

Quality-Based Procedures Clinical Handbook for Elective Repair of Lower Extremity Occlusive Disease

Ministry of Health and Long-Term Care

February 2013

Revision #1: September 2013

Revision # 2: January 2014



Table of Contents

1.0 Purpose.....	3
2.0 Introduction	4
3.0 Description of Elective Repair of Lower Extremity Occlusive Disease.....	10
4.0 Best practices guiding the implementation of Elective Repair of Lower Extremity Occlusive Disease	21
5.0 Implementation of best practices	25
6.0 What does it mean for multi-disciplinary teams?	27
7.0 Service capacity planning.....	29
8.0 Performance evaluation and feedback.....	30
9.0 Support for Change	32
10.0 Frequently Asked Questions	34
11.0 Membership.....	35

Quality-Based Procedures Clinical Handbook: Elective Repair Of Lower Extremity Occlusive Disease

1.0 Purpose

This clinical handbook has been created to serve as a compendium of the evidence-based rationale and clinical consensus driving the development of the policy framework and implementation approach for non-cardiac vascular procedures within the case mix group Bypass/Extraction of Vein/Artery of Limb, CMG 182. For the purposes of this handbook, procedures that fall within CMG 182, 183 and 185 will be collectively referred to as procedural repair of lower extremity occlusive disease.

The Cardiac Care Network of Ontario (CCN) has taken a leadership role in the planning and development of a Vascular Services Quality Strategy for Ontario. With active participation and support of Ontario's vascular services providers and other stakeholder groups, CCN and specifically a sub-committee of the CCN Vascular Care Working Group and a working group of technical and health data experts, have played an integral role in the planning and development processes and providing advice on best practice care in non-cardiac vascular surgery across Ontario aimed at improving access to non-cardiac vascular care and vascular health outcomes for Ontarians.

This clinical handbook is intended for a clinical audience. It is not, however, intended to be used as a clinical reference guide by clinicians and will not be replacing existing guidelines and funding applied to clinicians. Evidence-informed pathways and resources have been included in this handbook for your convenience.

2.0 Introduction

Quality-Based Procedures (QBP) are an integral part of Ontario's Health System Funding Reform (HSFR) and a key component of the Patient-Based Funding (PBF). This reform plays a key role in advancing the government's quality agenda and its **Action Plan for Health Care**. HSFR has been identified as an important mechanism to strengthen the link between the delivery of high quality care and fiscal sustainability.

Ontario's health care system has been living under a global economic uncertainty for a considerable period of time. At the same time, the pace of growth in health care spending has been on a collision course with the provincial government's deficit recovery plan.

In response to these fiscal challenges and to strengthen the commitment towards the delivery of high quality care, the **Excellent Care for All Act** (ECFAA) received royal assent in June 2010. ECFAA is a key component of a broad strategy that improves the quality and value of the patient experience by providing them with the right care at the right time, and in the right place through the application of evidence-informed health care. ECFAA positions Ontario to implement reforms and develop the levers needed to mobilize the delivery of high quality, patient-centred care.

Ontario's **Action Plan for Health Care** advances the principles of ECFAA reflecting quality as the primary driver to system solutions, value and sustainability.

2.1 What are we moving towards?

Prior to the introduction of HSFR, a significant proportion of hospital funding was allocated through a global funding approach, with specific funding for some select provincial programs and wait times services. A global funding approach reduces incentives for Health Service Providers (HSPs) to adopt best practices that result in better patient outcomes in a cost-effective manner.

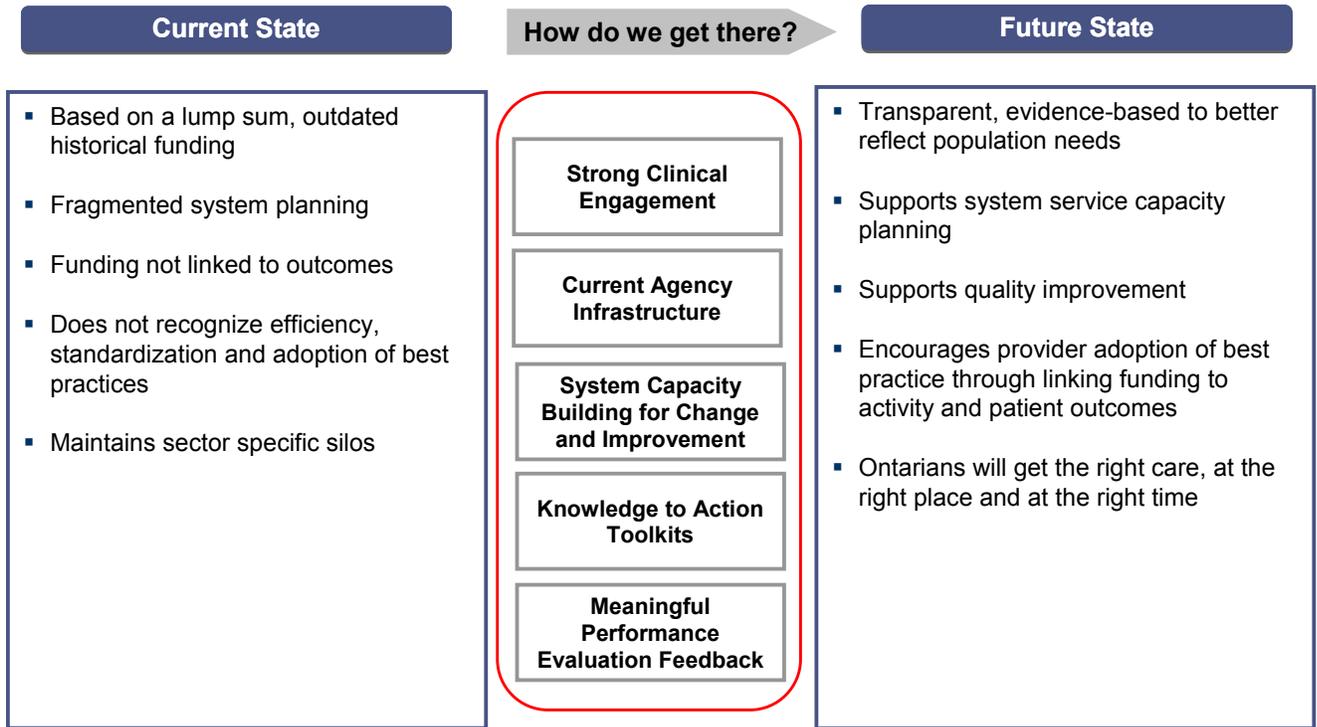
To support the paradigm shift from a culture of 'cost containment' to 'quality improvement,' the Ontario government is committed to moving towards a patient-centred funding model that reflects local population needs and contributes to optimal patient outcomes (Figure 1).

Internationally, PBF models have been implemented since 1983. Ontario is one of the last leading jurisdictions to move down this path. This puts the province in a unique position to learn from international best practices and lessons learned by others to create a funding model that is best suited for Ontario.

