

CARDIAC CARE NETWORK



**Ontario
Cardiac Services
Road Map**

2013

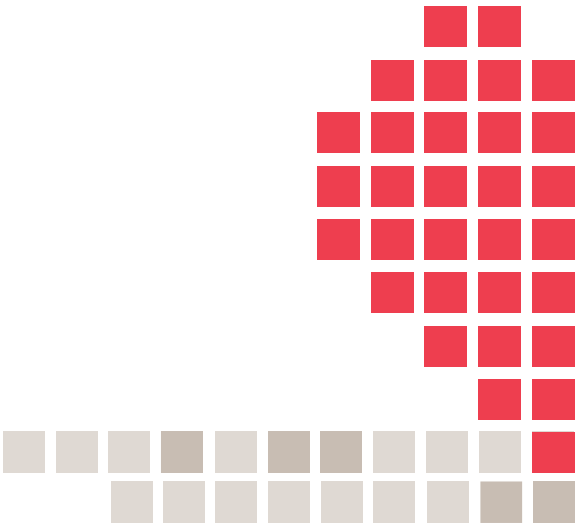




TABLE OF CONTENTS

Executive Summary 2

Section 1: What is Cardiac Disease? 7

 1.1 Cardiac Disease 7

 1.2 Vascular Disease = Cardiovascular Disease 13

Section 2: CCN and the Cardiac System in Ontario 15

Section 3: Managing the Burden of Cardiac Disease in Ontario 19

 3.1 Leading Health Burden 19

 3.2 The Added Cost to Patients and their Families 20

 3.3 Burden Spreading Across Many Population Groups 21

 3.4 Burden Growing as Ontario Residents Age 22

 3.5 Growing Pressure on the Health Care System 23

Section 4: The Current Profile of Cardiac Care in Ontario 25

 4.1 Advanced Cardiac Services – Placement of Services 27

 4.2 CCN Criteria Dashboard 29

 4.3 Utilization and Wait Times 35

 4.4 Procedure Volumes and Projections 35

 4.5 Regional Cardiac Priorities 37

 4.6 Cardiac Rehabilitation Programs 42

Section 5: Moving Forward: Focusing on the Patient 45

 5.1 The Current Cardiac Care Journey for Patients 45

 5.2 The Vision for Patient-Centred Cardiac Care 47

 5.3 What Patient-Centred Cardiac Care Looks Like from the Perspective of a Patient 48

Section 6: Priorities to Improve System Value and Patient Outcomes 51

 6.1 Current Provincial Initiatives 51

 6.2 Filling in the Gaps – Priorities for Action 54

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Executive Summary

The Cardiac Care Network of Ontario (CCN) serves as system support to the Ontario Ministry of Health and Long-Term Care (MOHLTC), Local Health Integration Networks (LHINs), hospitals and care providers and is dedicated to improving quality, efficiency, access and equity in the delivery of adult cardiac services in Ontario.

The MOHLTC requested that CCN develop a road map for the management of cardiac services in Ontario. This report provides a description of current services in Ontario, with additional perspective on future trends and direction. The report provides recommendations for advancing collaboratively to a more patient-centered, ideal cardiac care system in Ontario.

Objectives

This road map provides a high level plan for the organization of cardiac care services in Ontario. This plan builds on the ongoing work of CCN and its partners in moving Ontario closer to an ideal system of cardiac care – one focused on the patient, across the continuum, and based on evidence and best practices. This plan sets out priorities for attention and action.

For a number of years CCN has been engaged with hospitals providing adult advanced cardiac services in Ontario. CCN has been a leader in gathering, assessing and reporting cardiac services data to improve access and quality of care. In more recent years, CCN has also become more engaged in the continuum of cardiovascular care, with an expanded focus in setting standards for diagnostic testing, and supporting prevention and rehabilitation to optimize clinical outcomes for patients.

This road map is intended to increase awareness of the current state of cardiac care in Ontario and identify where gaps currently exist within the system. The recommendations set out in this road map present a plan to move Ontario towards an ideal system of cardiac care in Ontario. Ontario's cardiac care system should be patient-centered, provide equitable access to care, integrate care across the continuum, and be evidence and performance based. It should draw on health system leadership and expertise, and support continuous learning and quality improvement. The recommendations in this road map set the stage for Ontario to move to such a system.

Methodology

This report was developed in consultation with CCN partners and numerous stakeholders. CCN consulted extensively with hospitals, those who are providers of advanced cardiac services as well as with referral and other hospitals, to identify areas where services can be improved. CCN engaged in dialogue with each LHIN to identify local priorities linked to each LHIN's Integrated Health Services Plan (IHSP).

CCN also consulted with health care providers and clinical experts to gain their perspectives to inform this report. Finally, recognizing the importance of creating a document that reflects the patient journey and challenges along the continuum of care from the patient perspective, CCN consulted with patients and families to learn from the patient experience. The insights that were obtained from these groups are reflected in the priorities that are outlined in this road map.

Background

Cardiac disease represents a major disease burden in Ontario, and is a leading cause of death and disability in the province. The presence of risk factors can greatly impact the likelihood of someone developing cardiac disease and major risk factors for cardiac disease, including diabetes, high blood pressure, obesity and inactivity, are on the rise. Despite great efforts in public health to educate on the risks of smoking, many individuals continue to smoke. Not only are these risk factors prevalent in the adult population, there is an increasing presence of these risk factors among children and adolescents. In addition, there are unique populations, including Aboriginals and people of South Asian origin, who have a particularly high prevalence of risk factors and higher incidences of cardiac disease.

Overall, increasing risk factors combined with an aging population sets the stage for a surge in cardiac diseases in Ontario over the next 20 years. From a population perspective, cardiac disease places an enormous strain upon the health care system.

By age 75, cardiovascular disease is the cause of death for approximately as many Ontario residents as cancer. By age 80 it is the leading cause of the death for Ontario residents.



Across the continuum of care, there are key points for the diagnosis, intervention and follow-up of cardiac disease to control the progression of disease and limit morbidity and mortality. Health promotion, primary care and primary prevention are the cornerstones of early intervention and treatment to limit risk factors and encourage healthy lifestyle behaviours to mitigate risk and avoid cardiac conditions from emerging.

Unfortunately, cardiac care at the level of primary care is fragmented, and patients are often faced with making decisions based on the advice of multiple health care providers. In addition, primary care providers may be inundated with numerous clinical guidelines/recommendations which may make it challenging to provide basic therapeutic interventions for patients with multiple risk factors.

For the most part, while acute cardiac care services in Ontario are well maintained and monitored, the transition points between acute care and primary care settings often are not clearly articulated. As a result, patients may lose the opportunity to access appropriate medication regimens and other follow-up care. Following a cardiac event, primary care providers play an important role in the ongoing management of the cardiac patient, including treating co-morbidities, and titrating medication. The linkages back to primary care after the patient is discharged from hospital do not always occur, because of poor communication at transition points in care, and lack of resources such as self-management resources for patients. As a consequence of these fragmented care processes, higher rates of hospital readmissions and recurrences/exacerbations of conditions occur, many of which could be avoided by having better systems of care transition and communication in place.

As treatments continue to improve, more patients are surviving acute cardiac events and are living with cardiac disease as a chronic disease. These patients require ongoing follow-up care post-event (referred to as “secondary prevention”). Cardiac rehabilitation is a critical component of recovery for patients following a cardiac event, to deploy secondary prevention efforts and to help reduce cardiovascular risk. Many patients do not follow through with rehabilitation; this may be due to multiple reasons, including inability to access programs (lack of availability or scheduling challenges), lack of resources, return to work issues and/or lack of referral and follow-up to ensure adherence.

From extensive consultations, and stakeholder feedback, a number of key areas for shared focus are identified:

- The delivery of cardiac services should be planned based on population-based needs criteria. Decisions regarding new and existing advanced cardiac services should be based on evidence and best practices to ensure equitable and appropriate access to care. The propagation of small volume, provider-centric cardiac services should be avoided;
- Making better use of technology will enable people in remote and underserved areas to receive care closer to home and address issues in some parts of the province where people require service and there is not sufficient critical mass to establish advanced cardiac services locally;
- Making use of new procedures and technologies can provide people with more effective and efficient treatment options, including access to less invasive treatment. Standard processes to guide the implementation of new technology must be developed to ensure well defined criteria exist on appropriateness, utilization and evaluation;
- Providing timely access to appropriate diagnostic testing and intervention is critical to ensure individuals receive the right diagnostic test at the right time. Patients should be fully informed of options for intervention, and given a choice when more than one therapy may be of potential benefit;
- Targeted strategies need to be developed to support the needs of unique populations such as adults with congenital heart disease, certain groups, including Aboriginals and other people living in remote communities who may have limited access to diagnosis, intervention and follow-up; and
- Despite the proven benefits of cardiac rehabilitation to reduce mortality and morbidity in people with cardiac disease, there are insufficient community-based cardiac rehabilitation resources in Ontario.

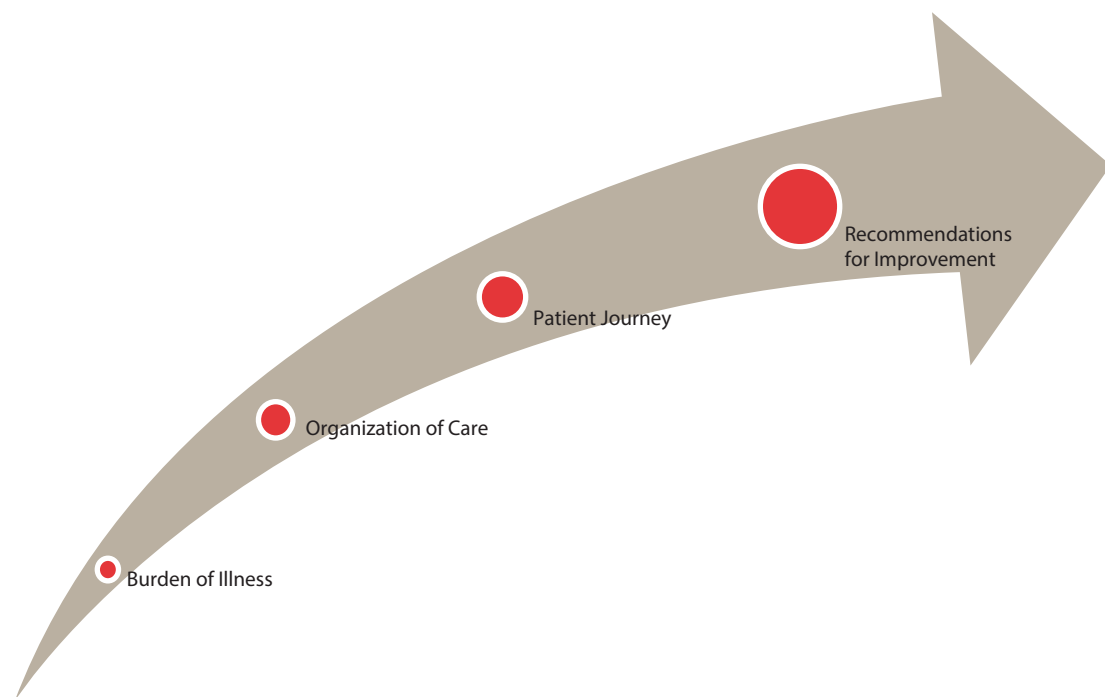


From focus groups and interviews, it was heard that patients want to participate in the decision-making process – and to be actively involved in their care plan. They want to be informed of their risks, and to understand how to effectively manage these risks and improve their quality of life. They want to see health care providers work collaboratively as a team – at the primary care level in particular – to eliminate redundant and confusing messaging and hopefully avoid relying on emergency departments as their key access point within the system.

Care coordination is important, supported by electronic records, and coordinated medication management. As providers and system planners, we know care coordination is optimized through evidence-based standardization and reliance on best practices. Once released from hospital, people want –and require – access to appropriate rehabilitation to help them stay healthy.

An ideal cardiac system should be patient centered, provide equitable access to care, integrate care across the continuum, and be evidence and performance based. It should draw on health system leadership and expertise, and support continuous learning and quality improvement. This cardiac services road map is intended to increase awareness of the current state of cardiac care in Ontario and identify where gaps currently exist within the system. Also included are data on trends and projections to inform future service planning. The road map provides priorities for action and sets out CCN’s planned approach moving forward by highlighting the burden of illness, the organization of care, the patient journey and recommendations for improvements.

Figure 1: The Road Map

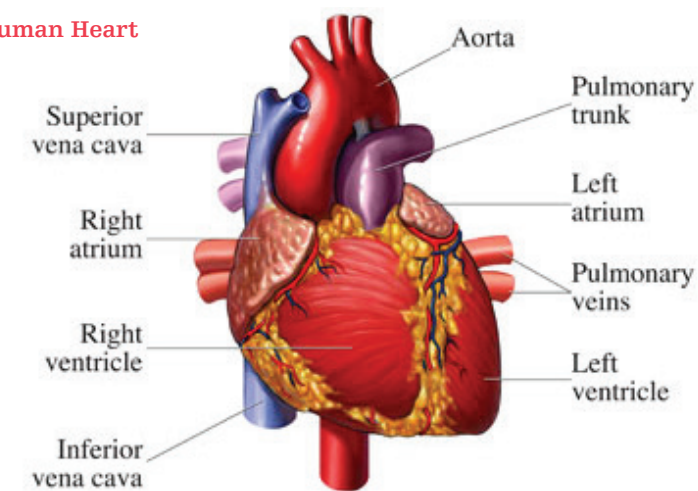


Section 1:

What is Cardiac Disease?

1.1 Cardiac Disease

Figure 2: Human Heart



The heart is approximately the size of a human fist and weighs between 200 and 425 grams. There are four heart chambers which include the right and left atria (upper chambers) and the right and left ventricle (bottom chambers). There are valves that separate the chambers of the heart and enable the flow of blood to receive oxygen from the lungs and to permit the oxygenated blood to be ejected through the aortic valve into the aorta and to the rest of the body. The heart is the most important muscle in the body, as it continuously pumps blood throughout the body and carries essential nutrients and oxygen to organs, tissues and cells. The heart muscle itself receives its own supply of blood and oxygen through the coronary arteries that lie on the surface of the heart.

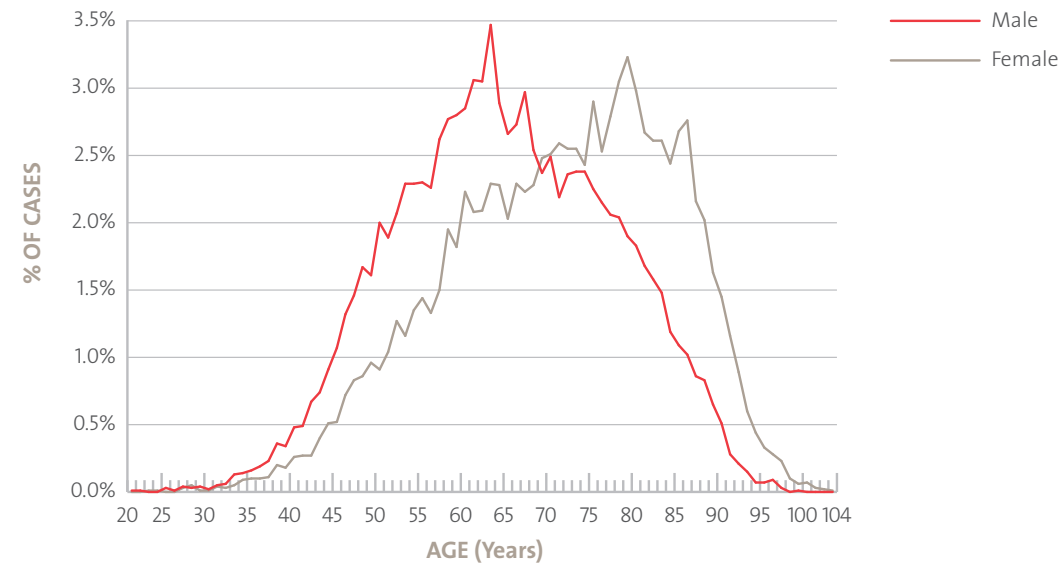
How the heart functions is fundamental to health, well-being and quality of life.

Cardiac disease can present in many ways, including:

- blockages in the coronary arteries (a process known as *atherosclerosis* or *ischemic heart disease*) that can lead to angina and heart attacks;
- malfunctioning heart valves that disrupt the flow of blood through the heart;
- issues with the heart rhythm (known as arrhythmia) can cause the heart to beat either too fast, too slow or the sudden stopping of the heart beat (known as a cardiac arrest);
- heart failure resulting from damage to the heart muscle or heart valves (either through heart attack or other causes); and
- structural heart disease (either congenital or acquired).



