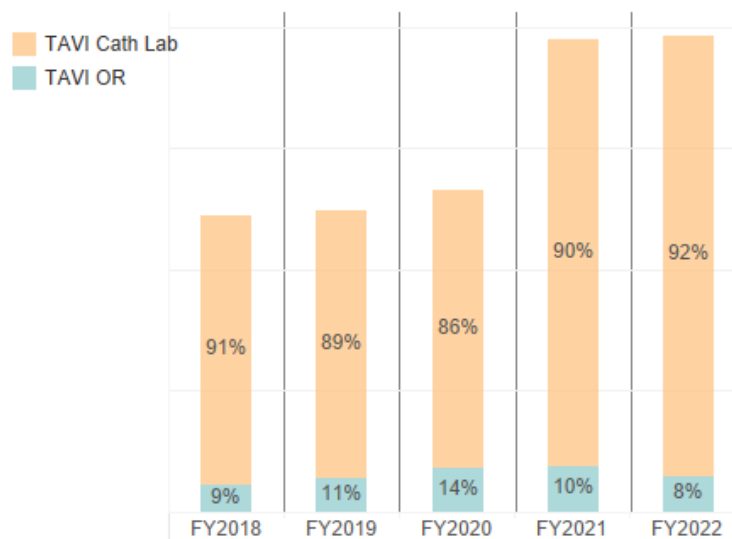
365

New Structural Heart Referrals

1.2

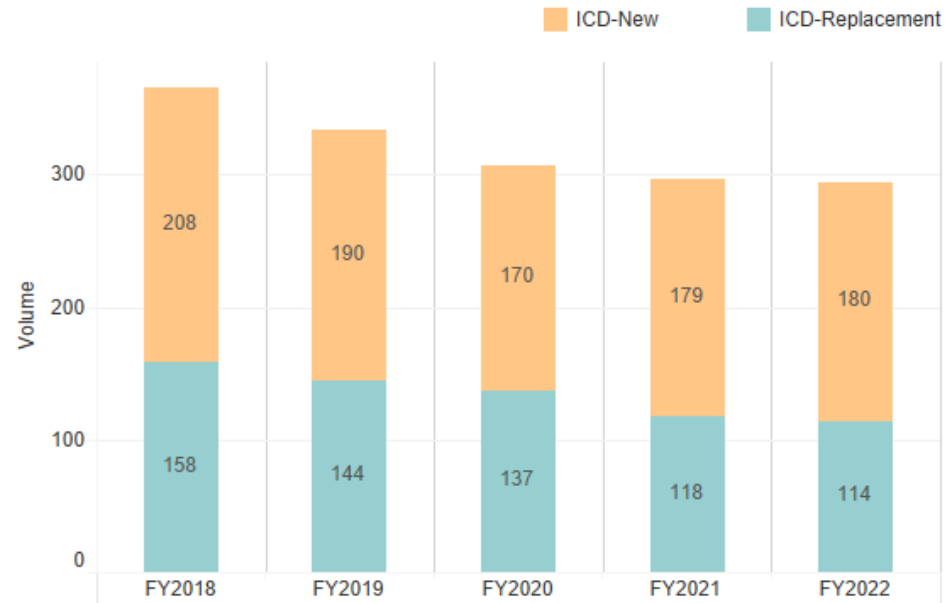
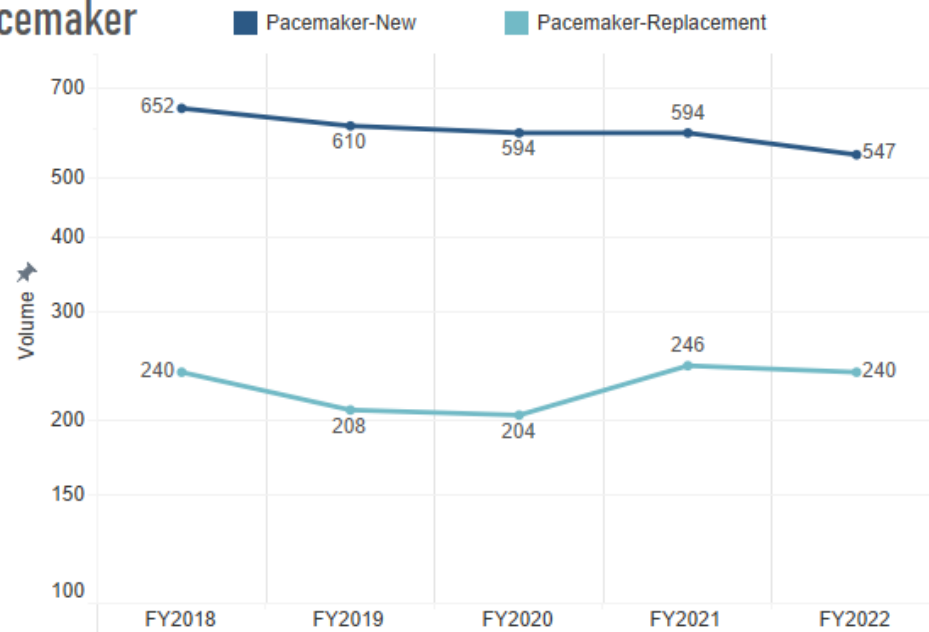
Length Of Stay
(in day)
TAVI in Cath Lab
*Apr-2022 to Oct-2022