PBF supports system capacity planning and quality improvement through directly linking funding to patient outcomes. PBF provides an incentive to health care providers to become more efficient and effective in their patient management by accepting and

adopting best practices that ensure Ontarians get the right care, at the right time and in the right place.

Figure 1: The Ontario government is committed to moving towards patient-centred, evidence-informed funding that reflects local population needs and incents delivery of high quality care



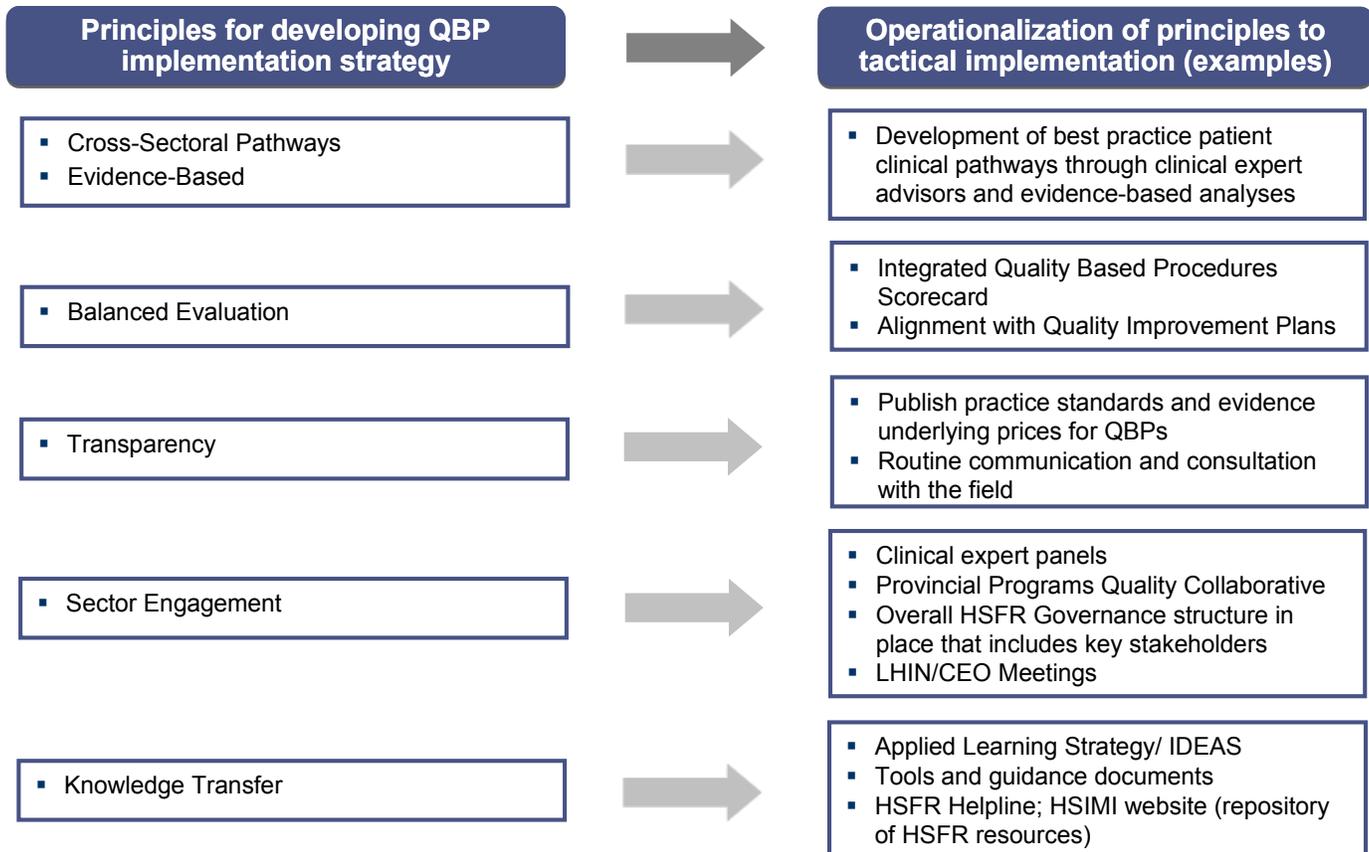
2.2 How will we get there?

The Ministry has adopted a three-year implementation strategy to phase in a BPF model and will make modest funding shifts starting in fiscal year 2012/13. A three-year outlook has been provided to the field to support planning for upcoming funding policy changes.

The Ministry has released a set of tools and guiding documents to further support the field in adopting the funding model changes. For example, a Quality-Based Procedure (QBP) Interim list has been published for stakeholder consultation and to promote transparency and sector readiness. The list is intended to encourage providers across the continuum to analyze their service provision and infrastructure in order to improve clinical processes and where necessary, build local capacity.

The successful transition from the current, ‘provider-centred’ funding model towards a ‘patient-centred model’ will be catalyzed by a number of key enablers and field supports. These enablers translate to actual principles that guide the development of the funding reform implementation strategy related to QBPs. These principles further translate into operational goals and tactical implementation, as presented in Figure 2.

Figure 2: Principles guiding the implementation of funding reform related to Quality-Based Procedures