Figure 3: Ischaemic Heart Disease Hospitalization by Age and Sex



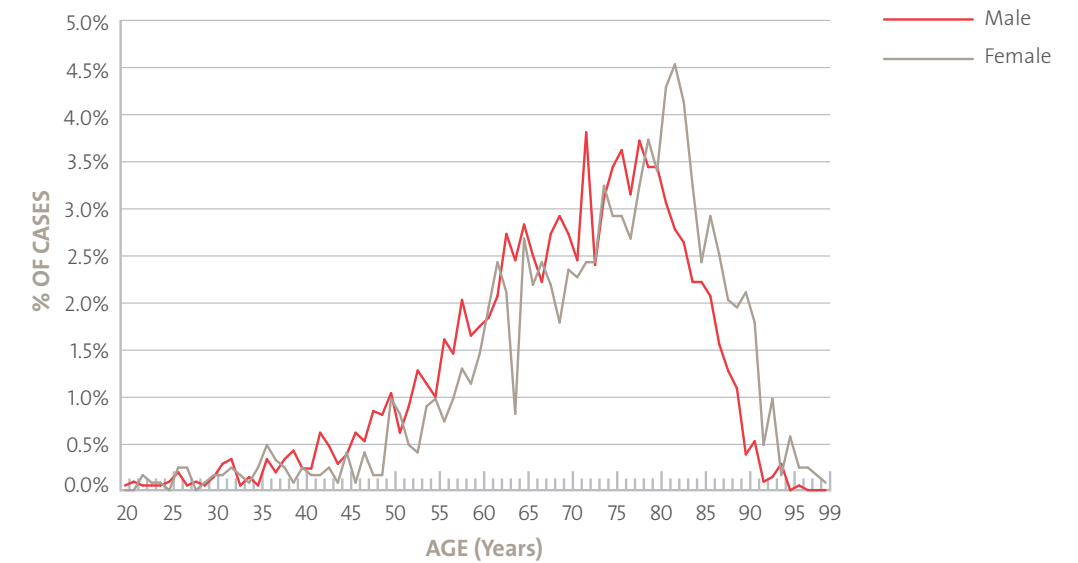
Data Source: Ontario Ministry of Health and Long-Term Care; IntelliHEALTH ONTARIO

Atherosclerosis or ischaemic heart disease is the most common form of cardiac disease. Atherosclerotic plaque in the coronary arteries can reduce the flow of blood to the heart muscle resulting in a lack of oxygen which can lead to symptoms of angina (chest pain) or myocardial infarction (heart attack). Heart attacks occur most commonly when a plaque ruptures and a blood clot forms inside the coronary artery, suddenly stopping the blood flow through the artery. Ischaemic heart disease most commonly occurs in men between the ages of 50 and 75. In women, the onset occurs slightly later in life.

Individuals with ischaemic heart disease may be treated by percutaneous coronary intervention (PCI), also known as balloon angioplasty. In a PCI, a catheter is inserted into the blocked coronary artery and a balloon is inflated, flattening the blockage against the wall of the artery to open up the artery and facilitate the flow of blood. After a PCI, a metal scaffold or “stent” is often inserted and positioned at the areas of blockage to keep the artery open. In some cases, where there is more extensive disease, open heart surgery (coronary artery bypass graft) will be required to repair the blockages in the arteries.

Acute Coronary Syndrome (ACS) is an acute event where the plaque in the artery may become less stable and/or may rupture resulting in unstable angina or myocardial infarction. ACS requires immediate medical attention; ST- elevation myocardial infarction (STEMI) is a severe form of heart attack that can cause death if not treated quickly. The incidence of STEMI in Ontario is approximately 68 of every 100,000 adult residents, or about 7,000 STEMIs per year.

Figure 4: Valve Disease Hospitalization by Age and Sex 2011



Data Source: Ontario Ministry of Health and Long-Term Care; IntelliHEALTH ONTARIO

In the acute stage of a myocardial infarction (such as a STEMI), it is critical to promptly open up the artery. STEMIs are treated through the restoration of blood flow in the coronary artery through one of two treatment options or “reperfusion” modalities: either primary PCI, if available, or through the use of clot-busting drugs (i.e. fibrinolytics) to dissolve the clot that has caused the myocardial infarction.¹

Heart valve disease involves the malfunctioning of one or more of the heart valves, resulting in the valves not opening and/or closing properly. Some of the terms related to disease of the heart valves include: stenosis (narrowing), prolapse (“falling” out of place) and regurgitation (results from a valve that is unable to close properly, resulting in backwards flow of blood through the heart valve). The hospitalization rate of valve disease increases with age, with the highest rate of valve disease occurring in men and women between the ages of 69-85 (see Figure 4). Treatment of the heart valves may include open heart surgery to repair or replace the diseased valve. A newer treatment (transcatheter aortic valve implantation– TAVI) is available to replace the aortic valve without open heart surgery for patients deemed to be at too high risk for conventional surgery.

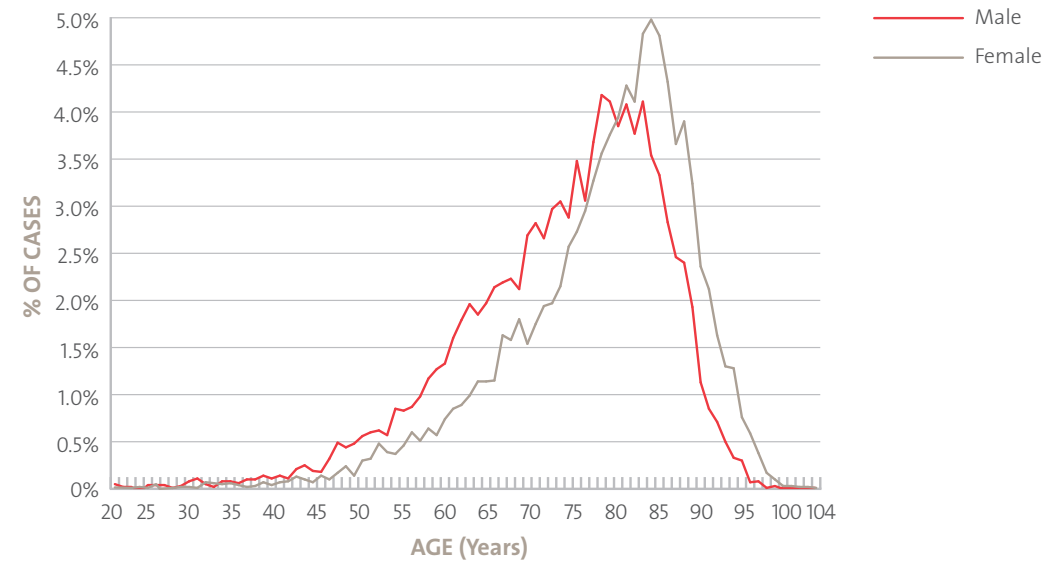
Arrhythmia describes an abnormality of the heart rate and/or rhythm. Atrial fibrillation is the most common cardiac rhythm disturbance, when the upper chambers of the heart (atria) fibrillate or quiver resulting in uncoordinated contractions of the heart. Atrial fibrillation and other arrhythmias increase with age. Individuals with atrial fibrillation are at higher risk of stroke, with over one-third of strokes after age 60 caused by atrial fibrillation.² Early intervention for atrial fibrillation can reduce acute episodes and can lower the incidence of stroke.

¹ In 2013, CCN published a document “Recommendations for Best-Practice STEMI Management in Ontario” with detailed recommendations to improve the standard of STEMI care across the province

² Heart and Stroke Foundation www.heartandstroke.com



Figure 5: Heart Failure Hospitalization by Age and Sex 2011



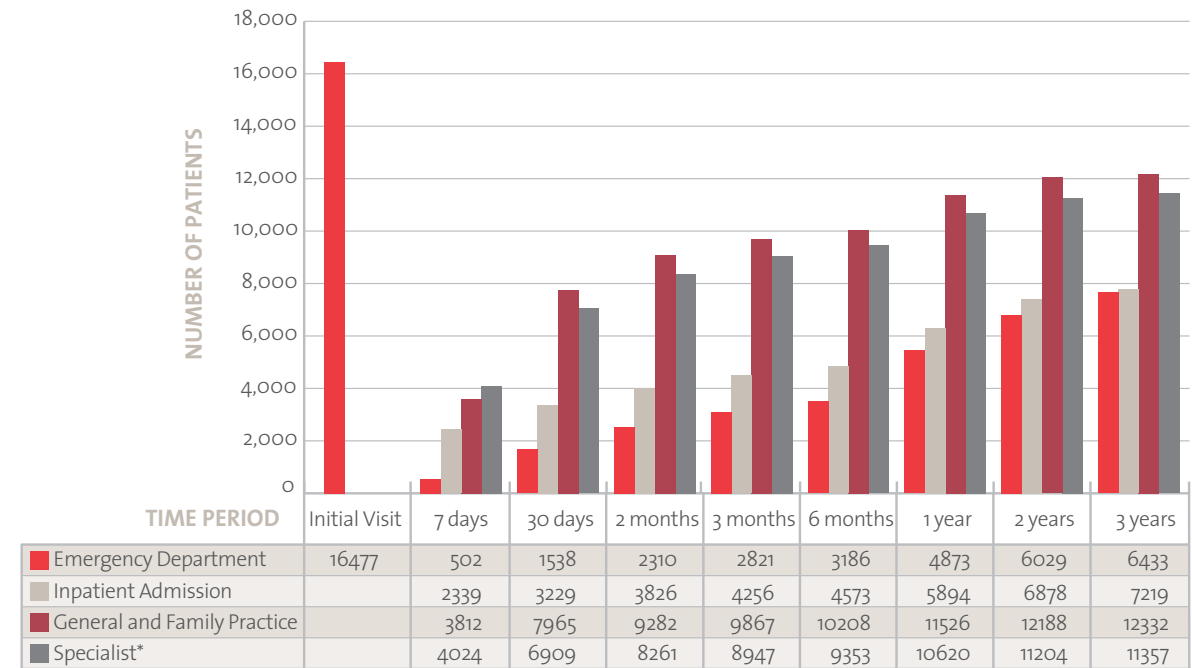
Data Source: Ontario Ministry of Health and Long-Term Care; IntelliHEALTH ONTARIO

Other arrhythmias can originate in the upper or lower chambers of the heart and result in the heart beating too slow, too fast or with extra heart beats. In addition, some patients can suffer a lethal arrhythmia where the heart stops beating, resulting in a cardiac arrest, and death. Management of cardiac arrhythmias may include intervention to correct the rhythm disturbance, such as an ablation procedure (where radio frequency energy is applied to the heart tissue using special catheters to destroy the tissue by heat or cold at the specific site causing the problem), medication management and/or lifestyle changes. In some cases, devices are implanted to regulate heart rhythms (i.e. pacemakers, implantable cardioverter defibrillators, cardiac resynchronization therapy). Proper monitoring and follow-up of the implanted devices is an important component of treatment post-implant.

Heart failure occurs when the heart muscle is damaged and is unable to work efficiently as a pump to supply blood throughout the body. The heart muscle may be damaged by a heart attack, malfunctioning heart valves, chronic hypertension, or other causes. In extreme cases, a virus may attack the heart muscle resulting in a condition called viral cardiomyopathy.

For the majority of heart failure patients, early intervention is important to treat the symptoms and slow its progression. Healthy lifestyles and medication management are important factors in avoiding acute incidents that lead to hospitalization. As a chronic disease, heart failure, like other chronic diseases, is marked by acute episodes of symptom exacerbations that require acute care intervention to stabilize the patient. These acute episodes result in higher rates of hospitalization, readmissions and for some, lengthy hospital stays. The majority of patients with heart failure will require medications and lifestyle modification with regular follow-up to optimize the treatment plan to optimize heart

Figure 6: Example of Heart Failure Patient Pathways (2008-2010)



*Cardiology, cardiac surgery and internal medicine

Data Source: Ontario Ministry of Health and Long-Term Care; IntelliHEALTH ONTARIO

function and minimize symptoms. In some cases, the diseased heart is so badly damaged and has such poor pumping function, (known as end-stage heart failure) that the patient may require intensive supportive therapy such as a left ventricular assist device (LVAD) while waiting for a heart transplant.

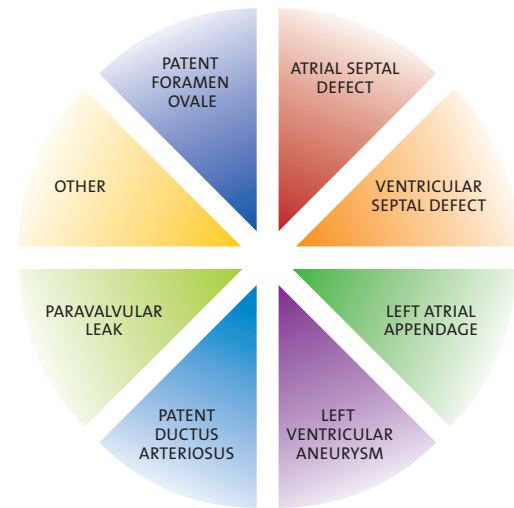
Heart failure is best managed by an inter-disciplinary team of physicians and other health care professionals who have specialized skills and training in the area of heart failure. Specialty heart failure clinics can help to establish treatment plans and serve as a resource for primary care providers in the clinical management of heart failure patients. Self-management is an important component of care for heart failure patients, however, this responsibility can be burdensome for patients, their families, and caregivers. The majority of heart failure patients are older, have other chronic conditions relating to aging and may be frail, requiring additional supports from family members and care providers.

Upon review of heart failure data, we observed that many individuals do not receive timely follow-up by their primary care physician after being admitted to hospital for acute heart failure. Almost 25% of patients had not visited their family physician within three years after leaving hospital. Over 30% have not seen a cardiologist or other specialist within three years of leaving hospital. Further, from a sample of 16,477 new acute heart failure patients, data indicates that within three months, approximately 17% of patients return to the emergency department (see figure 6).



Structural heart disease pertains to heart defects which are congenital in nature (birth defects), and may also include abnormalities of the valves and vessels of the heart wall that develop with wear and tear on the heart, or through other acquired processes.

Figure 7: Types of Structural Heart Disease



Source: Adapted from Steinberg D H et al.³

Congenital heart disease, a birth anomaly of the heart and circulation, is one of the most common forms of congenital birth defects. With the significant advances in paediatric cardiology, cardiac surgery and other interventions, the number of adults living with adult congenital heart disease (ACHD) is growing and will continue to increase.⁴ There are unique clinical issues specific to ACHD patients, including long-term and multi-systemic effects, acquired co-morbidities and potential complications (some life-threatening) specific to heart failure, arrhythmias and other conditions. In addition, factors related to quality of life, genetic counseling, functional capacity and high risk pregnancy management are highly relevant to ACHD patients and demand the intervention of trained professionals. According to Canadian consensus recommendations, patients with congenital heart disease who are transitioning from paediatric to adult care should be evaluated at least once by an adult congenital heart disease specialist to risk stratify and determine the most appropriate venue of care for ongoing follow-up. In addition, patients with significant complexity should be followed in a regional, specialized centre.

There are a number of advanced imaging techniques used to support the diagnosis of structural heart disease. In addition to surgery, transcatheter intervention procedures are available to treat and repair structural heart disease.

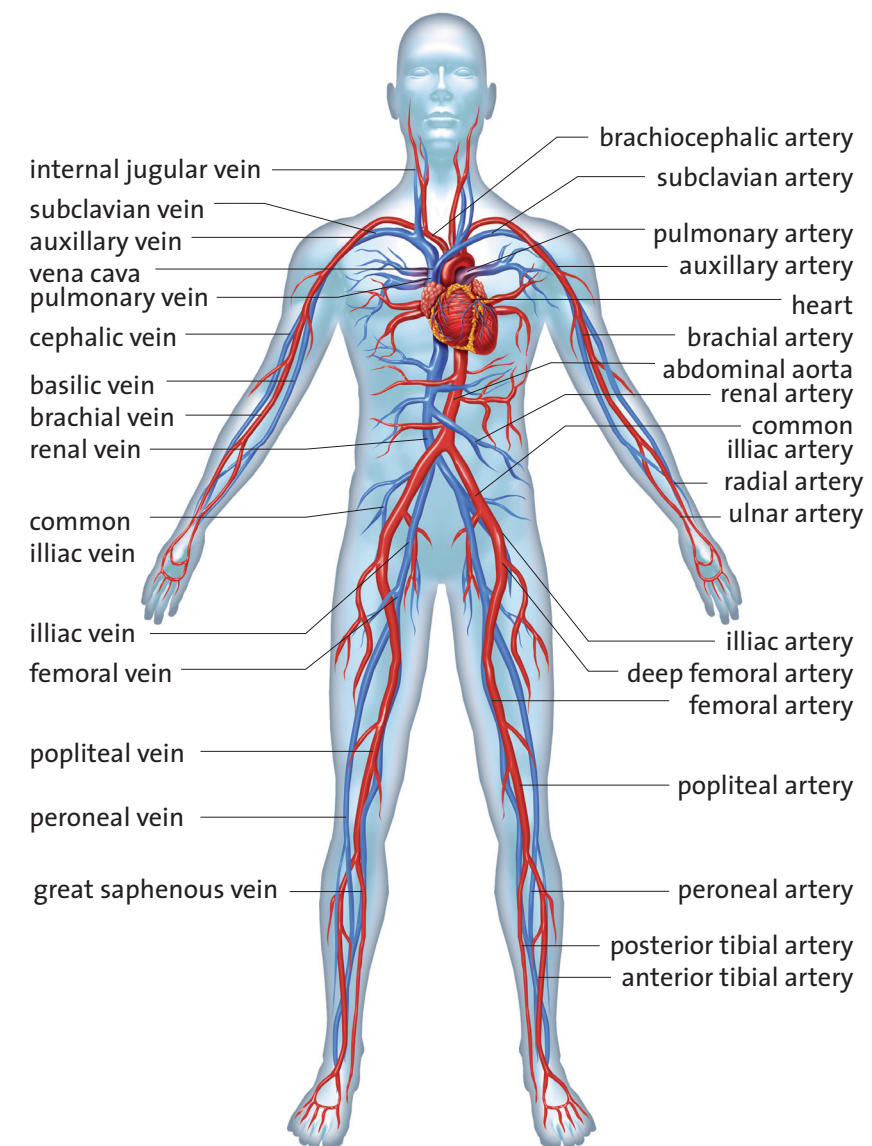
³ Steinberg D H et al. European Heart Journal Supplement (2010) 12:E2-E9

⁴ Canadian Journal of Cardiology (2010) Vol. 26 (3)

1.2 Vascular Disease = Cardiovascular Disease

It is important to note that the risk factors and processes that cause cardiac disease can also affect other major blood vessels resulting in diseases of the aorta and peripheral blood vessels that may result in a lack of blood supply (ischemia) to other parts of the body, including the kidneys, limbs and extremities. Vascular diseases can present as a bulging in the artery (aneurism), which is prone to rupture as well as blockages that can lead to decreased blood flow, ulcers and gangrene of the extremities. In some situations, the patient may present with a vascular emergency, such as stroke or ruptured aneurysm that requires immediate attention to prevent death and disability.