TAVI Unit Location



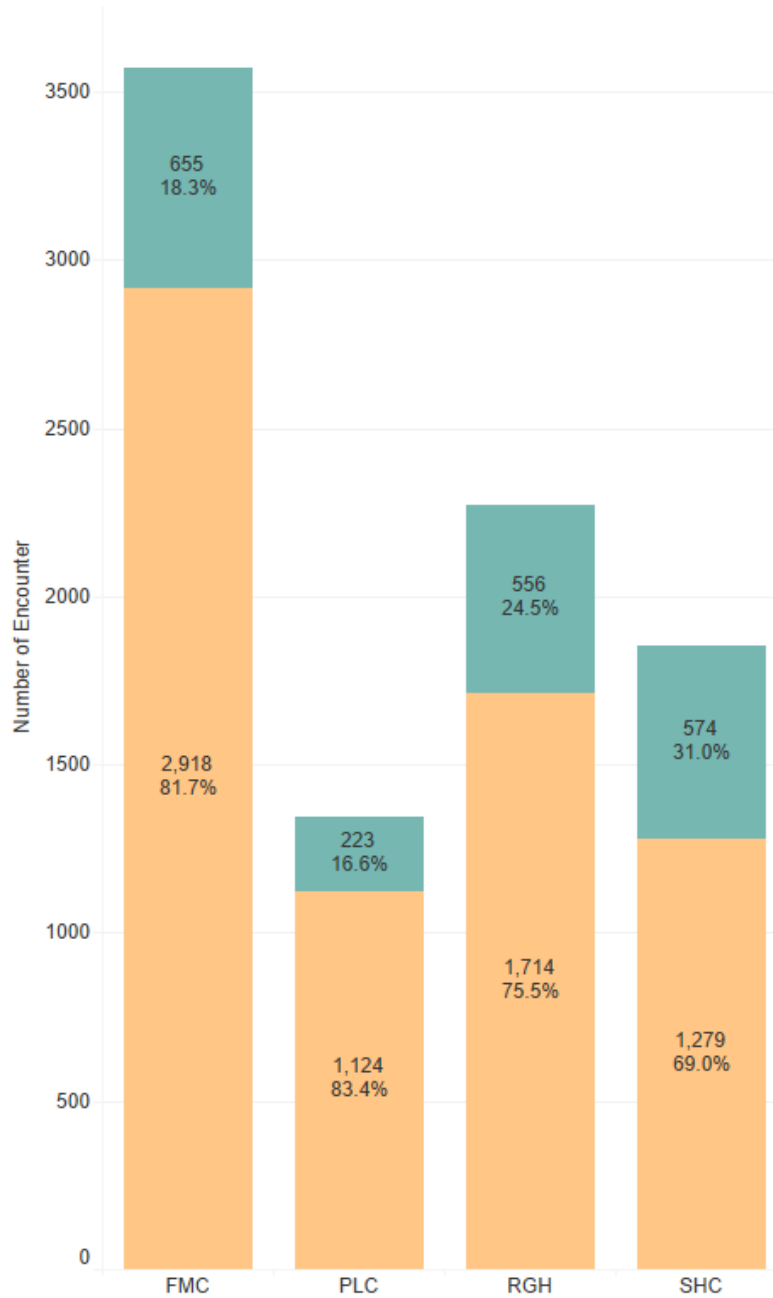
**CARDIAC
DEVICES**

CARDIAC DEVICES

Implantable Cardioverter Defibrillator (ICD)**Pacemaker**

**CARDIAC
SCIENCES****PATIENT FLOW THROUGH THE EMERGENCY DEPARTMENT****No. of Cardiology Consultations in Emergency Department**