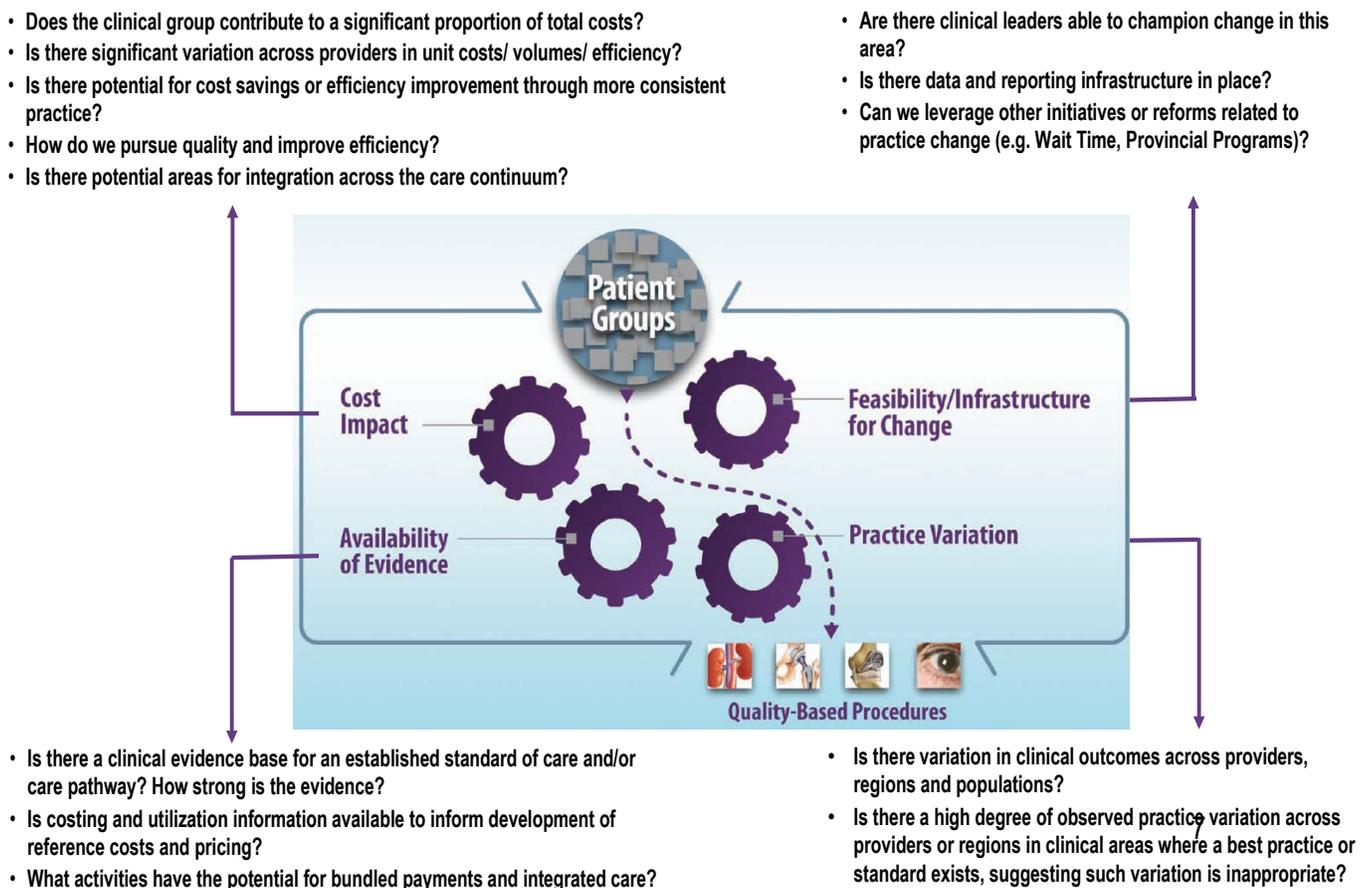
2.3 What are Quality-Based Procedures?

QBP involve clusters of patients with clinically related diagnoses or treatments. Lower extremity occlusive disease was chosen as a QBP using an evidence and quality-based selection framework that identifies opportunities for process improvements, clinical re-design, improved patient outcomes, and enhanced patient experience and potential cost savings.

The evidence-based framework used data from the Discharge Abstract Database (DAD) adapted by the Ministry of Health and Long-Term Care for its Health Based Allocation Methodology (HBAM) repository. The HBAM Inpatient Grouper (HIG) groups inpatients based on the diagnosis or treatment responsible for the majority of their patient stay. Day Surgery cases are grouped within the National Ambulatory Care Referral System (NACRS) by the principal procedure they received. Additional data was used from the Ontario Case Costing Initiative (OCCI). Evidence such as publications from Canada and other jurisdictions and World Health Organization reports were also used to assist with the patient clusters and the assessment of potential opportunities.

The evidence-based framework assessed patients using four perspectives, as presented in Figure 3. This evidence-based framework has identified QBPs that have the potential to both improve quality outcomes and reduce costs.

Figure 3: Evidence-Based Framework



Practice Variation

The DAD has every Canadian patient discharge, coded and abstracted for the past 50 years. This information is used to identify patient transition through the acute care sector, including discharge locations, expected lengths of stay and readmissions for each and every patient, based on their diagnosis and treatment, age, gender, co-morbidities and complexities and other condition specific data. A demonstrated large practice or outcome variance may represent a significant opportunity to improve patient outcomes by reducing this practice variation and focusing on evidence-informed practice. A large number of 'Beyond Expected Days' for length of stay and a large standard deviation for length of stay and costs, were flags to such variation. Ontario has detailed case costing data for all patients discharged from a case costing hospital from as far back as 1991, as well as daily utilization and cost data by department, by day and by admission.

Availability of Evidence

A significant amount of research has been completed both in Canada and across the world to develop and guide clinical practice. Working with the clinical experts, best practice guidelines and clinical pathways can be developed for these QBPs and appropriate evidence-informed indicators can be established to measure performance.

Feasibility/ Infrastructure for Change

Clinical leaders play an integral role in this process. Their knowledge of the patients and the care provided or required represents an invaluable component of assessing where improvements can and should be made. Many groups of clinicians have already formed and provided evidence and the rationale for care pathways and evidence-informed practice.

Cost Impact

The selected QBP should have no less than 1,000 cases per year in Ontario and represent at least 1 per cent of the provincial direct cost budget. While cases that fall below these thresholds may in fact represent improvement opportunity, the resource requirements to implement a QBP may inhibit the effectiveness for such a small patient cluster, even if there are some cost efficiencies to be found. Clinicians may still work on implementing best practices for these patient sub-groups, especially if it aligns with the change in similar groups. However, at this time, there will be no funding implications. The introduction of evidence into agreed-upon practice for a set of patient clusters that demonstrate opportunity as identified by the framework can directly link quality with funding.

2.4 How will QBP's encourage innovation in health care delivery?

Implementing evidence-informed pricing for the targeted QBP's will encourage health care providers to adopt best practices in their care delivery models, and maximize their efficiency and effectiveness. Moreover, best practices that are defined by clinical consensus will be used to understand required resource utilization for the QBP's and further assist in the development of evidence-informed prices. Implementation of a 'price X volume' strategy for targeted clinical areas will incent providers to:

- Adopt best practice standards;
- Re-engineer their clinical processes to improve patient outcomes; and
- Develop innovative care delivery models to enhance the experience of patients.

Clinical process improvement may include the elimination of duplicate or unnecessary investigations, better discharge planning, and greater attention to the prevention of adverse events, i.e. post-operative complications. These practice changes, together with adoption of evidence-informed practices, will improve the overall patient experience and clinical outcomes, and help create a sustainable model for health care delivery.

3.0 Description of Elective Repair of Lower Extremity Occlusive Disease

Describe the lower extremity occlusive disease population group (i.e. inclusion/exclusion criteria).

Arterial occlusive disease or peripheral artery disease (PAD) is the result of progressive narrowing and obstruction of the lumen of arteries to the extremities secondary to atherosclerosis and related disorders. Risk factors include smoking, hypertension, diabetes, hypercholesterolemia, and family history.