Figure 8: Cardiovascular System





The term “cardiovascular” includes diseases of the heart as well as the other parts of the vascular system. For the purposes of this road map, interventions designed to reduce risk factors for cardiac disease and secondary prevention/cardiac rehabilitation will also be of benefit to patients with vascular disease. Like cardiac disease, vascular disease is a progressive and chronic disease, and ongoing intervention is required to limit disease progression.

The vision for integrated cardiovascular care is to move towards a patient-centered approach that includes interventions designed to decrease the prevalence of risk factors, encourage healthier lifestyle behaviours, and improve opportunities for follow-up and self-management. This approach will ultimately contribute to reduced mortality and morbidity from cardiovascular disease and enable a networked and coordinated approach to care. Since 2011, CCN has worked to develop an integrated vascular strategy. The recommendations of this road map are relevant to cardiovascular disease broadly and will benefit individuals with both cardiac and non-cardiac vascular diseases.

Section 2:

CCN and the Cardiac System in Ontario

CCN serves as a system support to the MOHLTC, LHINs, hospitals and other care providers and is dedicated to improving quality, efficiency, access and equity in the delivery of adult cardiac services in Ontario. CCN develops recommendations and strategies, based on best practices, to better manage cardiovascular disease across the continuum of care, including strategies to prevent acute hospital re-admissions, decrease demand on emergency departments and decrease the need for initial and repeat procedures. For example, most recently, CCN has embarked on initiatives focused on appropriate use criteria for select cardiac diagnostic tests to ensure the patient receives the right test at the right time.

At its core, CCN has been fundamentally engaged with hospitals providing adult advanced cardiac services in Ontario with a focus on standardization and risk stratification of patients to plan and deliver needed access to timely and appropriate care. Over time, CCN has become more engaged in the broad continuum of cardiovascular care, with expanded interests in prevention and rehabilitation to ensure people receive optimal care throughout their care journey. CCN has established a robust foundation of excellent clinical expert resources and administrators who share a strong commitment to reviewing the evidence, developing best practice recommendations and promoting the highest standard of cardiac care within and between sub-specialty areas. CCN has a comprehensive network of clinical working groups that include:

Cath/PCI Working Group: The focus of this working group is on quality of care in the field of interventional cardiology, including diagnostic cardiac catheterization (cath) and PCI, identifying best practices and standards and enhancing the system of data collection, monitoring and reporting.

STEMI/EMS Working Group: The focus of this working group is on building capacity to effectively manage myocardial infarctions (specifically, STEMI) across Ontario. Through a collaborative effort between PCI providers, non PCI hospitals, emergency services (EMS) and base hospitals, this working group has examined in detail the current state of STEMI care in Ontario. A key performance metric is the time to treatment, and this working group has developed recommendations to ensure best practices are in place for management of STEMI in Ontario, including: early diagnosis, timely access to intervention, and leveraging better use of pre-hospital (EMS) resources to achieve better patient outcomes. The recommendations also highlight the need to work with rural and remote communities to standardize care and address access and transportation issues to improve the system.



Transcatheter Therapeutics and New Technology (T3 Working Group): The focus of this group is to review the evidence relevant to new technology, and manage a coordinated approach to the implementation of new technology into clinical practice. Most recently, this working group has undertaken monitoring and reporting on TAVI procedures in Ontario including developing processes for standardization in-patient referrals, assessment, and follow-up.

Heart Rhythm Working Group: This working group considers all aspects of cardiac arrhythmia management including device implants (e.g. pacemakers, implantable cardioverter defibrillators (ICDs), cardiac resynchronization therapy), diagnostic electrophysiology studies (EPS) and interventional procedures such as standard and complex ablations. In 2011, CCN published "Recommendations for Permanent Pacemaker Services in Ontario" to establish standards and best practices to support the care of patients requiring permanent pacemaker devices. In addition, CCN has undertaken a review to define appropriate use criteria for atrial fibrillation interventions (e.g. ablations).

Cardiovascular Surgery Working Group: This group's membership includes the leaders of each of the 11 cardiac surgery programs in Ontario. The group is committed to standardization and implementation of best practices to ensure cardiac surgery outcomes in Ontario remain among the very best worldwide. The working group monitors the case mix and outcomes of patients undergoing cardiac surgery in Ontario and works broadly with key partners in the sector (provincially and nationally) on joint initiatives, such as monitoring and reporting outcomes, and blood conservation strategies.

Heart Failure Working Group: The focus of this working group is to examine the current state of heart failure care in Ontario and to make recommendations for system improvements to ensure patients are able to access appropriate levels of heart failure care in community, primary care and acute care settings. This group focuses on identifying and addressing barriers in support of optimal care. The group has recently developed a comprehensive set of recommendations and an implementation strategy to ensure best practices are put in place, through a coordinated networked system of hub and spoke programs that offer resources for patient self-management and support for primary care providers.

Cardiac PET Scan Working Group: This working group serves as a standing expert clinical panel for matters pertaining to cardiac Positron Emission Tomography (PET). The cardiac PET Scan working group monitors the use of cardiac PET scans in Ontario. The group leads efforts with respect to cardiac-specific indications, including standardized referral management, ongoing quality improvement, and knowledge translation activities. In addition, the group provides the necessary cardiac clinical expertise to inform the deliberations of the Ontario PET Steering Committee (managed by Cancer Care Ontario).

Echocardiography Working Group: In 2012, the CCN Echocardiography working group developed standards and recommendations for the provision of echocardiography services in Ontario. This group's current priority is to ensure that patients undergoing echocardiographic examinations in Ontario receive high quality, timely and clinically appropriate services. This working group is serving as the clinical advisory committee for the Ontario Echocardiography Quality Improvement project, with a focus on developing voluntary accreditation programs for providers to meet the defined standards.

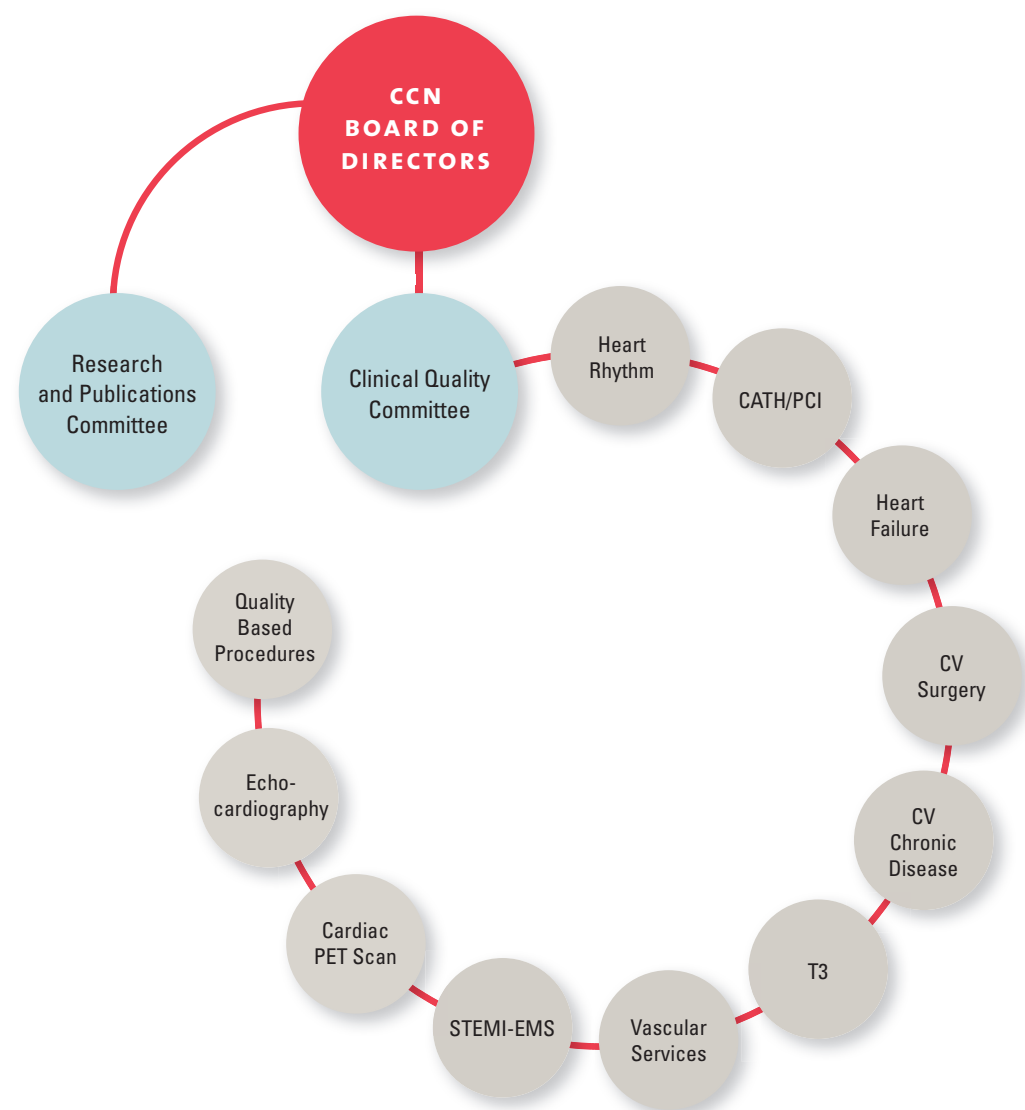
Cardiovascular Chronic Disease Management Working Group: This group focuses on key aspects of the continuum of care for patients living with cardiovascular disease as a chronic disease. The group has focused on developing an inventory of services and identifying opportunities to enhance prevention and cardiovascular rehabilitation services in Ontario. This working group is well positioned to develop synergies with other chronic disease management initiatives underway in Ontario and has begun work in this area. Most recently the group has focused on chronic diseases including chronic self-management models. The group is establishing a common evaluative framework project.

Vascular Care Working Group: The Vascular Care Work Group (VCWG) was established as part of the Vascular Services Quality Strategy for Ontario. The focus of the VCWG pertains to the delivery of acute care vascular services in Ontario, including vascular diagnostic testing and intervention, (including surgery and endovascular care). Membership includes clinical and administrative expertise from across the province, representing academic health sciences centres and large community hospitals across eight LHINs. Recent activity has been to define a work plan aligned with the recommendations of the Vascular Services Quality Strategy for Ontario. In addition, a subcommittee of the VCWG was established to advise on the development of best-practice clinical pathways, and to recommend indicators of quality outcomes for selected vascular interventions identified as Quality Based Procedures (QBP) within the MOHLTC Health System Funding Reform initiative.

In addition to the highly specialized clinical expertise provided through the working group's members, a broad network of system leaders, administrators and policy planners are also available to support CCN's efforts in addressing emerging issues and improving standards of care and efficiency within the cardiac system. CCN is very active in a growing number of collaborations and partnerships with other parts of the health care sector and with organizations in Ontario representing other disease groups with mandates similar to CCN. The goal is to align efforts, share resources where possible, and coordinate strategies to better integrate care.

CCN is responsible for Ontario's cardiac registry and in respect of its registry of cardiac services, is a prescribed person under the *Personal Health Information Protection Act* which gives it protected access to the data it requires to oversee services and standards. The cardiac registry includes detailed wait time information as well as specific clinical parameters required to evaluate key components of care, utilization and determine risk-adjusted outcomes. The CCN cardiac registry data are fundamental to CCN processes. The robust clinical and administrative data are used to monitor and evaluate cardiac system performance and track case mix and patient outcomes. In addition, the data are used in the evaluation of proposals relative to the structure and delivery of health services in the province. CCN cardiac registry data are also used for approved research purposes, and is invaluable for understanding current gaps, identifying issues and for designing system and patient care improvements.

Figure 9: CCN Working Groups



Section 3:

Managing the Burden of Cardiac Disease in Ontario

3.1 Leading Health Burden

It is estimated that 1.6 million Canadians have a cardiovascular condition that affects their quality of daily living.⁵

In Canada 14.8% of those between the ages of 65 to 74 years old report having heart disease, and 22.9% of those over age 75 report having heart disease.

Major risk factors for heart disease include: diabetes, high blood pressure, obesity, inactivity and unhealthy living. These risk factors are increasing among all age groups. Between 1994 and 2005, rates of high blood pressure among Canadians rose by 77%, diabetes by 45% and obesity by 18%.⁶ For the younger age groups, those aged 35-39, the prevalence of high blood pressure increased 127%, diabetes by 64% and obesity by 20%.⁷ In Ontario 27% of youth are overweight or obese.⁸

While progress has been made in Ontario in reducing smoking among the younger age groups, the smoking rate among those aged 20-24 is still 25%.⁹ Increasing rates of obesity and diabetes and a continued propensity to smoke, raise concerns about an increase in heart disease among younger age groups in the coming years.

Cardiac disease represents a massive drain on health care funds in Ontario. Studies show cardiovascular disease represents close to 12% of the total Canadian cost of illness.¹⁰ The Conference Board of Canada estimates that, in 2005, cardiovascular diseases cost Canada over \$22 billion a year in health care costs and lost productivity. Of this \$22 billion, mortality costs¹¹ account for the largest share at 43%, followed by hospital costs (14%), drugs (12%) and long-term disability (12%).¹²

According to Health Canada, cardiovascular disease is the most costly disease in Canada in terms of both direct and indirect costs.

⁵ Public Health Agency of Canada Tracking Heart Disease and Stroke in Canada (2009)

⁶ Heart and Stroke Foundation A Perfect Storm: Annual Report on Canadians' Health (January 25 2010)

⁷ *ibid.*

⁸ Ministry of Health and Long-Term Care News Release Maintaining the Gains, Moving the Yardstick, 2011 Report of the Chief Medical Officer of Health to the Legislative Assembly of Ontario (February 7 2013)

⁹ The Ontario Tobacco Research Unit Evaluation Update (November 2012)

¹⁰ Tarride et al. A review of the cost of cardiovascular disease Canadian Journal of Cardiology (2009) 25(6)

¹¹ Represents mortality costs from loss of future income

¹² Conference Board of Canada The Canadian Heart Health Strategy Risk factors and Future Cost Implications. (January 2010)



NEED FOR INTEGRATED FOCUS ON COMMON RISK FACTORS

- **Continued tobacco use:** 20.3% of Ontario residents 20 years and older continue to smoke.
- High levels of physical inactivity and unhealthy eating: 49.2% of Ontario residents aged 12 or older report being inactive during their leisure time, and more than half have inadequate vegetable and fruit consumption.
- **More overweight and obese:** 60% of men and 45% of women in Ontario are overweight or obese.
- **Persistent health inequity:** Ontario residents who live in the poorest or rural neighbourhoods, have less than secondary school education, or identify as First Nations, Inuit or Métis are more likely to be current smokers and/or obese.

*Taking Action to Prevent Chronic Disease: Recommendations for a Healthier Ontario
Public Health Ontario and Cancer Care Ontario, March 2012*

3.2 The Added Cost to Patients and their Families

Cardiac disease is also an economic drain on individuals living with cardiac conditions and their caregivers. Costs to caregivers and losses of productivity due to premature mortality or morbidity are considerable. While hospitalization is the main cost driver for cardiac disease, follow-up costs are also significant. Some studies show the costs associated with cardiovascular disease conditions are higher than other chronic conditions.

Many individuals with cardiovascular disease report fair or poor perceived health which imposes restrictions on their day-to-day activities, including work. Often, this poor health extends to requiring help with the activities of daily living. There are also financial costs associated with caring for people with cardiac diseases. Some people living with the disease may not be able to work and some may require assistance from a caregiver. There is a heavy burden on caregivers as well. Family members may need to miss work or to reduce their work commitments to care for loved ones with cardiac conditions.¹³

Cardiac disease also results in equally debilitating conditions. Studies have shown that depression is a significant risk factor for new heart disease and that it increases morbidity and mortality in established heart disease. Approximately one quarter of patients with heart disease have major depression.¹⁴

¹³ Tarride et al. *A review of the cost of cardiovascular disease* Canadian Journal of Cardiology (2009) 25(6)

¹⁴ Sher, Y. Lolak, S, Maldonado, J. *The Impact of Depression in Heart Disease* Current Psychiatry Reports Stanford (2010) 12:255-264

One in 5 people with ischaemic heart disease or with stroke, up to 2 in 5 people with congestive heart failure, and 1 in 3 people following a heart attack develop clinical depression. Individuals with both cardiovascular disease and depression have an impaired quality of life, and increased health problems and risk of death.¹⁵

3.3 Burden Spreading Across Many Population Groups

With the increasing incidence of risk factors such as high blood pressure, diabetes and obesity among younger age groups, heart disease is no longer a disease of aging. Between 1994 and 2005, among those 35 to 49 years of age, for example, the prevalence of high blood pressure increased 127%, diabetes by 64% and obesity by 20%. Young women are also at greater risk, with approximately 1.7 million women aged 20 to 34 in Canada identified as being inactive and almost 1 million are overweight.¹⁶

Heart disease and stroke is a leading cause of death among women in Canada. More women than men die from heart disease and stroke.¹⁷

Certain ethnic groups, such as Canadians of South Asian¹⁸ and African-Caribbean¹⁹ descent are at increased risk of heart disease, in part as a result of a higher incidence of diabetes and high blood pressure among these groups.