■ ED Discharged ■ I/P

**9,043**
Emergency
Department
Cardiology Consults**78%**
(n=7035)
ED Admitted
to Inpatient

APPENDIX B

Grand Round Speakers

DATE		SPEAKER	TITLE
APRIL	5	Jasmine Grewall	Everything Fontan and Canadian Initiatives to Improve Outcomes
	19	WellDoc Alberta	The Emotional Impact of Adverse Events
	26	John Ferrence	LDL-C Cumulative exposure hypothesis of ASCVD: Using Causal AI to personalize the prevention of ASCVD
MAY	3	John Floras	Sleep: Cardiology's Unmet Challenge
	10	Samuel Sears	The Psychology of Electrophysiology: "Freakin' Out in EP Clinic"
JUNE	7	Heather Edgell	Menstrual Cycle and Oral Contraceptive Effects on Autonomic and Cardiovascular Physiology
	14	Timothy Henry	Options for the No-Option Patient: Treatment of Refractory Angina in 2022
	21	Bill Kent	Minimally Invasive Cardiac Surgery: Are There any Benefits?
	20	Shannon Ruzycski & Sofia Ahmed	Equity, Diversity, and Inclusion Are Fundamental Research Skills
SEPTEMBER	27	Jeff Healey	The ATLAS Trial – Avoid Transvenous Leads in Appropriate Subjects
	4	Robert Miller	Latest Advances in Nuclear Cardiology
	18	Hude Quan & David Campbell	Person-to-Population Cardiovascular Health – An Introduction to Libin's P2 Initiative
	25	Seth Worley	Breaking Boundaries: Application of Interventional Techniques to Device Implantation
NOVEMBER	1	Khara Sauro & Joon Lee	Making Data Work for You: Implementing AI-based Clinical Decision Support Tools in Cardiac Care
	15	James White	Implementation of Personalized Cardiovascular Care in Real World Practice: The Libin Precision Medicine Initiative
	22	Aaron Phillips	A Neuroprosthetic for Treating Hemodynamic Instability After Spinal Cord Injury
	29	Steve Wilton	Hot Topics in Atrial Fibrillation: Advances in Screening, Preventions, and Treatment
DECEMBER	6	Sylvain Coderre	Memory Structure and its Relevance to Teaching and Curricular Design
JANUARY	17	Rahim Kachra, Mike Paget & Sarah Weeks	Reimagining Undergraduate Medical Education
FEBRUARY	7	Jodi Ploquin	Introduction to Trauma-informed Leadership
	14	Juan Russo	Complex High-Risk Interventions: a Patient-Centered Initiative
	28	Vikas Kuriachan	A Look Ahead: Presentation for Department Head Position
MARCH	7	Vikas Kuriachan, Ploquin & Faruqi	Stereotactic Arrhythmia Radioablation for Cardiac Dysrhythmias
	14	Sanjiv Narayan	Personalized Care of Cardiac Arrhythmias in 2023
	21	Jessica Patzer	An Approach to Cardiopulmonary Exercise Testing: Lessons Learnt from ACHD Patients

APPENDIX C

Success Stories

Calgary clinic specializing in sudden cardiac death helps a growing number of patients

By Dawn Smith, Libin Cardiovascular Institute

A childhood accident involving an all-terrain vehicle turned out to be a blessing in disguise for Julia Genaille.

When she was just 12, Genaille flipped the quad she was riding at her godparents' farm near Regina and was taken to the hospital as a precaution. Health-care providers didn't find any injuries caused by the accident, but they did notice a shadow around her heart.

"They did an X-ray and said, 'I don't see anything wrong with your ribs and your neck is fine,'" says Genaille, now 20. "But the shadow, along with the fact that I was born with a heart murmur, caused them some concern."

A few weeks later, Genaille visited a paediatric cardiologist for a followup appointment. That's when her family got life-changing news.

"I was diagnosed with obstructive hypertrophic cardiomyopathy, and was told I would eventually need surgery, medication and a heart transplant," says Genaille. "It was quite shocking."

Hypertrophic cardiomyopathy is a term that describes a group of genetic disorders that results in the thickening of the heart muscle. The condition is relatively common, impacting one in 500 to 1,000 people in Canada, often in family groups.

Patients with the condition can be affected in various ways: from being symptomless to developing an irregular heartbeat or arrhythmias to heart failure and even sudden cardiac death. The condition is the most common cause of sudden death in young athletes.

Since her diagnosis, Genaille's care has been extensive: she has an implantable cardioverter defibrillator that can deliver shocks for dangerous arrhythmias; she takes numerous medications and was one of the youngest patients ever to undergo a complex open-heart surgery that involved cutting away some of her excess heart muscle.