Estimation of the prevalence and incidence of PAD is difficult since many patients may have asymptomatic disease and because PAD is commonly associated with the risk factors listed above, the characteristics within a given study population will influence the estimation of PAD. In the medical literature PAD is defined a measured ankle-brachial index (ABI) of <0.9 and not by symptoms. In one major population study, the PAD prevalence as defined by a measured ankle-brachial index (ABI) of <0.9 was 12.2% (95% confidence interval [CI] = 10.9-13.5%) in the population over 60 years old. PAD prevalence increased with age. PAD prevalence was 7.0% (95% CI = 5.6-8.4%) for those aged 60 to 69, 12.5% (95% CI = 10.4-14.6%), and 23.2% (95% CI = 19.8-26.7%) for those aged 70 to 79 and 80 and older. Another US based primary care population study reported that the prevalence of lower extremity PAD was 29% as determined by an ABI of ≤ 0.90 . The population studied was patients over age 70 years and patients between the ages 50 and 69 years who had a history of cigarette smoking or diabetes. On a population level, of patients assessed to have PAD by ABI criteria, most will present with claudication (muscular pain and discomfort in the legs that occurs during walking and is relieved by rest), 1%-2% with critical limb ischemia and the remainder either asymptomatic or with atypical leg pain. Moreover, patients with PAD are at very high risk for the development of vascular disease in other areas (e.g., the coronary and cerebrovascular system) and as a consequence have a high incidence of myocardial infarction, stroke, and vascular related death.

Claudication is associated with significant reductions in quality of life. Patients with claudication generally present on an elective basis and are seeking improvement, relief from symptoms and avoidable disease progression that may threaten limb viability. If not properly managed, limb loss rates are 1-3% over five years. While symptom relief can be achieved through supervised exercise and walking programs, many patients require angioplasty and/ or surgical interventions (e.g. bypass and endarterectomy) to successfully relieve symptoms. A second goal is to reduce risk of myocardial infarction, stroke and cardiovascular death through risk factor modification. This involves smoking cessation, hypertension control, diabetes therapy, management of elevated lipids and weight reduction. In addition, use of cholesterol lowering medication, anti platelet agents and angiotensin converting enzyme inhibitors have all been demonstrated to reduce MI, stroke and cardiovascular death in randomized trials in PAD patients. Thus optimal management includes more than therapy for symptom relief but also medical therapy and risk factor modification.

Patients with more severe PAD can present with critical limb ischemia manifested by ischemic rest pain, non healing sores or ulcers, tissue loss or gangrene, or diabetic foot infections. Without timely revascularization these patients are at high risk of limb loss or amputation. Untreated one year limb loss rates are 80-90%. Again, as with the patients with claudication, successful limb salvage revascularization may be achieved through a strategy of percutaneous interventions and or open bypass procedures.

PAD patients may also present with acute limb threatening symptoms that mandate urgent therapy. These symptoms could include severe pain as well as loss of motor and sensory function. In these circumstances, urgent revascularization (less than 6 hours from onset of symptoms) is required to prevent limb loss. Therapy can include thrombectomy, angioplasty, thrombolysis, endarterectomy and bypass. Due to the urgent nature of the presentation and the advanced state of PAD, these patients have elevated rates of amputation, morbidity and mortality.

PAD is the most common condition resulting in non-trauma related amputations. Amputation has such a negative impact on patient quality of life that vascular specialists invest significant inpatient and outpatient resources attempting to prevent PAD related amputations. The risk of amputation in a claudicant population is reported to be approximately 1 to 3% over 5-years. Progression to night pain, rest pain, ulceration or gangrene (collectively called critical ischemia) is associated with a one year amputation rate of 80-90% if untreated. Studies demonstrate that the annual mortality rate for those with PAD is between 5-7% per year; higher than those with coronary artery disease or stroke alone. Approximately 25% of PAD patients diagnosed with claudication will require surgical or endovascular revascularization within 5 years of diagnosis. All patients with critical ischemia will require revascularization or amputation within one year.

Revascularization by elective surgical (by-pass or endarterectomy) or endovascular (balloon angioplasty and/or stenting) intervention in patients with PAD is directed towards symptom relief and/or limb salvage. Adjunctive medical risk reduction therapy seeks to decrease long-term cardiovascular risk and prevent disease progression. Elective revascularization is generally reserved for patients with claudication who have not achieved an adequate response to exercise, pharmacotherapy and where there is presence of severe disability that impedes normal work and day-to-day activities. The intervention carries relatively low risk and high probability of short and long term success. Those with critical limb ischemia who are at risk of limb loss are also treated with the same treatment modalities but with a more urgent time frame.

This QBP is for the provision of elective surgical or endovascular revascularization of the lower extremities where occluded vessels include any of the following: inflow vessels (aorta and iliac arteries), outflow vessels (common femoral and popliteal arteries) and runoff vessels (anterior tibial, posterior tibial, peroneal and pedal arteries). The outcomes, costs and route of interventions for PAD will be determined by the symptoms at the time the patient is accepted for treatment; either claudication or critical limb ischemia which includes night pain, rest pain, foot ulceration or gangrene and diabetic foot infections. The acute phase of clinical care for both open surgery and endovascular intervention will be addressed.

Elective Lower Extremity Occlusive Disease Population.

The recommended best-practice clinical pathway for lower extremity revascularization applies to patients that have a diagnosis of claudication or critical limb ischemia and who fall within the parameters of the following inclusion/ exclusion criteria.

Inclusion Criteria:

- Only the acute phase of clinical care for both open surgery and endovascular intervention will be addressed.
- Typical and atypical cases.
- Patients equal to or over 20 years of age.
- Both genders including those cases indicated as unknown.
- Ontario resident reported cases that have been performed within an Ontario hospital (acute facility).
- All cases defined as planned/elective admissions, assigned to an inpatient bed and are within CMG+ or HBAM Inpatient Groupers (HIG) 182, 183 or 185.

Exclusion Criteria:

- Urgent cases, emergent cases or revascularization due to trauma.*
- Partial or complete amputation of the lower limb.
- Cases reporting no birthdates or discharge dates.
- Out-of-Hospital Interventions.
- Abandoned interventions (status = A).

* Urgent and emergent cases have been excluded since treatment of urgent/ emergent cases may deviate from the described best-practice clinical pathways; moreover, the associated clinical outcomes are often much poorer than what is expected following an elective procedure. Should the scope of this QBP be expanded to include urgent and emergent cases then strategies must be developed to adjust for costs associated with deviation from the described clinical pathway and to adjust the expected outcome. Access to clinical outcomes data captured prospectively in a mandatory non-cardiac vascular outcomes registry will vastly improve the ability to benchmark with the appropriate adjustments.

Intervention Codes:

The discharge abstract database CMG+ or HIG levels 182, 183 and 185 were used to identify cases of lower extremity occlusive disease that are in-line with this QBP and provide data to support the recommendations presented within this clinical handbook.

HIG Definitions:

- a) (182) Bypass/Extraction of Vein/Artery of Limb;
- b) (183) Amputation of Hand/Foot;
- c) (185) Other Miscellaneous Vascular Intervention.

Due to difficulties with coding of diagnoses and interventions, accurate identification of this patient population will most likely require a prospective provincial non-cardiac vascular registry. Consequently, in an attempt to increase clinical homogeneity, interventions have been grouped by anatomical location of the occlusion and by surgical (open) or endovascular (endo) approach. The two groupings are: 1. Aortoiliac segment, which includes inflow arteries and 2. Infringuinal segment, that includes, outflow and runoff vessels.