Aboriginals, particularly those living on-reserve, have high incidence of heart disease, including heart failure, compared to the general population. Data show that on-reserve First Nations people have far worse overall cardiovascular health than the general Canadian population.²⁰ Almost three-quarters of the First Nations adults living on-reserve were overweight or obese, and many children were overweight or obese. Risk factors such as diabetes, smoking and obesity are concerns as well. Access to health care resources is limited in remote communities, and the interplay between federal and provincial oversight may lead to challenges in the provision of high quality care. Given the high burden of disease, interventions for these patients are a priority.

Other factors such as access to fresh, healthy, affordably priced food options, and treatment of mental health issues and addiction impact the ability of those people living on-reserve to self-manage their health care conditions. Language barriers and cultural barriers can impede the relationship between the patient and provider in this setting as well.

¹⁵ Public Health Agency of Canada (2009)

¹⁶ Heart and Stroke Foundation *A Perfect Storm of Heart Disease Looming on Our Horizon Annual Report on Canadians' Health* (January 25 2010)

¹⁷ Heart and Stroke Foundation

¹⁸ Heart and Stroke Foundation *A Perfect Storm of Heart Disease Looming on Our Horizon Annual Report on Canadians' Health* (January 25 2010)

¹⁹ Public Health Agency of Canada *Tracking Heart Disease in Canada* (2009)

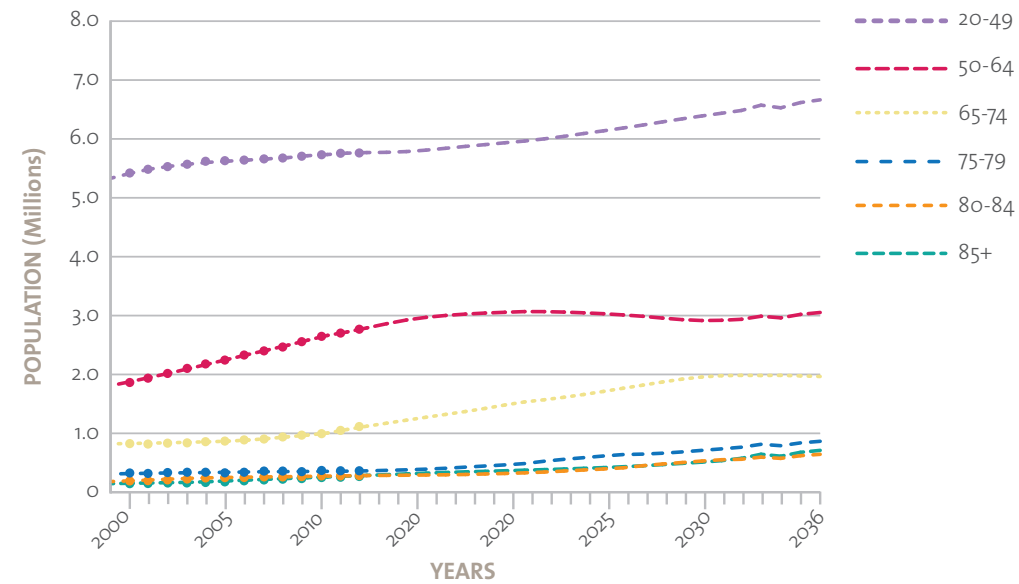
²⁰ Heart and Stroke Foundation *A Perfect Storm of Heart Disease Looming on Our Horizon Annual Report on Canadians' Health* (January 25 2010)



3.4 Burden Growing as Ontario Residents Age

Ontario's population is aging. Today, approximately 12.5% of the population in Ontario is over 65 years of age.

Figure 10: Ontario's Population Age Groups 2000-2036

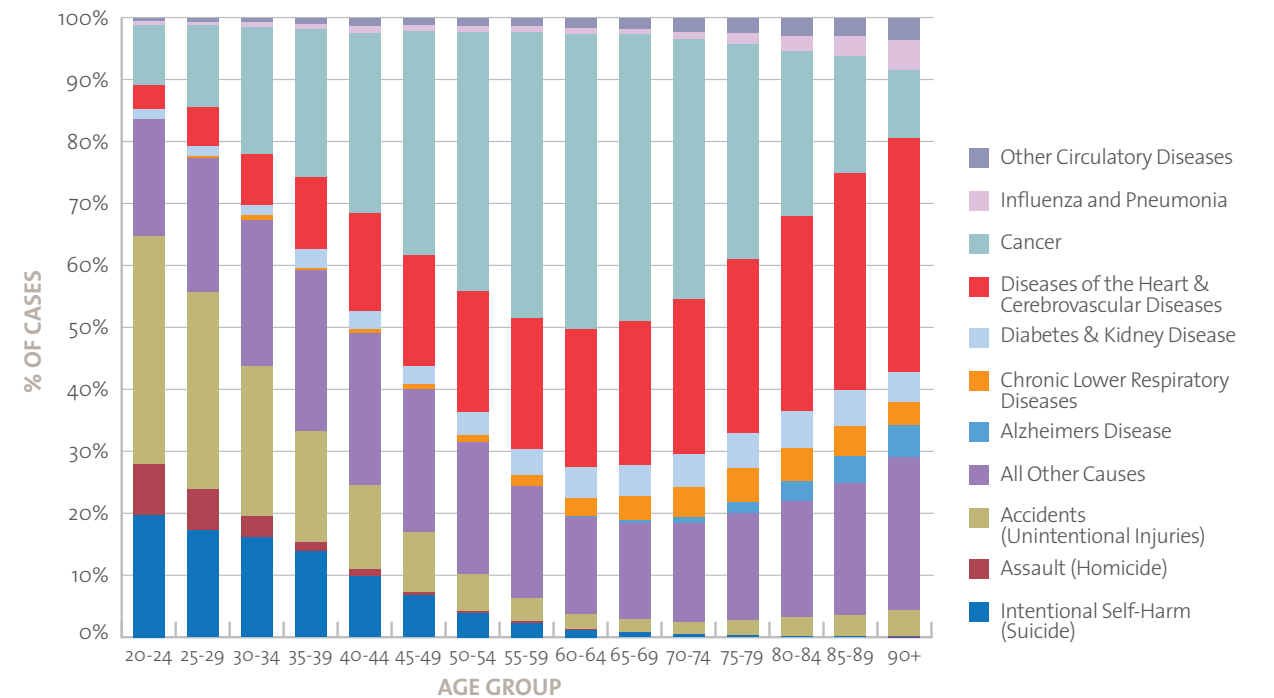


Data Source: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO; Ministry of Finance Population Projections

By 2036, people aged 65 and over will account for 23.4% of the population. One in 4 people living in Ontario will be over 65, and 1 in 8 will be over 75.

As the population ages, increases in co-morbidities and changes to anatomic heart structure lead to corresponding increases in cardiac disease. By age 75, cardiovascular disease is the cause of death for approximately as many Ontario residents as cancer. By age 80, cardiovascular disease is the leading cause of death for people in Ontario.

Figure 11: Mortality by Cause and Age, Ontario 2004-2008



Data Source: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO; Ministry of Finance Population Projections

3.5 Growing Pressure on the Health Care System

Cardiac diseases are responsible for an increasing number of hospitalizations as people age.

Heart diseases account for more hospital admissions, excluding pregnancy and childbirth, than any other cause and place a significant burden on our health care system.²¹

With the aging of the population and the poor health of many in older age groups, pressures on hospitals and other parts of the delivery system due to cardiac disease are expected to grow.

In 2007, according to the Public Health Agency of Canada, 10% of all visits made by Canadians to community physicians were for the management of cardiac disease.

²¹ Health Care in Canada, Canadian Institute for Health Information. (2006)



Section 4:

The Current Profile of Cardiac Care in Ontario

While we have made improvements in getting and keeping heart failure patients out of hospital through initial out-of-hospital care plans and treatments, we are seeing these patients eventually returning to hospital, either through the emergency department or to be re-admitted for additional interventions. With the aging of the population, more people will be dealing with the complexities of ongoing chronic management of heart disease and system pressure will continue to intensify unless mitigated.

System pressures that can, and should, be proactively planned for include increases in acute interventions, a pressing need for increased access to cardiac rehabilitation and other intensifying strains on chronic disease management programs.

Additional system pressures include providing appropriate care settings for patients with chronic heart conditions. Patients (referred to as alternate level of care patients) are often left waiting in hospitals for placements in long-term care homes. These patients could be cared for more appropriately in a long-term care setting, or at home with appropriate supports. Primary day-to-day responsibility as care givers for these patients is too often left to family members and friends who are ill-equipped to care for their loved ones. As a result of a wait for long-term care placements and inadequate home support, many patients must wait in hospital.

With its clinical leadership network, cardiac registry and data gathering, CCN has captured a comprehensive picture of cardiac care across the province of Ontario, including quality, efficacy and access to services across the province. Over the past several years CCN data has been used to determine referral patterns and how patients access acute cardiac services across Ontario. Currently there are 16 PCI programs, 11 cardiac surgery programs and 10 advanced heart rhythm programs which comprise the majority of adult advanced cardiac intervention services across the province.

The key to the planning of cardiac services in Ontario is to understand the distribution of these cardiac services and the volume of procedures across the province. The number of procedures by type provided within each LHIN is a useful and operational statistic for service planning and allocations, and highlights potential gaps between service provision and population based estimates.



Table 1. Distribution of Advanced Cardiac Services in Ontario by Centre and by LHIN

CCN Members Hospitals	LHIN	Advanced Cardiac Services				
		Cath	PCI	Cardiac Surgery	EP	TAVI
Hamilton Health Sciences	Hamilton Niagara Haldimand Brant	●	●	●	●	●
Health Sciences North	North East	●	●	●		●
Kingston General Hospital	South East	●	●	●	●	●
London Health Sciences Centre	South West	●	●	●	●	●
Niagara Health System	Hamilton Niagara Haldimand Brant	●				
Peterborough Regional Health Centre	Central East	●	●			
Rouge Valley Health System (Centenary)	Central East	●	●		●	
Sault Area Hospital	North East	●				
Southlake Regional Health Centre	Central	●	●	●	●	●
St. Mary's General Hospital	Waterloo Wellington	●	●	●		
St. Michael's Hospital	Toronto Central	●	●	●	●	●
Sunnybrook Health Sciences Centre	Toronto Central	●	●	●	●	●
Thunder Bay Regional Health Sciences Centre	North West	●	●			
Toronto East General Hospital	Toronto Central	●				
Trillium Health	Mississauga Halton	●	●	●	●	●
University Health Network	Toronto Central	●	●	●	●	●
University of Ottawa Heart Institute	Champlain	●	●	●	●	●
William Osler Health System	Central West	●	●			
Windsor Regional Hospital	Erie St. Clair	●	●			

4.1 Advanced Cardiac Services – Placement of Services

For the most part, hospitals are eager to provide advanced cardiac services, not only as a clinical service to patients, but also because advanced cardiac programs increase the profile of the hospital within the region and serve as an important recruitment and retention tool for physicians and other health human resources. A critical point in planning service delivery is to determine at what point investments should be made to build services locally, and repatriate patients to receive services in their own region, rather than be required to travel to an established cardiac program elsewhere. While “closer to home” is preferred where possible, in some jurisdictions the appropriate critical mass of patients to sustain procedural volumes may be unattainable.

From a quality perspective, it is well established that hospitals that have small volumes of specialized procedures may not have the minimum critical mass of patients to maintain optimal clinical competencies, and this may have negative implications for patient outcomes and program performance. In addition, small volume programs typically cost more per case than when these services are provided in larger, full service regional cardiac programs.

Considerations and Benchmarks for a Regional Cardiac Program

It is CCN’s position that a regional cardiac program should be based on the following considerations:

1. A strong level of community/public engagement, including consultation with clinical experts and other relevant leaders in the health care field in support of the program;
2. The capacity and necessary infrastructure upon which a robust cardiology program with a focus on the continuum of care can be established;
3. The support of the LHIN with confirmation that the regional cardiac services are aligned with the LHIN’s current IHSP;
4. Established and defined clinical activity to support comprehensive cardiac care, including chronic aspects of cardiac disease (i.e. cardiac rehabilitation, heart failure programs, atrial fibrillation clinics, hypertension clinics, diabetes education, etc.);
5. A complete understanding of the current state and access to cardiac services within the region, including wait times, referral patterns, repatriation and patient outcomes (including elective and emergency procedures) benchmarked against provincial aggregate data;



6. Evidence of necessary human resources (including multidisciplinary teams consisting of medical, nursing, physiotherapy, occupational therapy, social work and pharmacy) trained and assigned to care for cardiac patients with MD on-site availability within 30 minutes 24/7;
7. Capital investments as well as a reasonable operational funding model benchmarked against similar existing programs in the province;
8. A defined overview of patient care processes to support quality care, detailing the types of supports and resources in place, including quality assurance and risk management programs;
9. Clearly defined clinical pathways must exist for the care of cardiac patients using evidence based best practice guidelines;
10. A sufficient number of designated cardiac beds, other in-patient and ambulatory care resources as well as physical capacity to support all levels of cardiac care and clinic activities;
11. Evidence of repatriation agreements to ensure continuity and comprehensiveness of care for patients transferred between hospitals. This includes a well-established relationship with an advanced, full service cardiac centre with agreements in place for patient transfer and repatriation post-procedure. Dedicated ICU/CCU beds for cardiac patients (i.e. Level 2). RNs in this unit must be trained and maintain competence in advanced arrhythmia interpretation, defibrillation, and administration of life saving cardiac drugs, with the ability to manage complex critically ill cardiac patients;
12. Protocols must exist relating to the care of the critically ill patient during the stabilization and intrahospital transport period in the event a patient requires transfer to a higher level of care;
13. Dedicated cardiac in-patient ward beds where RNs are skilled in the management of post-ACS Cath/PCI (including STEMI) and CABG patients who are repatriated from centres where advanced cardiac procedures are performed;
14. Consistent documented evidence of repatriation transfers occurring on a no refusal basis;
15. Evidence that comprehensive quality assurance program and risk management strategies are established, including cardiac program evaluation, monitoring and reporting systems to ensure best practice guidelines are followed and tracking and monitoring of adverse events;
16. Adoption of standardized referral tools by providers in the community and institutional settings to ensure the patient is assigned the appropriate level of care within a specified recommended wait time;
17. Comprehensive discharge planning programs including ambulatory clinics to service patient needs upon discharge, available 5 days per week, with established protocols to expedite care and transitions to community supports, as appropriate;

18. Existence of a service plan for cardiac diagnostics (including appropriate use criteria defined by existing standards/guidelines) and available, trained and credentialed staff to conduct testing. Provision of a full range of in-hospital cardiac diagnostic testing must be present that services in-patient and ambulatory patient populations, including: ECG testing (24/7 for in-patients), Regular and Nuclear Stress testing, Holter monitoring and Echocardiography. Emergent/Urgent Echocardiography must be available for in-patients on an on-call basis 24/7; and
19. Rehabilitation, risk factor reduction strategies and programs (i.e. smoking cessation program, atrial fibrillation and heart failure clinics) available to in-patients and ambulatory out-patients who reside in the region and are discharged from other cardiac centres.

4.2 CCN Criteria Dashboard

The following tables set out the criteria for establishing specialized cardiovascular programs and services.

Table 2: Stand Alone (SA) PCI Clinical and Business Development Criteria

CRITERIA #	SA-PCI CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
1	Strong rationale for the stand-alone program, including substantial evidence for population need, an analysis of available alternatives to meet the identified needs and the level of community engagement and/or consultation with clinical experts or other relevant leaders in the health care field.
2	A well-established mentor relationship with an advanced, full service cardiac centre with joint agreements in place for mentorship, case consultation, emergency support and patient transfer. The mentorship agreement must include a detailed plan for support, training and ongoing clinical interaction, including clinical and/or administrative consultation for complex cases (including degree of consultation and number of cases per month).
3	A plan for emergency transfer of patients that must be in place at the time the proposal is submitted.
4	An overview of patient care processes to support quality care, including what types of supports and resources are required, a process for informed consent with respect to revascularization options, a quality assurance program and a risk management program.
5	Evidence of existing cardiology program within hospital with designated cardiac beds and resources to support complex cardiac cases, including current clinical care pathways.
6	Evidence of repatriation agreements to ensure continuity and comprehensiveness of care for patients transferred between hospitals.
7	Existing diagnostic cardiac catheterization lab performing a minimum of 1,500 diagnostic cardiac catheterizations annually.
8	Existing physical space with a funding and implementation plan for the development of two full service cardiac catheterization/intervention labs, including the necessary patient waiting/recovery areas.
9	Demonstrated ability to recruit a minimum of two experienced interventional cardiologists.
10	Demonstrated ability to recruit other relevant health human resources to support PCI cath lab activity, including registered nurses, X-ray technicians, and other relevant positions.
11	Developed plan for ongoing quality assurance, including program evaluation and monitoring systems to ensure ongoing quality improvement.