Still, Genaille is grateful the condition was discovered when it was because she was a very active individual who experienced very few symptoms, so wasn't aware that she was at risk of sudden death.

She is also incredibly thankful for the care she has received at the University of Calgary Hypertrophic Cardiomyopathy Clinic (HCM), located at South Health Campus.

"It has been fantastic," she says. "They go above and beyond patient care to really knowing me as a person and helping and supporting me."



Julia Genaille was diagnosed with hypertrophic cardiomyopathy and has received care at Calgary's clinic. She was thrilled to graduate high school.

About the University of Calgary Hypertrophic Cardiomyopathy Clinic

The HCM takes a familial approach while serving a growing number of hundreds of active patients, one of the largest clinics of its kind in the country.

"We have a grand vision for the clinic," says Dr. Grant Peters, MD, clinical director of the HCM and a clinical assistant professor in the Department of Cardiac Sciences at the Cumming School of Medicine (CSM). "We have a multidisciplinary team that meets often and looks collaboratively at how to optimize outcomes for individual patients."

That dedicated team includes electrophysiologists specializing in arrhythmia and sudden death prevention. The team has access to a genetics clinic that conducts comprehensive genetic screening for known genetic variants of HCM and they work with cardiac surgeon Dr. William Kent, MD, who specializes in myectomy surgery to remove excess portions of the heart and relieve obstructions. The team also includes two nurses who organize patient care.

In addition to the clinical excellence, the HCM has a large research component, headed by Dr. Bobby Heydari, MD, a clinical associate professor in the Department of Cardiac Sciences who specializes in cardiac MRI.

Research ranges from involvement in clinical trials to determine the efficacy of new pharmaceutical treatments to investigating potential markers for those at higher risk of sudden cardiac death. The clinic is also involved in national and international registries collecting data on hypertrophic cardiomyopathy patients to study numerous aspects of the disease, such as fibrosis and genetic characteristics.

“We are quite proud of the clinic, there is so much going on,” says Heydari. “It’s an exciting time to specialize in hypertrophic cardiomyopathy.”



Calgary's hypertrophic cardiomyopathy clinic team.

Innovative post cardiac surgery technique gets international attention

By Dawn Smith, Libin Cardiovascular Institute

Staff members at the Foothills Medical Centre were the first in Canada to implement a new standard of care following open heart surgery. “Keep Your Move in the Tube” (KYMITT) was introduced several years ago in the cardiovascular intensive care unit (CVICU) after research conducted by physiotherapist Lauren Park; clinical nurse educators Chris Coltman, Heather Agren and Susan Colwell; and Dr. Kathryn King-Shier, PhD, associate dean of graduate programs for the University of Calgary’s Faculty of Nursing.

The technique is pain-guided and involves keeping elbows tucked into the sides while lifting, pushing, pulling or raising the arms above the head. It helps prevent sternal wound complications and allows patients to return to their normal activities much quicker, which may alleviate patient anxiety and even lower health-care costs.

Follow up research published by the Calgary team has gotten international attention.

A team from the Netherlands of the Medisch Spectrum Twente, including Dr. Frank Halfwerk, MD, and physiotherapists Nicole Wielens, Kim Roerdink and Ankie Olde Keizer, recently visited Calgary to learn more about implementing KYMITT in their own country.

“We think KYMITT will improve life post surgery, not only in the recovery stage, but also after discharge and weeks later when they start cardiac rehabilitation,” says Halfwerk, who works with cardiac surgeons and is the principal investigator in the Cardiac Surgery Innovations Lab in the Dept. of Biomechanical Engineering at the University of Twente.

According to Halfwerk, the instructions given to patients following open heart surgery are currently restrictive. Patients are told not to push, pull or lift anything more than 10 pounds, raise their hands above their head or use their arms to get out of bed or a chair for several weeks following surgery to allow the sternum to heal.

KYMITT puts more control back into the hands of patients, allowing them to get back to their regular life quicker.

Wielens has been pleasantly surprised by what she has learned during her visit.

"It's been a surprise how quickly the post surgery care teams mobilize patients," says Wielens. "The KYMITT technique is amazing and will dramatically improve recovery for patients."

Keizer says she is impressed with how well the Calgary team communicates with patients.

"This technique is very clearly explained and as a result the patients know what to do," she says. "This technique is also a lot more positive for patients, rather than being told what they can't do, they are told what they are able to do. That makes a big difference."

All four of the visitors were excited with the culture they encountered in Calgary.