Principal Intervention (Tx) codes are from the 2011 Canadian Code Classifications, ICD10-CA and CCI codes.

1. Aortoiliac Pathway:

a. Intervention Type: ENDO

- (1KE50GQOA) DILATE ABD ART PTA BALLOON & STENT
- (1KT50GQBD) DILATE VES PELV PERIN & GLUT PTA &BALLOON
-
- (1KE50GQBD) DILATE ABD ART PTA &BALLOON
- (1KT50GQOA) DILATE VES PELV PERIN & GLUT PTA BALLOON &STENT
- (1KE80GQNRN) REPAIR ABD ART PTA &STENT &SYN MAT(1KE50GQBP) DILATE ABD ART PTA & DILATOR
- (1KT50GQBP) DILATE VES PELV PERIN & GLUT ART PTA &RIG DILATOR

b. Intervention Type: OPEN

- (1KE76MZXXK) BYPASS ABD ART TO LEG VES HOMOGR
- (1JM76MIXXN) BYPASS ART ARM TO ART LEG AXLLFEMRL & SYN MAT
- (1KE76MZXXN) BYPASS ABD ART TO LEG VES SYN MAT
- (1KT76MZXXN) BYPASS VES PELV PERIN & GLUT TO LEG VES OA SYN MAT
- (1KE76MZXXA) BYPASS ABD ART TO LEG VES AUTOGR
- (1JM76MIXXA) BYPASS ART ARM TO ART LEG AXLLFEMRL & AUTGR
- (1KT76MZXXA) BYPASS VES PELV PERIN & GLUT TO LEG VES OA AUTOGR
- (1KT76MZXXQ) BYPASS VES PELV PERIN & GLUT TO LEG VES OA COMB TIS
- (1KE80LAXXN) REPAIR ABD ART OA SYN MAT
- (1KE76MUXXA) BYPASS ABD ART TO ABD VES AUTOGR
- (1KE76MZXXQ) BYPASS ABD ART TO LEG VES COMB TIS
- (1KE80LA) REPAIR ABD ART OA
- (1KE76MUXXN) BYPASS ABD ART TO ABD VES SYNTH MAT
- (1KE80LAXXA) REPAIR ABD ART OA AUTOGR
- (1KT50LABP) DILATE VES PELV PERIN & GLUT OA &DILATOR
- (1KE50LABD) DILATE ABD ART OA &BALLOON
- (1KE50LABP) DILATE ABD ART OA &DILATOR

2. Infringuinal Pathway:

a. Intervention Type: ENDO

- (1KG50GQBD) DILATE ART LEG ART PTA &BALLOON
- (1KY50GPBD) DILATE ART & VN PTA &BALLOON
- (1KG50LAOA) DILATE ART LEG OA BALLOON & STENT
- (1KG80GQNRN) REPAIR ART LEG PTA & STENT &SYN MAT
- (1KG50GQOA) DILATE ART LEG PTA BALLOON &STENT
-
-
- (1KG50GQBF) DILATE ART LEG ART PTA &BALLOON &LASR
- (1KG50GQBP) DILATE ART LEG ART PTA &RIG DILATOR

b. Intervention Type: OPEN

- (1KG76MIXXA) BYPASS ART LEG TO ART LEG AUTOGR
- (1KG76MIXXN) BYPASS ART LEG TO ART LEG SYN MAT
- (1KG76MIXXQ) BYPASS ART LEG TERM ART LEG & COMB TIS
- (1KG76MZXXA) BYPASS ART LEG TO LEG VN AUTOGR
- (1KG76MZXXN) BYPASS ART LEG TO LEG VN SYN MAT
- (1KG80LAXXN) REPAIR ART LEG OA SYN MAT
- (1KG87LAXXN) EXCISE PRT ART LEG OA SYN MAT
- (1KG80LAXXA) REPAIR ART LEG OA AUTOGR
- (1KG87LA) EXCISE PRT ART LEG OA
- (1KG80LA) REPAIR ART LEG OA
- (1KG87LAXXA) EXCISE PRT ART LEG OA AUTOGR
- (1KG87LAXXL) EXCISE PRT ART LEG OA XENOGR
- (1KY80LAXXN) REPAIR ART & VN OA SYN MAT
- (1KV80LAXXA) REPAIR ART NEC OA AUTOGR
- (1KG50LABP) DILATE ART LEG OA &DILATOR
- (1KG50LABD) DILATE ART LEG OA &BALLOON

Describe the evidence-based rationale for choosing elective repair of lower extremity occlusive disease as a QBP.

Elective repair of lower extremity occlusive disease has been identified as a QBP using the evidence-based selection framework as presented in figure 4.

Figure 4. Evidence-based framework for elective repair of lower extremity occlusive disease.

Cost Impact	Feasibility/Infrastructure for Change
<ul style="list-style-type: none"> • In 2010/11YE, there were 3,059 elective lower extremity (LE) revascularization procedures in Ontario at a cost of over \$45M. <i>Note: Costs are based on a provincial costing average of select OCCI hospitals' data.</i> <i>Note: Costs are based on a provincial costing average of select OCCI hospitals' data.</i> • There is significant variation in average total length of stays and costs for these services (typical patients only). The average case cost for elective LE 	<ul style="list-style-type: none"> • There are clinical leaders in vascular care who are willing to act as champions for positive change. • CCN is building infrastructure and relationships with vascular care providers in the development of a provincial Vascular Care Network. • CCN has MOHLTC support to develop a non-cardiac vascular clinical outcomes registry. • Select elective vascular surgery procedures have been part of the provincial wait times strategy since

<p>revascularization in 2010/11 was \$14,854 and the min/max case costs were <\$1,000 and \$300,000 respectively. These data include open and endovascular procedures.</p> <ul style="list-style-type: none"> Standardizing best practices and models of care may result in cost savings and improve quality and efficiency in the delivery of care to patients. <p>Centralization of non-cardiac vascular services may be a feasible option as it will create centres of excellence for patients, ensure clinical competency of operators by maintaining a core minimum of cases performed, encourage economies of size and standardize models of care.</p>	<p>2009.</p>
--	--------------



Availability of Evidence	Practice Variation
<ul style="list-style-type: none"> A Vascular Services Quality Strategy for Ontario: Observations and Recommendations; submitted to the MOHLTC, May 2012. ACC/AHA Practice Guidelines for the Management of Patients with Peripheral Artery Disease Canadian Cardiovascular Society Consensus Document on the Management of Peripheral Artery Disease. Authoritative sources for case costing /unit pricing and clinical utilization data is available for reference. Payments and integrated care may potentially be bundled by disease severity (symptoms and presentation). 	<ul style="list-style-type: none"> There is considerable variation in wait times, case volumes and clinical outcomes across service providers, e.g. 30-day mortality, length-of-stay and re-admission rates. Facility LE revascularization case volumes ranged from < 5 to 283 procedures in 2010/11. <p>At hospitals with annual LE revascularization case volumes ≥ 5:</p> <ul style="list-style-type: none"> The provincial average total length of stay (LOS) following open aortoiliac revascularization was 11.2 days and ranged from 2.9 days to 65 days across hospitals. Following endovascular aortoiliac revascularization, the average total LOS was 7.8 days and ranged from 2 day to 68 days across hospitals. The provincial average total LOS following open infrainguinal revascularization was 10 days and