CRITERIA #	SA-PCI CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
12	Developed plan to perform a minimum of 400 PCI procedures annually by year 3; evidence that new PCI capacity will have sufficient patients to be sustainable long term.
13	Developed plan to implement primary PCI program (24/7) by year 2 of operations to support STEMI care without additional funding.
14	An overview of the potential challenges that may impact the implementation and growth of the new PCI program. Solutions to mitigate such barriers should be well defined and reflect the extent of program planning to support the defined implementation and growth strategy.
15	Full support of the Local Health Integration Network with confirmation that the proposed PCI program is aligned with the LHIN's current Integrated Health Services Plan (IHSP).
16	Market share analysis to identify the potential impact on referral patterns and volumes at existing PCI programs in other LHINs within Ontario.
17	Evidence that existing PCI programs will be able to retain volumes sufficient to maintain the integrity of their PCI programs despite the redistribution of cases that may occur once the new PCI program is performing a minimum of 400 cases.
18	Detailed plan of any capital requirements, including renovation, expansion, equipment or information technology investments.
19	Detailed budget of one-time start-up costs, including training.
20	Detailed budget to support ongoing operational costs.
21	Proposed implementation timelines, including high level activities (milestones) and anticipated timelines in months with the first activity starting at date 'zero' and the last activity and timeline when the proposed service is fully operational.

Table 3: Proposed Cardiac Surgery Clinical and Business Development Criteria

CRITERIA #	PROPOSED CARDIAC SURGERY CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
1	Strong rationale for the development or expansion of the cardiac surgery program, including substantial evidence for population need, an analysis of available alternatives to meet the identified needs and the level of community engagement and/or consultation with clinical experts or other relevant leaders in the health care field.
2	A well-established mentor relationship with an advanced, full service cardiac centre with joint agreements in place for mentorship, case consultation, emergency support and patient transfer. The mentorship agreement must include a detailed plan for support, training and ongoing clinical interaction, including clinical and/or administrative consultation for complex cases (including degree of consultation and number of cases per month).
3	An overview of patient care processes to support quality care, including what types of supports and resources are required, a process for informed consent with respect to revascularization options, a quality assurance program and a risk management program.
4	Evidence of existing cardiology program within hospital with designated cardiac beds and resources to support complex cardiac cases, including blood bank and a blood conservation program, dialysis services and current clinical care pathways.
5	Evidence of repatriation agreements to ensure continuity and comprehensiveness of care for patients transferred between hospitals.

CRITERIA #	PROPOSED CARDIAC SURGERY CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
6	Existing diagnostic cardiac catheterization lab performing a minimum of 1,500 diagnostic cardiac catheterizations annually that will support a cardiac surgical volume minimum of 300 cases annually.
7	Existing physical space with a funding and implementation plan for the development of two full service cardiac operating rooms, and dedicated cardiovascular intensive care unit (CVICU) beds.
8	Demonstrated ability to recruit a minimum of three experienced cardiac surgeons.
9	Demonstrated ability to recruit other relevant health human resources to support cardiac OR activity, including registered nurses, cardiovascular perfusionists, cardiovascular anesthetists, and other allied health professionals.
10	Developed plan for ongoing quality assurance, including program evaluation and monitoring systems to ensure ongoing quality improvement and patient satisfaction.
11	Developed plan to perform a minimum of 300 procedures annually by year 2 and evidence that new cardiac surgical capacity will have sufficient patients to be sustainable long term.
12	Developed plan to implement cardiac surgery (24/7) coverage to provide for emergency care.
13	An overview of the potential challenges that may affect the implementation and growth of the new cardiac surgical program. Solutions to mitigate such barriers should be well defined and reflect the extent of program planning to support the defined implementation and growth strategy.
14	Full support of the LHIN with confirmation that the proposed cardiac surgery program is aligned with the LHIN's current Integrated Health Services Plan (IHSP).
15	Market share analysis to identify the potential impact on referral patterns and volumes at existing cardiac surgery programs in other LHINs within Ontario.
16	Evidence that existing cardiac surgery programs will be able to retain volumes sufficient to maintain the integrity of their cardiac surgical programs despite the redistribution of cases that may occur once the new cardiac surgery program is performing a minimum of 300 cases.
17	Detailed plan of any capital requirements, including renovation, expansion, equipment, or information technology investments.
18	Detailed budget of one-time start-up costs, including training.
19	Detailed budget to support ongoing operational (base) costs.
20	Proposed implementation timelines, including high-level activities (milestones) and anticipated timelines in months with the first activity starting at date 'zero' and the last activity and timeline when the proposed service is operational.

Table 4: Proposed Advanced Arrhythmia Services Clinical and Business Development Criteria

CRITERIA #	PROPOSED ADVANCED ARRHYTHMIA CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
1	Strong rationale for the heart rhythm program, including substantial evidence for population need and an analysis of available alternatives to meet the identified needs.
2	A well-established mentor relationship with a Type 1 centre with joint agreements in place for mentorship, case consultation and patient transfers that includes in-house emergency protocols with regularly scheduled staff exercises. The mentorship agreement must include a detailed plan for the following: <ul style="list-style-type: none"> • Support and training protocols (e.g. participation in educational rounds); • Evaluation protocols for physicians (implanting cardiac devices, diagnostic EPS, ablations) and • Patient referrals. Ongoing clinical interaction including clinical and/or administrative consultation for complex cases (including degree of consultation and number of cases per month).



CRITERIA #	PROPOSED ADVANCED ARRHYTHMIA CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
3	An overview of patient care processes to support quality care, including what types of supports and resources are required. There must be evidence of an existing cardiac surgery and cardiac catheterization program including an interdepartmental support system within hospital with the following considerations to be incorporated: <ul style="list-style-type: none"> • A process for informed consent; • Designated cardiac beds; • Electrophysiology lab requirements; • Resources to support complex cardiac cases (emergency patient access to cardiac surgery); and • Current clinical care pathways.
4	Evidence of comprehensive community engagement and consultation with appropriate clinical and administrative experts and/or other relevant leaders within the health care field.
5	Evidence of repatriation agreements with referring hospitals to ensure continuity and comprehensiveness of care for patient selection and referrals between centres.
6	A well-defined plan for the long-term management of patients with comprehensive follow-up services to be provided on-site or in partnership with arrhythmia device clinics (outpatient basis); follow-up care and discharge plans are to include outreach clinics and/or telephone transmission (remote monitoring) with consideration given to the expansion of services where new or existing locations are required.
7	Existing physical space with a funding and implementation plan for the development of a full service electrophysiology lab, including a connecting workroom to be outfitted with the appropriate specialized equipment.
8	Two or more qualified implanting cardiologists/electrophysiologists with experience in standard and complex ablation, implantation and follow-up of pacemakers, ICDs, and CRTs, advanced cardiac support and resuscitation. There should be a demonstrated ability to recruit the minimum two experienced cardiologist/electrophysiologists.
9	Demonstrated ability to recruit other relevant health human resources to support electrophysiology (EP) lab activity. A minimum of three nursing personnel for EP suite staffing, including nursing (circulator, conscious sedation 1:1, scrub nurse) may also need additional nurses or EP technicians trained to run EP recording system, ablation equipment, 3D mapping systems) cardiac anesthesia, echocardiography technicians, fluoroscopy. A nurse trained in the programming and monitoring of implantable devices both in the EP lab as well as follow-up device clinic will also be required.
10	Developed plans for ongoing quality assurance and risk management, including program and physician evaluation and monitoring systems to ensure ongoing quality improvement.
11	A developed plan to perform the recommended minimum case volumes (per implanting physician) in accordance with each specialty, evidence that new heart rhythm capacity will have sufficient patients to be sustainable long term and maintain clinical competency; <p>An EPS centre should provide a minimum of 50 cases per operator for diagnostic EPS cases annually;</p> <p>A minimum of 10 ICD and 10 CRT cases with a minimum of 20 follow-up patients seen per year;</p> <p>A minimum of 20 - 50 ablations (standard/complex) per year;</p> <p>A minimum of 40 lead extraction procedures during training with a minimum of 20 cases annually following training is recommended per operator;</p> <p>Type I centres need to perform 200 new implants (50 of which are pacemakers) and follow-up services for a minimum of 500 patients per year;</p> <p>Type II centres implanting pacemakers need to maintain a minimum of 50 new devices per year and provide follow-up service to a minimum of 200 patients per year; and</p> <p>Type III centres to provide follow-up services only for pacemaker devices with a minimum volume of 200 patients per year.</p>
12	Developed plan to implement a heart rhythm program that includes a plan for on-call services after-hours.

CRITERIA #	PROPOSED ADVANCED ARRHYTHMIA CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
13	An operational work plan that incorporates future implementation and costing of new technologies that may impact clinical indications (based on scientific evidence from authoritative clinical trials) for the continued viability of the program once operationalized.
14	An overview of the potential challenges that may impact the implementation and growth of the new heart rhythm program. Solutions to mitigate such barriers should be well defined and reflect the extent of program planning to support the defined implementation and growth strategy.
15	Full support or approval of the LHIN with confirmation that the proposed arrhythmia program is aligned with the LHIN's current Integrated Health Services Plan (IHSP) and/or Clinical Services Plan (CSP).
16	Market share analysis to identify the potential impact on referral patterns and volumes at existing heart rhythm programs in other LHINs within Ontario.
17	Evidence that existing arrhythmia programs will be able to retain volumes sufficient to maintain the integrity of their programs despite the redistribution of cases that may occur once the new program is performing the recommended minimum cases.
18	Detailed plan of any capital requirements, including renovation, expansion, equipment or information technology investments; specific to each proposed centre.
19	Detailed budget of one-time start-up costs, including training and education; specific to each proposed centre including costs for follow-up programs. Note: Orientation period for specialized arrhythmia technicians and cardiac nurse clinicians are anticipated to be longer and therefore needs to be budgeted accordingly.
20	Detailed budget to support ongoing operational costs; specific to each proposed centre that includes costs for follow-up programs. The operational (base) budget for all projected years should include cost considerations for new technologies, continued training, research and changing clinical developments. Note: The proposed centre should have costs that are separated from other existing functional centres/modalities.
21	Proposed implementation timelines, including high level activities (milestones) and anticipated timelines in months with the first activity starting at date 'zero' and the last activity and timeline when the proposed service is fully operational.

Table 5: Proposed Vascular Surgery Clinical and Business Development Criteria

CRITERIA #	PROPOSED VASCULAR SURGERY CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
1	Strong rationale for the development or expansion of the vascular surgery program, including substantial evidence for population need, an analysis of available alternatives to meet the identified needs and the level of community engagement and/or consultation with clinical experts or other relevant leaders in the health care field.
2	A well-established mentor relationship with an advanced, full service vascular centre with joint agreements in place for mentorship, case consultation, emergency support and patient transfer. The mentorship agreement must include a detailed plan for support, training and ongoing clinical interaction, including clinical and/or administrative consultation for complex cases (including degree of consultation and number of cases per month).
3	An overview of patient care processes to support quality care, including what types of supports and resources are required, a process for informed consent, a quality assurance program and a risk management program.



CRITERIA #	PROPOSED VASCULAR SURGERY CLINICAL AND BUSINESS DEVELOPMENT CRITERIA
4	Evidence of existing infrastructure within hospital with designated beds and resources to support complex vascular cases, including advanced imaging services, blood bank and a blood conservation program, dialysis services and current clinical care pathways.
5	Evidence of repatriation agreements to ensure continuity and comprehensiveness of care for patients transferred between hospitals.
6	Existing vascular lab with both invasive and non-invasive diagnostic capabilities that will support a comprehensive vascular program.
7	Existing physical space with a funding and implementation plan for the development of two full service vascular operating rooms including endovascular or hybrid suites and dedicated cardiovascular intensive care unit (CVICU) beds.
8	Demonstrated ability to recruit a minimum complement of vascular surgeons and interventional radiologists to support a 24/7 vascular unit.
9	Demonstrated ability to recruit other relevant health human resources to support vascular OR activity, including registered nurses, cardiovascular perfusionists, cardiovascular anesthesia, and other allied health professionals.
10	Developed plan for ongoing quality assurance, including program evaluation and monitoring systems to ensure ongoing quality improvement and patient satisfaction.
11	Evidence that new vascular surgical capacity will have sufficient patients to be sustainable long term.
12	Developed plan to implement vascular surgery (24/7) coverage to provide for emergency care.
13	An overview of the potential challenges that may affect the implementation and growth of the new vascular surgical program. Solutions to mitigate such barriers should be well defined and reflect the extent of program planning to support the defined implementation and growth strategy.
14	Full support of the Local Health Integration Network with confirmation that the proposed vascular surgery program is aligned with the LHIN's current Integrated Health Services Plan (IHSP).
15	Market share analysis to identify the potential impact on referral patterns and volumes at existing vascular surgery programs in other LHINs within Ontario.
16	Evidence that existing vascular surgery programs will be able to retain volumes sufficient to maintain the integrity of their vascular surgical programs despite the redistribution of cases that may occur once the new vascular surgery program is performing at its local capacity.
17	Detailed plan of any capital requirements, including renovation, expansion; equipment or information technology investments.
18	Detailed budget of one-time start-up costs, including training.
19	Detailed budget to support ongoing operational (base) costs.
20	Proposed implementation timelines, including high-level activities (milestones) and anticipated timelines in months with the first activity starting at date 'zero' and the last activity and timeline when the proposed service is operational.

4.3 Utilization and Wait Times

CCN actively monitors and reports on wait times and access for selected cardiac procedures, including:

- Diagnostic cardiac catheterization;
- Percutaneous Coronary Intervention (PCI);
- Cardiac Surgery;
- Diagnostic electrophysiology procedures (EP);
- Device implants (ICD, CRT);
- Ablation; and
- TAVI.

According to CCN data, Ontario adults, with limited exceptions, receive advanced services within established access targets for selected cardiac procedures. Wait time benchmarks and targets are developed over time, and work is currently underway by CCN to determine the appropriate wait times for newer procedures (such as Ablation and TAVI).

4.4 Regional Cardiac Priorities

In 2006, the MOHLTC regionally divided the province into fourteen Local Health Integration Networks (LHINs) to enable local planning, funding and integration of health services directly in communities. LHINs bring together local health care partners – from hospitals, community care, support services, mental health and addictions, health centers and long-term care.

CCN conducted a consultative process with each LHIN in considering the provincial cardiac services road map. Each LHIN has their own issues, priorities and strategies relating to cardiac disease; this is a function of some of the regional variations in the prevalence of risk factors and other factors contributing to cardiac disease of the populations within each LHIN.

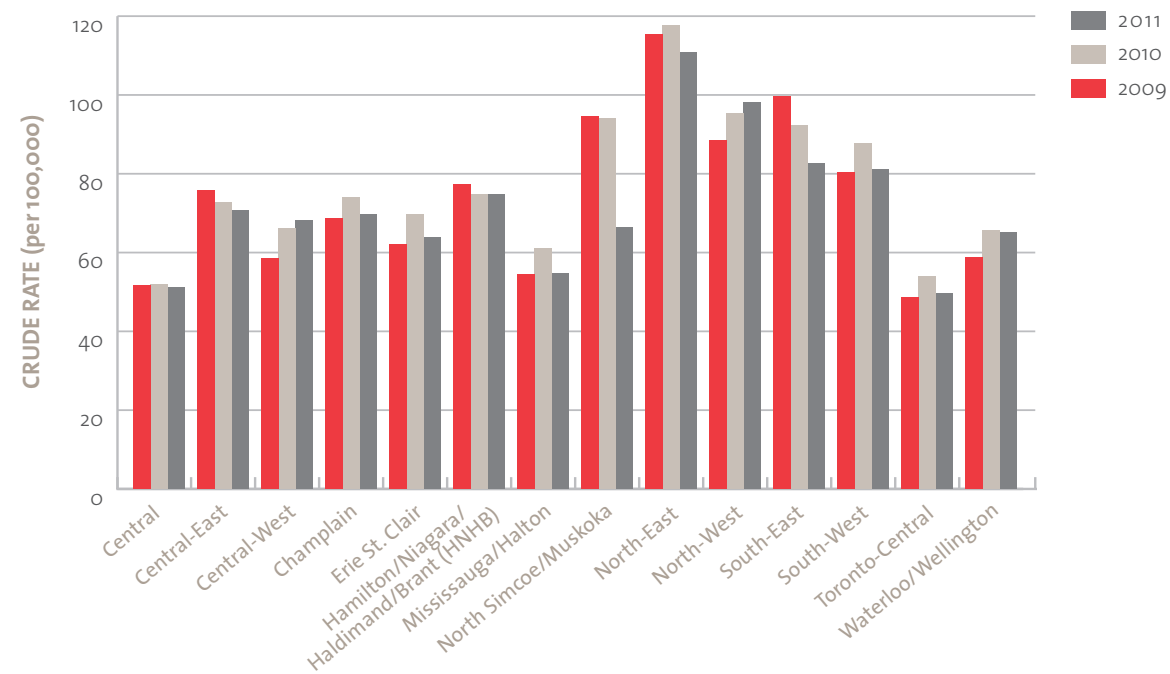
Incidences of heart disease are highest in the North East LHIN; areas such as North Simcoe Muskoka LHIN, the North West LHIN and the South East LHIN also demonstrate higher rates of heart attack than other areas of the province. Rates for heart failure are also highest in the northern areas of the province.

The use of hospital services varies across the province. There are higher rates of hospitalization in the North East LHIN, North West LHIN, and North Simcoe Muskoka LHIN, and lower rates in the Central/Greater Toronto Area (GTA) LHINs.