"It's amazing here," says Wielens. "Everyone is on the same page here and so enthusiastic. All the health professionals, from physiotherapists and occupational therapists to the cardiac surgery team and leadership, everyone supports this movement."

Halfwerk agrees.

"What's amazing about the Calgary team is the commitment to patient care exhibited by the staff," he says. "They are so eager to improve patient care."

According to Halfwerk, the team is the first in Europe to implement the KYMITT technique. He thinks it will be very popular. He notes the team is planning a clinical trial in their own country to provide more scientific evidence that KYMITT improves quality of life for patients.

Coltman and Park were equally happy with the visit.

Park, the CVICU project lead for KYMITT, said the Dutch team visited several locations, shadowing the Calgary team while they worked with patients, meeting with leadership, attending rounds and speaking with nurse educators.

"So much has come out of this visit," says Park. "The team's enthusiasm for this work and their passion for patient care came across strongly."

The visit has encouraged the Calgary team in their aspiration to spread the KYMITT movement.

"Our aspiration is to take this further," says Park. "It would be great to see KYMITT introduced as a national guideline because it is so valuable for patients."



A team from The Netherlands visited the Libin Cardiovascular Institute for a first-hand look at the KYMITT technique in use. Photo by: Dawn Smith/Libin Cardiovascular Institute

Libin Institute director leads effort to send essential medical supplies to Ukraine

By Kelly Johnston, Libin Cardiovascular Institute

Dr. Paul Fedak, MD, PhD, was moved to action watching a video of how the surgical and care team at the Heart Institute in Kyiv, Ukraine, pivoted to care for patients bomb shelter.

"It really shook me, I'm a heart surgeon and director of a heart research institute. I know the challenges," says Fedak, heart surgeon at Foothills Medical Centre and director of the Libin Cardiovascular Institute at the Cumming School of Medicine. "People there are very creative. They found all kinds of ways to get things done and that's part of what inspires me."

Fedak reached out on social media to Dr. Igor Mokryk, chief of the Department of Adult Cardiac Surgery at the Heart Institute in Kyiv and the heart surgeon who posted the video. First Fedak wanted to know how Mokryk was, and then to learn what supplies were needed. Mokryk brought the director of the Heart Institute into the conversation and a list of essential supplies was quickly created that Fedak set out to fill with the help of executive director Amanda Weiss of Alberta Health Services. She mobilized her team to find the needed supplies.

“Being in a leadership position, I know who to contact at the Foothills Medical Centre, how to mobilize nursing managers to go through units, scour hallways and cupboards. Ask, is there anything not being used that could be given up without impacting patient care?” says Fedak. “Often times the systems change here and we get newer equipment and then some of the supplies, the disposables, that support the older equipment, are just not usable for us.”

The shipment of 30 boxes includes personal protective equipment, dressings, catheters, syringes and defibrillator electrodes, all of which were either surplus or past their recommended shelf life. All materials are safe for use and there is no impact to patient care in Alberta.

“It’s a really nice win, where these things would probably be discarded and thrown in the garbage, now they’re going to probably save lives. It’s kind of amazing.”

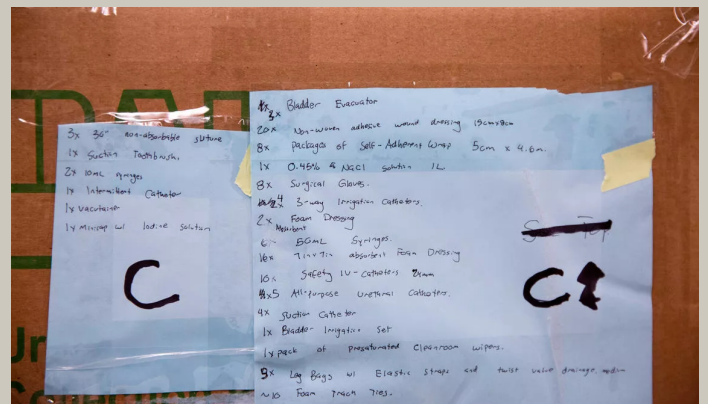
He is hoping this small act will be a spark to raise awareness of what you can do – even on a small grassroots level to try to make a difference. He says while the video moved him to action, his own family history has played a role.

“I’m also Ukrainian-Canadian. I grew up understanding the oppression of communism and heard lots of stories of the atrocities. It broke my heart to think what was happening there.”



Dr. Fedak mobilized nursing managers to find supplies not being used that could be given up without impacting patient care.

Photo by: Riley Brandt, University of Calgary



Thirty boxes of medical supplies will be sent to Kyiv.