	<p>ranged from 1 day to 20 days across hospitals. Following endovascular revascularization the average total LOS was 9.5 days, ranging from 1 day to 50.3 days across hospitals.</p> <ul style="list-style-type: none"> • The average SCU stay following open aortoiliac revascularization was 40.2 hours and ranged from 0 to 216 hours across hospitals. Following endovascular revascularization the average SCU stay was 20 hours, ranging from 0 to 111 hours across hospitals. • The average SCU stay following open infrainguinal revascularization was 26.4 hours and ranged from 0 to 126 hours across hospitals. Following endovascular revascularization the average SCU stay was 7.7 hours, ranging from 0 to 56.7 hours across hospitals. • The identified practice variations that exist would benefit from an over-arching, provincial strategy that is premised on best practices and standards of care. Non-cardiac vascular services would benefit from a coordinated and standardized network environment where providers can collaborate; develop and implement innovative, optimized care delivery models to enhance patient outcomes.
--	--

Describe the application of the evidence-based framework.

Analysis of recent administrative data from Ontario hospitals suggests that there are variations across the province with respect to wait times and risk-adjusted clinical outcomes for elective repair of lower extremity occlusive disease.

Wait Times

Wait time data are an important indicator of patterns of patient access to surgical services. Recommended maximum wait times are established based on patient clinical priority or urgency ranking. Patients are assigned a clinical priority ranking using a defined set of evidence-based criteria. The surgeon assigns the patient a priority based on the criteria and the urgency of the situation (priority 1-4) which indicates the urgency in which intervention is needed. Priority 1 indicates that emergency surgery is required within the next 24 hours – these data are not tracked in the current wait times data. Priorities 2-4 are for non-emergency patients, where the recommended maximum wait time for priority 2 is ≤ 14 days and for priority 3 is ≤ 56 days and priority 4 is ≤ 182 days. Currently the only lower extremity repair reported in the wait times database is femoral popliteal/ tibial bypass surgery. In fiscal year 2010/2011 there were 522 priority 3 and 315 priority 2 femoral popliteal/ tibial bypass surgeries in Ontario; a priority 3: priority 2 ratio of approximately 1.7:1. Priority 3: priority 2 ratios across LHINs ranged from 6:1 to 0.25:1. These results may reflect variation in surgeons’ assessment of patient’s symptom severity and allocation to the different priority categories. The average provincial wait time for a priority 2 patient awaiting femoral popliteal/ tibial bypass surgery was 21 days and the average wait time ranged from 6 days to 40 days. The

average provincial wait time for a priority 3 patient was 40 days, where the average wait time range was from 19 days to 77 days.

Risk-Adjusted Clinical Outcomes

To examine variation in clinical outcomes across LHINs, standardized outcome ratio analyses were completed. A standardized ratio (SR) is the ratio of actual outcomes to the number of outcomes that would be expected for a hospital given the demographics and clinical complexities of their patients; where, a SR greater than 1.0 indicates that the outcome, following adjustments for age and comorbidity, occurred at a greater frequency than the provincial average; a SR less than 1.0 indicates that the outcome occurred at a frequency less than the provincial average.

Standardizing outcome ratios allows for meaningful comparisons between hospitals or regions. Here we report standardized ratios for in-hospital mortality, length-of-stay and 30-day readmission. For these analyses, inpatient data from fiscal years 2008/09 and 2009/10 for all patients older than 17 years were used.

The standardized mortality ratio (SMR) for endovascular repair of the lower extremity ranged from 0.4 to 3.6. For open repair the SMR ranged from 0.7 to 3.9.

The standardized length-of-stay ratio (SLR) for endovascular repair of the lower extremity ranged from 0.7 to 1.3 and from 0.9 to 1.3 for open repair.

The standardized 30-day readmission ratio (SRR) for endovascular repair of the lower extremity ranged from 0.4 to 2.1 and from 0.6 to 1.2 for open repair.

Inclusion of elective repair of lower extremity occlusive disease as a QBP provides opportunities to ensure equitable access to standardized non-cardiac vascular care across Ontario. Moreover, it provides opportunities to ensure patients receive the best possible care and achieve optimal outcomes. The QBP initiative is in-line with many of the recommendations that were submitted to the MOHLTC in May 2012 by CCN and its Ontario Vascular Services Advisory Committee in the report "*A Vascular Services Quality Strategy for Ontario: Observations and Recommendations*".

Quality improvement requires the ability to define the quality indicators to be measured; develop a platform for measurement; and benchmark and track the measured indicators for change. During development of the Vascular Services Quality Strategy for Ontario it was identified that existing data sources are ineffective for this purpose due to the wide variation in coding practices between hospitals and the limitations of contemporary administrative data.

Fundamental to the implementation of the described framework is the ability to continuously monitor and report on outcomes for selected non-cardiac vascular procedures at a hospital, regional and provincial level by way of a clinical non-cardiac vascular outcomes registry. Outcomes should be risk-adjusted to enable meaningful comparisons with common standards and benchmarks as well as comparisons between providers.

A non-cardiac vascular outcomes registry will support the acquisition of data to determine current procedural volumes, case cost and develop projections of future

volumes. It will provide a quality tool to aid clinical decision-making, service delivery planning and will be valuable resource for research initiatives.

There is a strong interest within the vascular community and the Cardiac Care Network of Ontario to work together with the Ministry, LHINs and other provincial programs on the development and implementation of a program model and a rich clinical database that will leverage current expertise, resources, infrastructure and established networks to ensure non-cardiac vascular care is able to fully benefit from provincial oversight and management.

Describe the key objectives of the elective repair of lower extremity occlusive disease QBP.

The key objectives of the lower extremity occlusive disease QBP are to:

- Improve health outcomes of PAD patients;
- Manage the cost of surgical and endovascular care for the treatment of lower extremity PAD on the healthcare system;
- Be accountable to PAD patients that have lower extremity occlusive disease;
- Ensure equitable access to standardized surgical and endovascular care for the treatment of lower extremity PAD across Ontario;
- Address service gaps and/or need for capacity and infrastructure management.

How will elective repair of lower extremity occlusive disease be documented? Is there a need for a new data collection process?