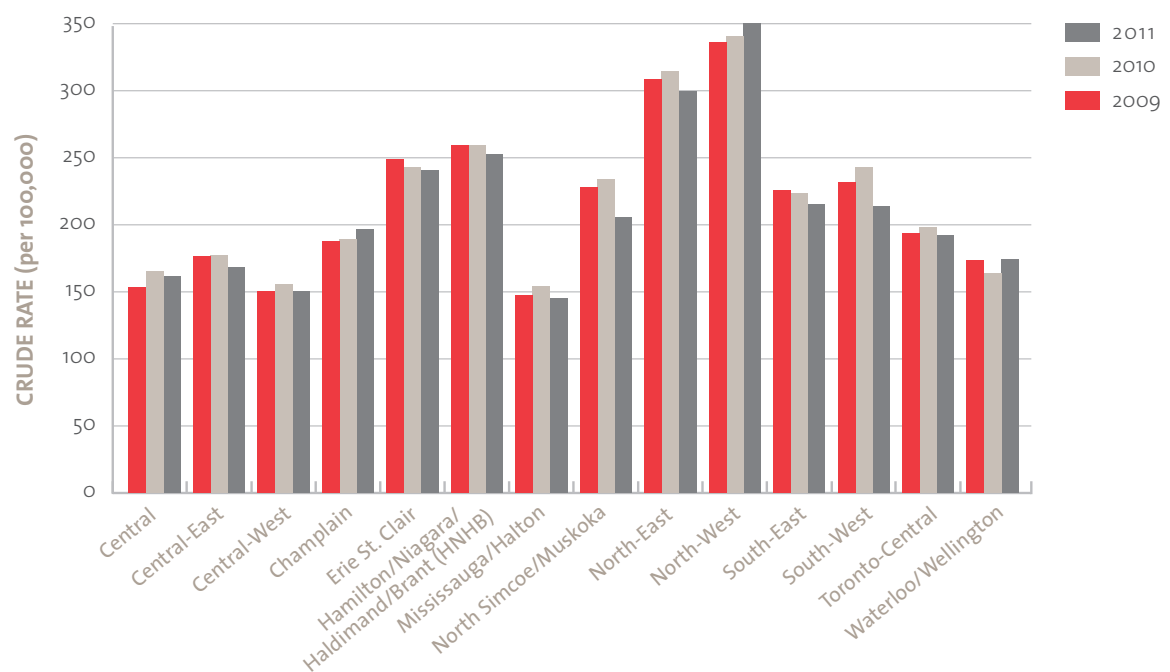
The following figures provide two examples of these trends.

Figure 12: Rates of Hospitalization (STEMI) by LHIN



Data Source: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO

Figure 13: Rates of Hospitalization due to Heart Failure by LHIN



Data Source: Ontario Ministry of Health and Long-Term Care: IntelliHEALTH ONTARIO

The majority of LHIN Integrated Health Service Plans (IHSP) include specific reference to cardiac care and related strategies. Heart failure and stroke are identified as priority areas for most LHINs in their planning. In addition, secondary prevention and cardiac rehabilitation were also flagged as priority areas for a number of LHINs, however resources to support these types of programs were identified as an area of concern. Acknowledged in the LHIN IHSPs was the need for common strategies to impact cardiovascular health more broadly, including population prevention strategies, enhanced coordination and access to primary care and chronic disease management.

All LHINs expressed focusing on better system integration and improved transitions of patient care between providers and settings as a priority. Ontario is now moving to integrate local planning and accountability for primary care into the LHINs to improve care for patients with complex care needs. In addition, specific provincial initiatives are underway to improve the care of complex patients and many LHINs are engaged in projects to address priorities in this area.

4.5 Procedure Volumes and Projections

Ontario hospitals with advanced cardiac programs provide a range of services including cardiac catheterizations and PCI, cardiac surgery, diagnostic electrophysiology procedures, ablation, cardiac device implants and TAVI procedures. The high volume procedures for Ontario are cardiac catheterization, PCI, and cardiac surgery (including isolated CABG, CABG+VALVE, and VALVE-Only). Actual volumes (FY2008-2012) and projected volumes (FY2013-2016) are summarized in Table 6. LHIN level estimates for these procedures are presented in Table 7.

Volume Projections and Methodology

LHIN volume projections were estimated by applying provincial crude rates for the selected cardiac procedures to LHIN population estimates for each year of the projection period. The provincial crude rates were estimated using historic volume data (the 'Actual' values in Table 6 below), and projecting these trends using different regression formula, yielded estimated cardiac volumes by procedure (the 'Projected' values in Table 6). Using the projected volumes and the projected adult population values from MOHLTC sources, a procedure rate of hospitalizations per 100,000 was calculated and then applied to LHIN population projections to produce LHIN level estimates. The LHIN population projections were provided by the MOHLTC.



Table 6: Ontario Cardiac Procedure Volumes, Current and Projections (Source: Cardiac Care Network)

	2008 - 09	2009 - 10	2010 - 11	2011 - 12	2012 - 13	2013 - 2014	2014 - 2015	2015 - 16	2016 - 17
PROCEDURE	ACTUAL					PROJECTED			
Cardiac Catheterization	57,539	59,891	60,172	63,851	65,314	66,799	68,538	70,276	72,014
PCI	19,852	21,108	21,715	22,281	24,087	24,373	25,286	26,199	27,112
Cardiac Surgery	10,197	10,171	9,938	10,230	9,856	9,806	9,764	9,728	9,696

Notes:

1. Actual volume data provided by CCN October 2008 to present.
2. Cardiac Surgery includes - CABG, CABG+Valve, Valve-only
3. Population data provided by the Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, accessed March 2013. Adult 20+ population used in rate calculations.

The changes of the volumes and rates of these major cardiac procedures are a function of changing cardiac hospitalization rates for these procedures, and changes in the adult (20+) population. Based on current procedure volumes from Table 6, and population projections for Ontario, we can expect to see the following service trends:

- An increase in cardiac catheterization and PCI; and
- Stable rates of cardiac surgery.

LHIN Cardiac Volume Estimates - By Patient Residence

Table 7 provides LHIN projection estimates for procedure volumes that were calculated by applying the estimated provincial crude rate per procedure to the LHIN specific populations. Based on this calculation, this table provides the estimated number of procedures required by the LHIN population. For example, 3,323 residents of Central LHIN are projected to require a PCI procedure in 2013-14. This information, however, does not include market share to estimate where these cardiac procedures are likely to be performed (recognizing that some residents of the Central LHIN may receive their procedures at cardiac centres outside of their LHIN).

Table 7: Projected LHIN Volumes for Cardiac Procedures, based on LHIN Population (Source: Cardiac Care Network)

Patient Procedure Estimates	2013-14			2014-15			2015-16			2016-17		
	Cath	PCI	Cardiac Surgery	Cath	PCI	Cardiac Surgery	Cath	PCI	Cardiac Surgery	Cath	PCI	Cardiac Surgery
Ontario Estimate:	66,799	24,373	9,806	68,538	25,286	9,764	70,276	26,199	9,728	72,014	27,112	9,696
Rate/100,000:	629.44	229.66	94.27	636.81	234.94	92.40	643.94	240.06	90.72	651.07	245.12	89.13
Central	9,108	3,323	1,337	9,410	3,472	1,341	9,714	3,621	1,345	10,020	3,772	1,349
Central East	8,184	2,986	1,201	8,440	3,114	1,202	8,693	3,241	1,203	8,945	3,368	1,204
Central West	4,017	1,466	590	4,137	1,526	589	4,263	1,589	590	4,396	1,655	592
Champlain	6,368	2,323	935	6,543	2,414	932	6,718	2,505	930	6,892	2,595	928
Erie St. Clair	3,126	1,140	459	3,178	1,173	453	3,231	1,204	447	3,282	1,235	442
HNHB	7,085	2,585	1,040	7,251	2,675	1,033	7,415	2,764	1,026	7,575	2,852	1,020
Mississauga Halton	5,799	2,116	851	5,985	2,208	853	6,174	2,302	855	6,370	2,398	858
North East	2,832	1,033	416	2,875	1,061	410	2,918	1,088	404	2,960	1,114	399
North Simcoe Muskoka	2,340	854	344	2,413	890	344	2,485	926	344	2,556	962	344
North West	1,159	423	170	1,179	435	168	1,198	447	166	1,216	458	164
South East	2,508	915	368	2,559	944	365	2,609	972	361	2,657	1,000	358
South West	4,757	1,736	698	4,862	1,794	693	4,966	1,851	687	5,067	1,908	682
Toronto Central	5,772	2,106	847	5,855	2,160	834	5,936	2,213	822	6,014	2,264	810
Waterloo Wellington	3,743	1,366	550	3,850	1,420	548	3,957	1,475	548	4,064	1,530	547

Notes:

1. All rates are crude rates.
2. Cardiac Surgery includes - isolated CABG, CABG+Valve, Valve-only
3. Population data provided by the Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, accessed March 2013. Adult 20+ population used in rate calculations.

The number of advanced cardiac procedures a LHIN provides through its hospitals differs from its population based estimates. Table 8 shows the number of cardiac procedures each LHIN is estimated to provide based on current market share percentages, representing the distribution of cardiac procedures according to existing referral patterns. For example, even though in 2013-14 Central LHIN's residents are estimated to need 3,323 PCI procedures, only 2,271 will be provided by Central LHIN hospitals.



The estimate of the actual procedures provided is the relevant planning statistic for provincial level allocation and planning purposes. The market share percentages used in the adjustments are based on a 2012-13 market share analysis report done by CCN; these values were held constant throughout the projection period.

Table 8: LHIN Adjusted Estimates based on Market Share Adjustments (Source: Cardiac Care Network)

LHIN Procedure Estimates	2013-14			2014-15			2015-16			2016-17		
	Cath	PCI	Cardiac Surgery	Cath	PCI	Cardiac Surgery	Cath	PCI	Cardiac Surgery	Cath	PCI	Cardiac Surgery
Ontario	66,799	24,373	9,806	68,538	25,286	9,764	70,276	26,199	9,728	72,014	27,112	9,696
Central	6,313	2,271	1,013	6,513	2,369	1,014	6,714	2,467	1,016	6,915	2,566	1,017
Central East	6,001	2,269	—	6,186	2,365	—	6,369	2,460	—	6,552	2,556	—
Central West	2,991	1,043	—	3,081	1,086	—	3,174	1,130	—	3,272	1,176	—
Champlain	6,634	2,397	1,021	6,814	2,489	1,017	6,994	2,582	1,014	7,172	2,674	1,011
Erie St. Clair	2,069	641	—	2,105	659	—	2,139	677	—	2,173	694	—
HNHB	6,677	2,473	1,107	6,835	2,559	1,099	6,990	2,645	1,091	7,144	2,729	1,084
Mississauga Halton	5,687	2,211	1,153	5,862	2,304	1,153	6,041	2,400	1,154	6,227	2,498	1,157
North East	2,554	895	303	2,594	919	298	2,633	943	294	2,671	966	290
North Simcoe Muskoka	—	—	—	—	—	—	—	—	—	—	—	—
North West	1,143	427	—	1,163	439	—	1,181	451	—	1,199	462	—
South East	2,221	826	327	2,267	852	324	2,313	879	322	2,357	904	319
South West	4,290	1,724	976	4,380	1,779	966	4,469	1,833	957	4,557	1,887	948
Toronto Central	15,581	5,472	3,229	15,978	5,673	3,217	16,375	5,874	3,207	16,773	6,075	3,199
Waterloo Wellington	4,636	1,725	677	4,759	1,792	675	4,881	1,858	673	5,003	1,924	671

Notes:

1. Cardiac Surgery includes - isolated CABG, CABG + Valve, Valve-only
2. Where data is omitted, the hospitals in the LHIN do not provide this procedure.

Model Adjusters

Tables 6 to 8 show the estimated number of procedures using a ‘top-down’ approach by applying provincial procedure rates to LHIN populations. The procedure rates were projected based on historical use patterns, which were then applied to projected LHIN population values that were provided by the MOHLTC. The projection model was subsequently validated by comparing the model values to actual values for 2012-13 that showed a less than 2.7% variance across the three cardiac procedure groups.

The use of a provincial crude rate for each procedure group means there will be some inevitable loss of local/specific detail that may affect the accuracy of the LHIN estimates. There are many sources of variation between LHINs that in some cases can be quantified and used to complement the crude rate approach. The use of other factors in the model can add an additional level of accuracy, provided they can be reliably quantified for use as model adjusters. Some sources of variation that can be used to refine LHIN level estimates are summarized in Table 9.

Table 9: Summary of Model Adjusters

<p>1. Structural Population Differences</p>	<p>The provincial crude rate approach assumes the same population structure for all LHINs. Each LHIN will have differences in its age-sex composition, and these differences can affect the estimates if they are associated with higher procedure rates. A LHIN with a higher proportion of elderly can have higher rates of cardiac disease and associated procedures. The provincial crude rate estimates can be enhanced by stratifying the provincial adult population into age-sex cohort groups and applying age-sex adjusted rates to each LHIN’s population.</p>
<p>2. Prevalence of Risk Factors</p>	<p>There are many well known modifiable risk, and socio-economic status (SES) factors associated with cardiac disease rates, and once quantified, can be incorporated into an estimates model.</p>
<p>3. Special Populations</p>	<p>Some populations have a higher risk for cardiac disease. Volume estimates can be modified where there is a high proportion of an at-risk population in the LHIN, and the association between those populations, cardiac disease, and procedure volumes can be quantified.</p>



<p>4. Disease Clusters or Patterns</p>	<p>Hospital encounters by a LHIN resident for a cardiac event are classified using the ICD10 coding scheme. Crude and standardized hospitalization rate of cardiac diseases for a LHIN can be computed and used to create a cardiac disease profile. Although the profile is based on diseases, not procedures, there are clear associations between some of the disease groups and the procedures. The hospitalization rate for STEMI and for cardiac valve disease, for example, can be incorporated into estimates for PCI and valve procedures.</p> <p>Although these associations have to be quantified to be fully incorporated into an estimates model, observing a statistically higher proportion of these diseases in certain LHINs can be an important additional statistic in cardiac service planning.</p>
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A full model to estimate cardiac volumes should ideally incorporate all the material sources of variation that reflect unique local differences as adjusters to the crude rate model, and work is underway by CCN to develop these models.

4.6 Cardiac Rehabilitation Programs

The Canadian Association of Cardiac Rehabilitation (CACR) defines cardiac rehabilitation as: *“The enhancement and maintenance of cardiovascular health through individualized programs designed to optimize physical, psychological, social, vocational and emotional status.”*

Cardiac rehabilitation is a critical component of recovery after a cardiac event (such as a heart attack) and is vital to ongoing cardiac disease management. For cardiac rehabilitation to be most effective, it must be accessible to patients. Other factors will also improve adherence and compliance, including convenience for patients, caregiver supports and strong linkages to primary care providers.

Cardiac rehabilitation following initial treatment of a cardiac condition further reduces mortality by approximately 25%.²²

Similar to the management of heart failure, inter-disciplinary cardiovascular rehabilitation programs offered on an out-patient basis are associated with measurable reductions in mortality and decreased morbidity.

CACR defines a cardiac rehabilitation program as being hospital and/or community based (or a satellite of either) that has the following key components:

- Appropriate medical assessment;
- A multidisciplinary team of health care professionals, including a physician;
- A core element of exercise;
- The ability to provide and/or access approved exercise testing procedures;
- Client and family education; and
- Structured heart hazard identification and behaviour modification.

System-wide planning, as well as a targeted funding strategy, is required to ensure the sustainability of cardiac rehabilitation programs. The benefits of cardiac rehabilitation are well documented, including a CCN implemented pilot project funded by the MOHLTC in 2001 that involved the development of a multi-factoral model for cardiac rehabilitation delivered at 17 sites across Ontario. The results of the pilot project indicated that the model of cardiac rehabilitation can be successfully deployed in multiple jurisdictions and was effective in reducing co-morbidities and health care utilization, representing significant reductions in health care costs.

In the consultative processes for this road map, stakeholders emphasized the need for a standardized approach to cardiac rehabilitation and integrated risk factor reduction programs to address multiple related vascular conditions and more broadly, chronic disease management. Improved access to rehabilitation was one of the strongest themes that emerged from our consultative processes.²³

²² Grace et al. *Systematizing Impatient Referral to Cardiac Rehabilitation: A joint policy position of the Canadian Association of Cardiac Rehabilitation and Canadian Cardiovascular Society. (April 2011)*

²³ Swabey, T. et al. *The Ontario Rehabilitation Pilot Project Canadian Journal of Cardiology Vol. 20:10 (August 2004)*



Currently, there is much heterogeneity and variation in the number, location and type of cardiac rehabilitation programs across Ontario. There is no single standard of care established, and funding and resources to support necessary program infrastructure is best described as fragmented and unstable. A recent Ontario study (2006) demonstrated that the demand for inter-disciplinary cardiac rehabilitation services far exceeded the supply by approximately 35,200 patients (assuming services were provided to each patient with recent cardiac hospitalization). When including patients with incident diabetes in the eligible population, the supply-demand gap rose to nearly 110,800 patients annually. Furthermore, in the study, researchers confirmed marked regional variation among LHINs in the burden of eligible patients, the provision of services, and the supply-need mismatch. There was no correlation between the regional burden of disease and the available supply of cardiac rehabilitation services across Ontario.²⁴

Section 5: Patient Centred Cardiac Care

The road map for cardiac care in Ontario is focused on improving our approach to providing true patient-centered care. To understand what this means in terms of program decisions and funding priorities, CCN undertook a close examination of cardiac care utilization data and also spoke to people living with cardiac disease as well as their providers. The current picture reveals critical gaps in care.

5.1 The Current Cardiac Care Journey for Patients

As a province, Ontario is well positioned in providing timely access for the majority of adult advanced cardiac services, including cardiac diagnostic catheterization, PCI and cardiac surgery, as evidenced by stable wait times for the majority of patients across the province. Work is currently underway by CCN to determine benchmarks and targets for newer cardiac procedures.

Despite the investments made to date to establish necessary infrastructure to ensure access to advanced care procedures, there has been little coordinated effort to establish and standardize strategies to effectively support and sustain cardiac disease prevention and rehabilitation efforts.

After a cardiac diagnosis, patients may re-enter the cardiac system multiple times, often with fragmented transition points and generally not following a well-guided and coordinated pathway of care. Unfortunately, too many patients are left to manage and coordinate follow-up care on their own without understanding the importance of cardiac rehabilitation and secondary prevention to reduce morbidity and mortality and improve quality of life.

Follow-up visits with a cardiologist have been shown to improve outcomes for patients with higher baseline cardiovascular risk, for example after a visit to the ER for chest pain.²⁵

²⁴ Candido, Richards, Oh, et al. *The relationship between need and capacity for multi-disciplinary cardiovascular risk -reduction programs in Ontario* Canadian Journal of Cardiology (2011)

²⁵ Czamecki, A. et al. *Association between physician follow-up and outcomes of care after chest pain assessment in high risk patients* Circulation (2013) 127 1386-94.



WHAT PERSONS LIVING WITH CARDIAC DISEASE IN ONTARIO SAY:

CCN conducted a small number of focus groups with individuals living with cardiac disease in Ontario. We talked to them about their experience and asked for their advice in how to improve care and access to care. A sample of their comments demonstrate the importance they place on being actively involved in their own care management and a need for greater guidance, support and resources in order to empower their own rehabilitation and health care.

About recognizing the signs:

“We need to start much earlier teaching people what heart disease is.”

“I thought it was indigestion. For a long, long time I thought it was indigestion. My GP didn’t know what it was but finally said I should just go the ER.”

About navigating the system:

“I learned a lot myself. There was no network to help me.”

“I found I had to push for myself.”

“You do really have to take charge of your own care. But what if you don’t know how?”

About integrated care:

“We have terrific providers but they all work separately.”

“Right now I have to game the system so that my information ends up where it needs to be.”

“I carry around a big thick binder of my tests – I’m so worried things are not getting communicated.”

About follow-up care, cardiac rehabilitation and secondary prevention:

“Patients leaving hospital are so shell-shocked. They need to hear about their follow-up plan from their GP a few days later. I didn’t.”

“There isn’t enough information on recovery and cardiac rehabilitation and where to get help.”

“When you live alone, you have no supports. My cardiac rehab program gives me one-on-one supports.”

“I have a disability. I can’t do the standard program.”

“All hospitals with heart patients need to know how and where to refer those patients for cardiac rehab.”

“Patients should be told you need to do this, not would you like to do this.”

“It’s a safe environment for me. There is always a doctor on site. There is a crash cart. It gives you confidence.”

“There’s still no follow-up when you leave cardiac rehab though.”

“I keep all my health care files on line where I can access them anywhere.”

“I always ask for a copy of my test results. I keep it.”

Self-management is essential to patient-centred care:

“Sorry, that’s my alarm. I have to take my pills.”

(A participant in CCN focus group session when her cell phone beeps).

5.2 The Vision for Patient-Centred Cardiac Care

Based on the input we received from patients, providers, the clinicians and administrators who sit on our working groups and other senior system leaders we consulted, CCN has developed a set of principles that summarize what we heard.

Principles for an Ideal System

Patient centered: The patient is at the centre of the system. Patients and their families are actively involved in their care and decisions about their care. Patients are empowered with information and support to prevent disease and manage their care.

Equity: All Ontario residents have access to the care they require when they require it. There is fairness across regions and among population groups in access to care and resources.

Integration across the continuum: Care is coordinated across the continuum based on a long-term care plan that guides the patient and his/her care providers. The patient’s information is up-to-date and readily available to providers at all points along the continuum.

Capacity and access: Access to appropriate and needed care is available across the province, including advanced diagnostics and interventions as appropriate. The supply of multidisciplinary



health care professionals meets the needs of the population and the scope of practice of each cardiac care provider is fully employed and leveraged. Virtual health care solutions, such as telemedicine, are used to increase patient access to care across geographical regions and connect providers with each other.

Evidence-based: Care is based on rigorous evidence and best practices, through the development of standardized guidelines for care. Guidelines are multidisciplinary and standardized across the continuum of care.

Performance-based: Quality of care is measured, reported and used to optimize provision of care and to improve outcomes for patients. There is accountability for results. Patient-reported outcomes are critical to understanding how we are doing and how we can improve.

Leadership and expertise: The system draws on leaders who share a vision of integrating primary, community, acute and chronic care cultures understanding each is unique but together they form an essential interprofessional continuum of patient care.

Continuous applied learning and improvement: Learning networks are established for innovation and improvement. Current best practices are shared with providers for continuous improvement through educational programs.

The ideal cardiac care system is truly patient-centered, with individuals actively engaged, in self-managing their health, establishing healthy lifestyle behaviours to reduce risk and prevent the onset of disease. If cardiovascular disease does occur, there is coordinated effort to co-manage strategies to mitigate risk, by the individual, their primary care provider and other members of the interdisciplinary team. Cardiac rehabilitation is key to recovery, and must be accessible to all cardiac patients. Special attention is required to provide additional supports to patients with complex conditions, (e.g. frail elderly, those with heart failure, as well as others known to have lower socioeconomic status, language barriers, and/or high prevalence of risk factors).

5.3 What Patient-Centred Cardiac Care Looks Like from the Perspective of a Patient

For this road map, we wanted to ensure we fully considered the patient perspective in the creation of the ideal cardiac system. We confirmed knowledge gained through consultative processes, by way of focus groups and pilot testing ideas with patients and caregivers in an effort to identify a common definition of patient-centred care across the continuum care. Table 10 highlights key themes heard through this process.

Table 10: Highlights of Key Themes

PRIMARY PREVENTION	DIAGNOSTIC TESTING, PRE-HOSPITAL AND EMERGENCY CARE	TREATMENT 1. MEDICAL THERAPY 2. INTERVENTIONAL	RECOVERY 1. SECONDARY PREVENTION 2. CARDIAC REHABILITATION
<ul style="list-style-type: none"> I am active in my own care. I am involved in setting goals for my health and managing my health. My family is a partner in my care. I have ongoing and convenient access to a primary care provider who knows me and my health profile. My primary care provider works in a team with others so I have ready and convenient access to the supports I require to help me stay healed. My primary care provider provides active and ongoing case management and ensures I am seen regularly/as needed. I have ready access to affordable prevention programs that fit me, despite my cultural background, socio-economic status or where I live in Ontario. 	<ul style="list-style-type: none"> If and when needed, I will be referred to the appropriate specialist and will be seen in a timely manner. I have access to timely assessment, needed diagnostic procedures and diagnosis no matter where I live in Ontario. My results are shared with me and my primary care provider in a timely manner. I have access to specialized rapid response when I need it (such as for a heart attack). I have access to specialized resources in the community to help me stay out of hospital and the ER. If I need to go to the ER by ambulance, my EMS team is equipped to handle a heart attack and able to communicate my vital statistics ahead of time to the Emergency Department. I have access to needed diagnostic procedures and I receive diagnostic-specific education. 	<ul style="list-style-type: none"> When I need it, I have access to appropriate specialized cardiac teams and advanced cardiac services that provide timely and high quality cardiac care provided close to home. A discharge plan is communicated to my primary care provider before or as soon as I leave hospital and I know exactly when I must follow-up with my primary care provider and/or any others. 	<ul style="list-style-type: none"> I have a customized readmissions reduction plan when I leave hospital with day-to-day instructions; it is monitored by a multidisciplinary team. I am referred to cardiac rehabilitation services when I am discharged from hospital if I have had a heart attack, stroke, cardiac surgery, congestive heart failure or cardiac catheterization or angioplasty. I have access to a cardiac rehabilitation program close to home that is well-suited to me and my needs. I also have the other help I need after my hospitalization to enable me to reintegrate back into my community such as social and mental health services and family supports. When possible, if I have a device implanted I have the ability to have my device followed at home and if needed, I can be brought in to a follow-up clinic without delay to have my device adjusted.
ACROSS THE CONTINUUM			
<ul style="list-style-type: none"> I know that cardiac health begins with a healthy lifestyle. And I know my cardiovascular risk factors. Primary care is involved in, and aware of, every aspect of my care. I also have ready access to specialist care when needed. With any warning sign of cardiac risk or condition such as hypertension or diabetes, I am provided with a detailed long-term care plan that is kept up to date and can be used by me, my family and my health and social care providers. I work with my primary care provider and others to set goals and track my progress. My care plan is comprehensive in helping me make healthy choices and get the supports I need – from good nutrition to smoking prevention and cessation, to exercise. And I have diagnosis-specific education on how to manage my condition at every stage, beginning with prevention. I know that all the providers involved in my care provide me with the best care because I know they use standardized and evidence-based pathways to diagnose and manage my cardiac condition. They have the knowledge, supports and tools needed to provide excellent care. I have access to my electronic health records, as does everyone involved in my care. I am confident in navigating the system for information and health care services. The system takes my unique needs into consideration, at home and in the community. As I move between providers and care settings, my medications are always updated, reconciled and communicated to my pharmacist and primary care provider. 			



Section 6:

Priorities to Improve System Value and Patient Outcomes

6.1 Current Provincial Initiatives

Ontario has embarked aggressively on system-wide strategies to effectively impact illness and disease rates and improve the overall sustainability of the health care system. Ontario's approach is based on improving overall population health and primary care resources while focusing, in a very targeted way, on specific groups that represent the highest complexity and health care utilization across the province.

Ontario's Health System Performance Research Network (HSPRN) notes that most of the province's current and projected spending increase is for older persons, mostly with complex medical needs.

HSPRN's review of the most current Ontario data shows that 66% of total health expenditures are used to care for only 5% of the population.²⁶

The highest user group represents only 1% of the population yet represents 34% of total health expenditures. These are people with complex health needs and chronic diseases, generally with co-morbid conditions. They are very frequent users of the hospital emergency departments. They are admitted to hospital often, and for some this is literally dozens of times in a year. Common cardiac conditions including heart failure and myocardial infarction dominate the health conditions that these patients face.²⁷ While these individuals represent all age groups, most are elderly, and many are dealing with mental health issues in addition to their other health issues.

In addition to the efforts of CCN and others that are focused on specific cardiac and vascular health strategies, Ontario has implemented provincial initiatives aimed at effectively reducing illness and supporting chronic disease management across disease groups. The implementation of two interconnected reform strategies: the *Excellent Care for All Act* and *Ontario's Action Plan for Health* are fundamental to the health system transformation currently underway in Ontario.

²⁶ Wodchis, W. *High Cost Users Driving Value with a Patient-Centered Health System* HSPRN (2013)

²⁷ HSPRN (2011)



Excellent Care for All Act (ECFAA): ECFAA is bold legislation, enacted in 2010 through the support of all three provincial political parties, that aims at “improving the quality and value of the patient experience through the application of evidence-based health care”.²⁸ The strategy enhances patient outcomes and steps-up accountability for achieving outcomes within health care delivery organizations. In line with this strategy, CCN is actively involved with its other provincial partners in developing and planning care pathways and clinical guidelines for cardiac services that improve quality and accountability.

Ontario’s Action Plan for Health Care: In January 2012, the Ontario government introduced the Ontario Action Plan for Health Care, communicating the vision to make Ontario the healthiest place in North America to grow up and grow old. Its three overarching strategies are:

1. Keeping Ontario healthy;
2. Faster access and a stronger link to family health care; and
3. Right care, right time, right place.

Public Health Promotion and Disease Prevention: Managing chronic disease begins with preventing it in the first place. Ontario is proactive in many areas of public health promotion and providers and agencies across disease groups are increasingly working together to address public health concerns that impact common health conditions, including heart disease. For example, Ontario has committed to aggressively take on the challenge to reduce childhood obesity by 20% over five years.²⁹ Taking action early in people’s lives will enhance their chances of remaining active and at a healthy weight, reducing the chances of a cardiac incident down the road.

Ontario has also implemented strong smoking prevention and cessation measures organized under a partnership structure called Smoke Free Ontario. Smoking rates decreased considerably between 2001 and 2005: from 23% to 20%. There has been important progress towards decreasing smoking among youth: from 12% in grades 11 and 12 in 2005 to 6% in 2011.³⁰ However, smoking rates overall and, in particular, among young adults are still a concern and an ongoing focus in Ontario.

A partnership between Public Health Ontario and Cancer Care Ontario, with the contribution of other organizations such as CCN, led to a report to address the burden of chronic disease in Ontario.

Comprehensive Primary Care: Primary care is the foundation of any health care system. A strong primary care foundation improves health, has a measurable and critical impact on illness and death and helps to ensure equitable access to care.³¹ Ten years ago, the vast majority of family physicians practiced in solo or small group practices and almost 10% of Ontario residents had no access to a regular primary care provider. Since then, Ontario has invested enormously, in effort and in funding, to transform access to primary care.

Today, more than two thirds of Ontario’s family doctors practice in new primary care group models, such as Family Health Teams, that emphasize interdisciplinary care, comprehensiveness and quality of care.³² Ontario also has a small but growing number of nurse practitioner-led clinics as well. These new models of care are of direct and critical benefit to the provision of cardiac care.

A patient enrolled to a primary care group enables a proactive approach to chronic disease management and preventive care.³³ Family Health Teams have been active in providing cardiac care services to their patient groups and many have established direct linkages with local cardiac rehabilitation programs. In some communities, primary care providers are leading the development of new local cardiac rehabilitation initiatives.

System Integration Including the New Health Links Initiative: Ontario has recently introduced Health Links to improve care for seniors and others with complex conditions. A target group is the high-user group described above.

Health Links will encourage greater collaboration among local care providers by bringing together a voluntary partnership composed of primary care providers, hospitals, health and social agencies and others to focus on better meeting the needs of a targeted patient population. In the first instance, this target group will be the highest users of health care services, most often complex patients with multiple co-morbid conditions. Through Health Links, patients will be provided with enhanced care navigation, coordination and access to a full range of needed supports. They will have a care provider they can call, eliminating unnecessary visits to providers and an individualized comprehensive plan developed by a multidisciplinary team of providers directly involved in their care. This is particularly important for cardiac care patients who may have multiple care providers handling a complex set of issues.

CCN is already actively collaborating with a number of early adopter Health Links to explore interventions to address cardiac-related issues within the high user patient population. The aim is to apply learnings and new approaches to care to the broader cardiac patient population.

Health System Funding Reform: The province’s Health System Funding Reform strategy is a core enabler to the implementation of ECFAA. The reform is aimed at moving away from global funding to health service providers (e.g. hospitals) to a new funding approach known as Patient-Based Funding (PBF). Under PBF, health care organizations will be compensated based on how many patients they look after, the services they deliver, the evidence-based quality of those services and the specific needs of the population they serve.

²⁸ *Excellent Care for All Act* (2010)

²⁹ Ontario’s Action Plan for Health Care (2012)

³⁰ The Ontario Tobacco Research Unit, Evaluation Update (November 2012)

³¹ Starfield, B, Shi, L, Mackinko, J. *Contribution of Primary Care to Health Systems and Health*. The Millbank Quarterly (September 2005) 83-3

³² Laupakis, A and Born, K. *Are Ontario’s Primary Care Models Delivering on Their Promises?* Healthy Debate (March 2012)

³³ Kralj J, Kantaevic J. *Primary Care in Ontario: Reforms, Investments and Achievements*, Ontario Medical Review, February 2012



The two main components of PBF include:

- Health Based Allocation Model (HBAM) which supports quality, patient-centred care and ensures accessibility of services according to identified need. HBAM was used in fiscal 2011/2012 to allocate incremental funding; and
- The Quality Based Procedures (QBP) impact clusters of patients with clinically related conditions that have been identified as providing significant opportunities for process improvements, clinical re-design, improved patient outcomes, enhanced patient experience and potential cost savings.

CCN is an agency partner with the Ministry in rolling out QBPs in the selected areas of non-cardiac vascular procedures in 2012/13 and cardiac procedures started in 2013/14.

Changing Delivery Channels: Another supporting strategy that is now actively underway is shifting the focus of care from institutions to community settings. This strategy is currently aimed at developing specialized clinics to shift services out of hospitals where appropriate and into the community. This is particularly relevant to cardiac care delivery. Cardiac patients will benefit from this shift, and the system will benefit.

The above examples demonstrate the considerable provincial activity already underway to impact patient outcomes and improve system integration and coordination.

Also of significance is Ontario's Vascular Health Coalition in which CCN, the Heart and Stroke Foundation of Canada and the Ontario Stroke Network formed a coalition to map a new and better way of addressing the province's growing vascular-related chronic disease burden. In 2012, the Coalition released the *Integrated Vascular Health Blueprint for Ontario*, rooted in a vision of an integrated, patient-centered, accessible continuum of services. The Blueprint is aimed at improving vascular health, reducing incidences of vascular disease, and reducing the consequences of the disease for the people of Ontario.

The Blueprint sets out recommendations across four domains:

1. Population health and promoting healthy public policy;
2. Understand and support the individual and family through the vascular health journey(s);
3. Improving the quality and access to a continuum of vascular services; and
4. Developing system enablers and efficient use of resources and assets.

6.2 Filling in the Gaps – Priorities for Action

The road map for cardiac services in Ontario is a patient-centered approach that fills in critical gaps in the patient's treatment continuum and addresses priorities identified by patients and their providers.