Currently all elective repair of lower extremity occlusive disease performed in Ontario are documented in administrative databases by conventional chart abstraction methods; however, a recent analysis of Ontario hospital administrative data showed remarkable variability in coding and documentation practices. This variability inherently weakens the quality and reliability of data. In addition, the indication for the procedures are unclear as are the risk factors that will predict outcomes. Further to the absence of clear diagnostic information, outcomes indicators are limited in the available administrative databases making it difficult to identify areas in which to focus quality improvement efforts. To improve in PAD care, improved data collection including standardized reporting and data entry with attention provided to the collection of specific quality indicators is recommended and required. Recommendations to improve data collection are:

- Provider coding - Vascular surgeons should be classified separately from general surgery, general medicine, cardiac surgery, transplant surgery and thoracic surgery.
- Diagnostic coding - Should be improved to reflect clearly the presentation of symptoms and should be simplified and limited to one code each for claudication,

critical ischemia and acute ischemia. Currently there are more than 20 PAD diagnostic codes, most of which do not clearly identify the reason for intervention.

- Procedure coding - Should be improved to reflect clearly the intervention used and limited to one code per intervention method. As an example, there should be one standard code for lower extremity bypass (e.g. BYPASS ART LEG TO ART LEG AUTOGR OR SYN could be used). Currently there are many ambiguous procedure codes resulting in subjective data entry and fragmentation of data within the administrative databases.
- Collection of patient comorbidities should be improved as increased patient complexity is correlated with increased costs of hospitalization. Preoperative patient comorbidities should be documented prospectively in a standardized provincial non-cardiac vascular outcomes registry.
- Evidence that a claudicant received an adequate trial of a supervised walking exercise program prior to surgery should be mandatory.

This approach is achievable through the development of a non-cardiac vascular outcomes registry. Adoption of existing North American vascular databases or creation of a risk adjusted Ontario vascular database (that includes PAD) is required.

How will clinical documentation change? What are the implications on physician charting on billing and elective repair of lower extremity occlusive disease funding?

Currently there are no standardized guidelines or recommendations regarding information recorded onto patient charts by physicians. There have been observations of extreme variability and inaccuracies in the detail included in charts, ultimately impacting the quality of data input into provincial databases. To ensure collection of a predefined data set it is recommended that a coding system be employed and completed by the surgeon or designated individual at the time of intervention. This observation supports the need for a provincial non-cardiac vascular registry.

Clinical documentation will require improvements to indicate:

- a) Indication for the procedure (i.e., claudication, night pain, rest pain, ulceration or gangrene);
- b) Preoperative risk factors;
- c) Preoperative investigations including ABI, radiological investigations, and specifics of arterial occlusions;
- d) Preoperative cardiac investigations and results;
- e) Preoperative medications;
- f) Recording of operative interventions will be detailed and specific;
- g) Postoperative outcomes and complications will be added.

Adding this level of data collection and auditing is not time consuming for a trained individual with surgical input of some data. This data will enable case costing for procedures by indication and adjusted to risk.

How were the clinicians engaged? Please describe the process for clinical engagement.

Clinicians have been engaged to work with CCN and have aided in the production of the *Vascular Services Quality Strategy for Ontario* that was submitted by CCN to the MOHLTC in May, 2012. Leading provincial vascular specialists have been consulted and are keen to have an outcome registry that is standardized across the province. Subsequent to the work of the Ontario Vascular Services Advisory Committee, CCN convened a Vascular Care Working Group to act on the recommendations of the strategy. The clinical expert panel formed to advise on this QBP was a subcommittee of the Vascular Care Working Group. The clinical expert panel were engaged in this QBP process through face to face meetings, teleconference and email exchange where there was opportunity to review all relevant data and provide input into the content of this handbook. Recommendations of clinical care best practices were derived from available evidence, experience and consensus. The provincial discharge abstract database was used as the primary source of evidence to describe practice and outcomes variation across Ontario for lower extremity revascularizations.

4.0 Best practices¹ guiding the implementation of Elective Repair of Lower Extremity Occlusive Disease

How were the best practices defined?

Describe the process.

Best practice for lower extremity revascularization was defined using a combination of expert consensus and evaluation of available guidelines and literature (eg. ACC/AHA Practice Guidelines for the Management of Patients with Peripheral Artery Disease; Canadian Cardiovascular Society Consensus Document on the Management of Peripheral Artery Disease).

Provide the 'agreed-upon' pathway for patient treatment.

Best Practice Clinical Pathway –Lower Extremity Revascularization:

The following recommended best-practice clinical pathway for lower extremity revascularization applies to the following patient population:

1. Elective surgical or endovascular revascularization of the lower extremities where occluded vessels include any of the following: inflow vessels (aorta and iliac arteries), outflow vessels (common femoral and popliteal arteries) and runoff vessels (anterior tibial, posterior tibial, peroneal and pedal arteries).
2. The recommended best-practice clinical pathway does not apply to revascularization due to trauma and does not apply to partial amputation or complete amputation of the lower limb.

Lower Extremity Revascularization, Comprehensive Care Includes:

Pre-Pathway:

Prior to operative intervention for PAD patients should have:

- a) Assessment and modification of risk factors. This should include treatment for hypertension, diabetes, elevated lipids including cholesterol and smoking cessation.
- b) An adequate trial (at least 3 months) of supervised exercise therapy for claudicants.
- c) Assessment of both endovascular and open therapeutic options for therapy based on patient characteristics, clinical judgment and an informed patient decision.

¹ Best practice refers to a combination of best available evidence and clinical consensus

Pathway:**Pre-Operative:**

1. Appropriate physiologic risk assessment/ management of co-morbidities:
 - a. Cardiac risk assessment and stratification:
 - i. Testing could include: 12-lead ECG in patients with documented clinical risk factor(s); LV function test in patients with dyspnea or prior heart failure (HF); non-invasive stress testing in patients with poor (less than 4 METs) or unknown functional capacity and 3 or more clinical risk factors, where clinical risk factors include: ischemic heart disease, compensated or prior HF, diabetes mellitus, renal insufficiency, and cerebrovascular disease.
 - ii. Identification of any of the following active cardiac conditions warrants delay or cancellation of non-emergent vascular intervention until cardiac condition improves/ has been stabilized: unstable coronary syndromes, unstable or severe angina, recent MI (within 1-month of planned intervention), decompensated (HF), significant arrhythmias, severe valvular disease.
 - b. Assessment of renal function:
 - i. Renal function assessment could include: Serum creatinine, creatinine clearance and/ or glomerular filtration rate.
 - c. Assessment of atherosclerotic risk factors.
 - d. Respiratory/ pulmonary assessment as required:
 - i. Respiratory assessment could include: patient history, physical examination, determination of functional capacity, response to bronchodilators, arterial blood gas analysis.
 - e. Appropriate anaesthetic/ other specialist assessment as required.
2. Appropriate anatomical imaging –including but not limited to duplex US, MR/CT and or angiography.
3. Patient consultation & informed consent.

Intra-Operative:

1. Appropriate preoperative pharmacologic risk reduction (i.e., antibiotic delivery and DVT prophylaxis).
2. Procedure undertaken or supervised by an appropriately trained & certified practitioner.
3. Anaesthesia provided by practitioner who is experienced in vascular intervention.
4. Nursing staff appropriately trained in vascular care.
5. Appropriately equipped and accredited hospital.
6. Completion of pre-op checklist.
7. Access to appropriate imaging and interventional equipment.