To inform this road map, CCN conducted consultations with its working groups, with hospitals with advanced cardiac programs, hospitals without advanced cardiac programs and with other cardiac care providers. CCN also spoke to individuals living with cardiac disease. These consultations revealed a strong consensus about the improvements that need to be made to the current continuum of cardiac care.

Based on this valuable input and based on system trending data we have shown, CCN proposes seven priority areas for provincial policy, program and funding attention:

1. Evidence-based cardiac services planning;
2. Timely access to appropriate diagnostic testing;
3. Thoughtful adoption of new technologies and procedures;
4. Targeted strategies to support unique population needs;
5. Best practices to improve and standardize STEMI care across the province;
6. Implementation of evidence-based standardized heart failure programs across the Province;
7. Improving infrastructure for secondary prevention and cardiac/vascular rehabilitation; and
8. Addressing the entire patient journey across the continuum of care.

1) Evidence-Based Cardiac Services Planning

To optimize the appropriate use of resources, to ensure that services are able to address growing demands in an equitable fashion and to ensure patient safety and quality outcomes, cardiac services should be planned and delivered as a provincial program within the overall systems framework in Ontario.

Resources need to be allocated where they can best meet the needs of the population, and in such a manner as to provide services in centres with a critical mass to ensure safe and quality patient outcomes.

In terms of resource allocation, rather than hospitals self-selecting and proposing enhancements to services on a one-off basis, it is strongly recommended that the need for cardiac programs be assessed and planned centrally, with input from key stakeholders, to propose where program enhancements (either service expansion or new programs) should be developed. In addition, active processes should be put in place to consolidate resources and infrastructure where it would be logical to do so and where excess capacity exists. Where programs are identified to lack sufficient critical mass and volumes to support quality care, there should be an active process for ongoing evaluation and enhanced monitoring to ensure the provincial standard of care in that area of care is maintained.



2) Timely Access to Appropriate Diagnostic Testing

According to Ontario's Expert Panel on Appropriate Utilization of Diagnostic and Imaging Studies: "Currently, there is significant variability in service provision and practice patterns between and across medical specialties that provide diagnostic and imaging studies in Ontario, and detailed data regarding the utilization of diagnostic and imaging studies is lacking."³⁴ According to the panel, the focus should be on ensuring that all diagnostic and imaging studies are being provided for the right reason, in the appropriate environment, by appropriately trained providers.

There is strong system support for the development of common patient-focused standards for cardiac diagnostic testing and a guiding quality framework for these tests in Ontario. These standards and framework will help to ensure appropriate and timely access to testing by those who need it.

Standardization of cardiac testing will improve the quality of these services, improve patient results and become an important component of increasing the value of the health care dollars invested in the province to support optimal care.

CCN has taken strong leadership in this direction with its 2012 report "Standards for Provision of Echocardiography in Ontario" which was submitted to the MOHLTC last year. CCN's report provides a comprehensive set of recommendations to implement and maintain a common standard for echocardiography procedures in Ontario. CCN has proposed a graduated, voluntary program to educate existing echocardiography providers on the provincial standards and conduct voluntary external reviews/program assessments against a quality framework. CCN's recommendations were subsequently endorsed by the provincial Expert Panel on Appropriate Utilization of Diagnostic and Imaging Studies.

3) Thoughtful Adoption of New Technologies and Procedures

As is the case for diagnostic testing, it is important that promising new cardiac interventional technologies are adopted and funded based on evidence. Again, CCN plans to play a key advisory role in this regard, leveraging the clinical expertise of the working groups and through partnerships with Health Canada Special Access Program, Canadian Agency for Drugs and Technology in Health (CADTH) and the Ontario Health Technology Assessment Committee (OHTAC). CCN is well-positioned to develop recommendations, establish standards, and provide clinical guidance and monitor outcomes relative to the introduction and funding of new technologies.

New technologies and procedures are being introduced to manage the wide range of cardiac diseases that affect people in Ontario. The MOHLTC, with the support of CCN, has identified and invested in infrastructure and technologies to promote improved access to, and quality of, cardiac care and services in Ontario.

For those patients who have had a pacemaker implanted, new technologies are enabling the devices to be monitored remotely. Remote monitoring has the potential to improve access to cardiac care for atrial fibrillation and other arrhythmia patients across Ontario. It can enhance timely access to care and improve equity in access. Remote monitoring can lead to early intervention, and avoidance of emergency room visits in some cases.

Information technology provides opportunities to enhance care for people living in remote communities. For those in remote and underserved areas, the use of an integrated EMR IS/IT PACS links across regions to enable sharing of results, such as results of diagnostic testing.

The use of telemedicine provides opportunities to enhance care in areas where heart specialists and other providers are not available, or where care is provided on a temporary basis.

4) Targeted Strategies to Support Unique Population Needs

Work done in support of Health Links indicates that, in order to improve patient experience and population health, while still containing costs, it is important to define populations that can be linked to potentially effective interventions or system redesign strategies.³⁵ Priority groups identified by CCN are:

Adult Congenital Heart Disease: Given the transition from children to adult care systems, there should be a proactive collaboration to develop a coordinated plan for the provision of ACHD services in Ontario. Based on a previous report from a Joint Committee of the Paediatric Cardiac Network, in collaboration with CCN (2006), it was recommended that a coordinated plan for the provision of ACHD services in Ontario be developed to address the following key issues:

- **Data:** Reliable data on the Ontario ACHD population is lacking. Canadian Institute for Health Information (CIHI) data do not adequately capture ACHD activity in either inpatient or outpatient settings;
- **Wait Times:** Wait times for ACHD patients to access a specialist are well in excess of what is considered medically acceptable;

³⁴ Expert Panel on Appropriate Utilization of Diagnostic and Imaging Studies *Interim Report* (2012)

³⁵ Wodchis, HSPRN (2013)



- **Transition System:** There is no tracking system in place to ensure that appropriate transitioning has occurred from a paediatric cardiologist to an ACHD specialist/clinic for patients at high risk. This has led to a situation where a number of children with high risk congenital heart conditions do not receive ongoing care in adulthood; and
- **Knowledge Transfer:** It is unclear to what extent Canadian ACHD guidelines and recommendations have been implemented into Ontario's health care system.

People Living in Remote Communities: The sparse population, the high cost of travel (for patients and for providers) and the relatively poor socio-economic health of the population are barriers to the development of cost effective heart failure programs and treatment for acute incidents. These communities lack a range of essential services – from adequate access to primary care to access to cardiac rehabilitation. For example, 14% of residents in the North West LHIN do not have a primary care physician. Specialized cardiac programs require a critical mass of population and providers to be effective and evidence-based. As a result, unique strategies are required for these communities. Enhanced use of remote technologies can alleviate access issues to some degree. Use of telemedicine can be expanded in these areas. As well, expanding the concept of visiting clinics has been proposed by these regions.

First Nations People On-reserve: Studies have shown that successful cardiovascular programs include a dedicated focus on the population living on-reserve, widespread community involvement within local communities (often including indigenous community health workers), and a focus on high risk individuals. Regularly scheduled contact between the program and participants is also beneficial.³⁶

Other Ethnic Groups: Research indicates that certain ethnic groups, such as Canadians of South Asian and African-Caribbean descent are at increased risk of heart disease. Increased rates of diabetes and high blood pressure among these groups elevate the risk of heart disease. Communities, such as parts of the Greater Toronto Area, with high representation of these cultural communities require specialized health promotion programs to educate these groups about particular cardiac health risks, such as diet.

5) Best Practices to Improve and Standardize STEMI Care across the Province

Through a collaborative effort between PCI providers, non PCI hospitals, EMS and base hospitals, CCN's STEMI-EMS Working Group has examined in detail the current state of STEMI care in Ontario and identified key opportunities to make system-wide improvements to eliminate variation and ensure a high performing system.

A key performance metric is the time to treatment, and this working group has developed recommendations to ensure best practices are in place for management of STEMI in Ontario, including: early diagnosis, timely access to intervention, and leveraging better use of pre-hospital (EMS) resources to achieve better patient outcomes.

The recommendations are as follows:

Priority Recommendation 1: That all PCI Centres, in collaboration with Regional Base Hospitals, Emergency Medical Services and Referring Hospitals in their catchment area, develop shared and common STEMI protocols to achieve timely access to reperfusion for all patients diagnosed as or suspected of having a STEMI. All Referring Hospitals should have a STEMI protocol with linkages to a PCI Centre.

Priority Recommendation 2: That all PCI Centres, Emergency Medical Services and Referring Hospitals report every diagnosed STEMI case to the Cardiac Care Network's cardiac registry, even if the patient is not referred for primary PCI.

Recommendation 3: That CCN STEMI protocols developed to ensure timely and appropriate diagnosis and management of STEMI patients for all remote northern communities be adopted as the standard of practice in Ontario, supported by Regional Base Hospitals, ORNGE, EMS, and PCI Centres and Referring Hospitals as well as primary care physicians.

Recommendation 4: That CCN develop a standard provincial inter-hospital agreement for the acceptance and repatriation of STEMI patients between Referring Hospitals and PCI Centres that can, in collaboration with Local Health Integration Networks and local health service providers, be adapted to local circumstances. The Ministry of Health and Long-Term Care is asked to mandate the use of these templates. Where current protocols exist for repatriation (e.g. stroke patients), the agreements could be adapted to include STEMI patients.

Recommendation 5: That CCN develop criteria for standardized discharge and repatriation practices that can be adapted for local use by all institutions that treat STEMI PCI patients, in collaboration with their local PCI provider.

Priority Recommendation 6: Ensure that the appropriate infrastructure is in place in Ontario to support timely diagnosis for STEMI patients through the following investments:

- Ensuring that all ambulances and emergency response vehicles in Ontario are equipped with cardiac monitors capable of 12-lead ECG acquisition and ensuring the development of processes for informing the nearest cardiac centre or emergency department of the results;

³⁶ Huffman, Mark D. and Galloway, James M. *Cardiovascular Health in Indigenous Communities: Successful programs* Heart, Lung and Circulation (2010)



- Supporting the existing provincial paramedic education program for ECG acquisition and STEMI identification for all paramedics; and
- Directing Regional Base Hospitals to develop a standardized annual education program to ensure ongoing competency in ECG acquisition skill.

Recommendation 7: That every emergency department and urgent care centre in Ontario, in collaboration with the nearest PCI Centre, Regional Base Hospital and EMS, establish a multidisciplinary team (including emergency medicine physicians, cardiologists and nurses) to develop guideline-based, institution-specific, written protocols for triaging and managing patients suspected of or diagnosed as having STEMI.

Priority Recommendation 8: That all Emergency Medical Services establish, in collaboration with area hospital emergency departments, Regional Base Hospitals and the nearest PCI Centre, activation protocols to minimize delays in the acceptance of the patient for primary PCI and arrival of the cath lab team.

Recommendation 9: That all Emergency Medical Services, in collaboration with CCN, Regional Base Hospitals and Referring Hospitals establish local and regional guidelines and rapid transfer protocols to facilitate the timely transfer of STEMI patients directly to a PCI capable site, even when this involves bypassing a closer hospital that does not offer primary PCI.

Recommendation 10: That all Emergency Medical Services, in collaboration with CCN and Regional Base Hospitals, establish guidelines for the identification, notification and bypass to PCI Centres for transporting patients suspected of or diagnosed as having STEMI where applicable within established regions according to defined inclusion and exclusion criteria.

Recommendation 11: That all Emergency Medical Services establish direct transfer agreements with all area hospitals for the inter-hospital transfer of STEMI patients. These agreements should recognize the emergent nature of these transfers.

Recommendation 12: That CCN develop standardized protocols for the treatment of patients (e.g. antiplatelet and post-lytic management) suspected of or diagnosed as having a STEMI while awaiting transport to a PCI Centre.

Priority Recommendation 13: That health service providers, including Emergency Medical Services, with the support of their Local Health Integration Network, enable the real-time exchange of data for STEMI patients between EMS, other medical facilities and clinics, Referring Hospitals and PCI Centres, including the provision of 12-lead ECG on arrival at the accepting PCI Centre.

Recommendation 14: That all PCI Centres, in collaboration with their EMS, Regional Base Hospitals and Referring Hospital partners, develop a regional STEMI network to ensure rapid access to appropriate care for all patients diagnosed as or suspected of having a STEMI. All hospitals that treat STEMI patients should be part of a regional STEMI network, in partnership with a PCI Centre (hub-and-spoke model).

Recommendation 15: That CCN, with the support of the MOHLTC, develop a provincial quality assurance program for the care of all STEMI patients. The program should define the indicators to be monitored and the data definitions for those indicators. The data definitions and quality indicators used for this program should be consistent with the pan-Canadian data definitions and quality indicators recently developed by the Canadian Cardiovascular Society and CCN.

Recommendation 16: That CCN, with the support of the MOHLTC, add the data needed for the quality assurance program to its provincial cardiac database and develop protocols for the collection, monitoring and reporting of all STEMI cases across the Province.

6) Implementation of Evidence-Based Standardized Heart Failure Programs across the Province

At present, care for heart failure patients in the community is too often uncoordinated and fragmented. Many patients do not have a central point of contact. Primary care providers may not be up to date with the latest approaches to care. More specialized resources should be introduced into the community, such as nurse practitioners with a cardiac specialty and primary care cardiac clinics, each with close primary care and hospital linkages.

To better support primary care leadership in heart failure management, primary care providers require education, tools and resources that enable awareness, and adoption, of best practices. As well, continued monitoring of readmissions to hospital for heart failure patients is important.

Ontario has taken important steps in recognizing the need for appropriate management of heart failure patients. Through Health Quality Ontario, Ontario has developed a system of performance measures to monitor readmissions to hospital of heart failure patients. A system framework for heart failure care would ensure more equitable access to timely and evidence-based care.



CCN's Heart Failure Working Group is developing a set of comprehensive recommendations for a provincial heart failure strategy to be released shortly. There are three core elements of the strategy:

1. Provide resources to patient and providers to support improved care;
2. Re-organize care into a “hub and spoke” model that ensures access to heart failure specialist expertise across Ontario and addresses variation in access to services and clinical care standards; and
3. Create a provincial registry to track metrics related to heart failure.

Achievements that will result from implementing the recommendations include:

- Supporting patients and families in self-care strategies;
- Assisting HF care providers in delivering high quality of care, based on best practices throughout all phases of the HF cycle;
- A “Hub and Spoke” system to provide differentiated levels of HF care; therefore building capacity into the health care system to care for these patients, using resources that for the most part are presently available in the health care system;
- A future HF system to be based on the Provincial Chronic Disease Prevention Management framework;
- A provincial coordinated triage system to link patients with appropriate providers within a recommended wait time;
- Comprehensive data collection so patient access and outcomes can be measured; and
- Provincial quality assurance program to define, monitor and report on performance metrics.

Once implemented using various practical approaches, the Working Group’s recommendations will result in:

- Better use of hospital resources by reducing unnecessary ED visits and hospitalizations, by building capacity in the community to care for the growing HF population; and
- Better patient outcomes by reducing morbidity and mortality while improving quality of life as patients receive the right care in the right place at the right time within the recommended timelines.

7) Improving Infrastructure for Secondary Prevention and Cardiac/Vascular Rehabilitation

Cardiac rehabilitation is an essential component of care, with well-established evidence to demonstrate its effectiveness to reduce mortality and morbidity after a cardiac event. Priority planning must be implemented to ensure that patients are able to access rehabilitation after a cardiac event. More broadly, cardiac rehabilitation programs, traditionally structured to identify and manage cardiac risk factors, can be of great benefit to other high-risk groups, including patients with diabetes and other vascular conditions. Core program components can be delivered through multiple channels, including remotely through technology to address the broad geography of the province.

8) Addressing the Entire Patient Journey, across the Continuum of Care

Investments in the Ontario cardiac system to date have been largely focused on intervention and ensuring that patients are able to access high quality, acute care services in a timely manner. A major success of the cardiac system is the increased survival of cardiac patients post-acute event. However, it is important to note that survivors of acute cardiac events are not “cured”, rather, they are faced with living with cardiac disease as a chronic condition and are at higher risk for future events and hospitalizations. Understanding the increasingly chronic nature of cardiovascular disease, it is vital that the focus of care encompasses the entire continuum – from prevention, to diagnosis and treatment, to recovery and rehabilitation.

It is time now to make similar investments to standardize areas of cardiac care that will continue to make system-wide improvements that are fundamental to a sustainable health care system. This includes focused attention on the transition points between specialized and primary care, and ensure the right tools and resources are in place such that no patient is left behind. In addition, we need to foster self-management strategies and ensure patients and their care givers are well supported and engaged to advocate for their health and well-being.



Conclusion:

The CCN Ontario Cardiac Services Road Map provides a high level plan for the organization of cardiac care services in Ontario. This plan builds on the ongoing work of CCN and its partners in moving Ontario closer to an ideal system of cardiac care – one focused on the patient, across the continuum, and based on evidence and best practices. This plan sets out priorities for attention and action within eight priority areas and sixteen recommendations. The proper and timely implementation of these priorities and recommendations has the potential to transform cardiac services in Ontario. Successful transformation will rely on the focused and coordinated effort of many individuals and organizations following the path set out by the road map. The effort of all hospitals, our current specialized cardiac centres, the Ministry of Health and Long-Term Care, the LHINs as local system managers, health care professionals, and community-based services are all required now to address a disease complex that is a leading cause of morbidity and mortality in Ontario. Although great progress has been made, the factors for the growth of cardiovascular disease are increasing: cardiovascular disease is highly correlated to our aging population, especially for heart failure, and risk factors like smoking, obesity, and diabetes rates are on the rise. The time to implement these recommendations is now.

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