Post-Operative:

1. Access to a special care unit or step-down unit.
2. Access to inpatient dialysis.
3. Access to inpatient critical care services, wound care specialists and other interdepartmental support systems.
4. 24/7 on call coverage by an appropriately trained & experienced practitioner.
5. Access to vascular nurse practitioner, allied health care services and diagnostic services.

Transitional Care:

1. Patient consultation regarding discharge and follow-up planning
2. Discharge to home. Access to home nursing support for surgical wounds.
3. Evidence based wound therapy for foot ulcers, wounds and amputation sites; ideally provided in multidisciplinary dedicated wound clinics.
4. Access to rehabilitation services, including amputee and prosthetic services.

Follow-up:

1. Need follow up for success of therapy, assessment of treatment success and complications.
2. Post-operative graft surveillance if applicable.

Additional Considerations:

1. Need to maximize and consolidate medical management.
2. Further attempts at smoking cessation as required.
3. Record outcomes and complications in outcomes database.
4. Quarterly review of outcomes and development of strategies to address quality improvement.

How does the elective repair of lower extremity occlusive disease best practice pathway improve patient outcomes?

The recommendations provided in the elective repair of lower extremity occlusive disease QBP pathway will improve patient outcomes by providing provincial standards for care, including minimum resource standards at centres providing services. Moreover, mandatory participation in a provincial non-cardiac vascular outcomes registry will enable ongoing surveillance of clinical outcomes and correction of significant variances through continual sharing of best practices. A patient-centric approach will increase communication between health care providers and patients thereby providing opportunities for discussion and will inform patients of next steps and

expected outcomes. In other jurisdictions, a focus on HCP-patient communication has improved patient outcomes by reducing patient isolation.

Describe the expert panel chosen to identify and reach consensus on the best practices.

The clinical expert panel formed to identify and reach consensus on the best practices recommended in this QBP handbook was a subcommittee of the CCN Vascular Care Working Group and consisted of vascular specialists from academic and community hospitals in Ontario whom are recognized leaders in non-cardiac vascular care.

5.0 Implementation of best practices

How should the best practices be implemented to ensure standardized and optimal patient care delivery?

Although there is already a high level of care provided to patients receiving elective repair of lower extremity occlusive disease, there are variability's in outcomes and indicators of efficiency across Ontario suggesting opportunities for improvements in the delivery of this core non-cardiac vascular service.

In May 2012, the *Vascular Services Quality Strategy for Ontario* was submitted by CCN to the MOHLTC. This document highlighted some key areas of variability that may be improved through implementation of standardized best practices coupled with appropriate benchmarking and measurement. Results of standardized ratio analyses showed areas of practice and outcome variability for the following: length of stay, 30-day readmission rates, operative mortality and utilization of technology for endovascular intervention. Implementation of standardized best practices may improve system efficiencies and reduce the regional disparities in clinical outcomes, benefiting patients and the health-care system. As a system support to ensure the implementation of best practices for repair of lower extremity occlusive disease and other non-cardiac vascular services, formation of a network of non-cardiac vascular care is proposed with the primary goals to enhance quality of care and outcomes and provide timely access for both emergent and elective non-cardiac vascular care. The network should include stakeholders involved in the delivery of services, including multidisciplinary care providers in hospitals and outpatient centers, administrators with a standard approach to support evidence-based and effective diagnostic and therapeutic management for non-cardiac vascular patients and organizations with expertise in emergency referral and management.

A plan for site specific implementation may include:

- A gap assessment of the current standard practice and the recommended best practice recognising the need(s) for change.
- An assessment of the readiness of the institution to provide a full breadth of care and possible barriers to implementation.
- Identification of the stakeholders and their required involvement.
- Dedicated individual(s) to provide support for education and implementation.
- Timelines for implementation.
- Forums for discussion and education.
- Roll out plans focused around the unique areas identified for change.
- Follow-up evaluation of progress.
- Participation in a formal provincial non-cardiac vascular network and registry.

- A sustainability plan for maintaining the Best Practice Standards.

Describe data management implications.

Data management would be impacted should there be agreement to mandatory participation in a non-cardiac vascular outcomes registry. The magnitude of an impact is largely dependent on the scale and detail of the registry and whether participation in an existing registry is a suitable option.

6.0 What does it mean for multi-disciplinary teams?

Will elective repair of lower extremity occlusive disease have any implication on multi-disciplinary teams (i.e. physicians, nurses, allied health, health records etc.)?

A move towards standardization of best practices for treatment of lower extremity occlusive disease will require individual hospitals to consider a coordinated multidisciplinary approach to non-cardiac vascular care involving a network of care providers with various expertise including but not limited to surgeons, radiologists, nurses, nurse practitioners, internal medicine practitioners, anesthesiologists, intensive care practitioners, technologists, pharmacists and allied health provider's to facilitate continuity of inpatient and outpatient care and chronic disease management. Innovative solutions are required to plan for and meet the future non-cardiac vascular care human resource needs and maintain levels of service delivery.

How does the elective repair of lower extremity occlusive disease best practice pathway align with clinical practice?

The recommendations for best practice elective repair of lower extremity occlusive disease are based on evidence from current literature, guidelines and consensus of the clinical expert group.

The elective lower extremity revascularization pathway has been derived from current national guidelines such as those described within the ACC/AHA Practice Guidelines for the Management of Patients with Peripheral Artery Disease and the Canadian Cardiovascular Society Consensus Document on the Management of Peripheral Artery Disease. Also, current elective lower extremity revascularization protocols in place in Ontario hospitals and the collective experience of the clinical advisory committee shaped the development of the pathway recommended herein. Alignment of these recommendations with current clinical practice will vary across institutions; however, it is felt that many hospitals are currently following similar practices.

Will adoption of the elective repair of lower extremity occlusive disease pathway change current clinical practice?

Smaller hospitals that provide vascular services including elective lower extremity revascularization may have to adjust their clinical practice if the recommended pathway is adopted. The extent of change to clinical practice will vary based on the individual circumstances of each hospital. Hospitals that perform the highest volumes of lower extremity revascularization are least likely to have to change their clinical practice to adopt the recommended pathway.

Adoption of evidence based best practices is expected to improve patient outcomes through:

- a) Refined indications for intervention;

- b) Increased use of supervised walking exercise programs;
- c) Access and treatment with least invasive and most effective therapy;
- d) Reduced rate of complications secondary to pre operative work up and maximized risk reduction;
- e) Maximized wound healing secondary to careful management;
- f) Sites will have indication specific risk adjusted outcomes with provincial comparisons to enable practice adjustments to improve patient outcomes.

7.0 Service capacity planning

How will clinical volume management be affected by QBP funding and/or affect hospital lower extremity revascularization volumes?

How will the new model of budget planning include clinicians?

The impact that QBP based funding will have on hospital volumes of repair of lower extremity occlusive disease remains to be determined; however, health service providers (clinicians and administration) will need to continue volume planning. Factors that could affect elective lower extremity occlusive disease repair volumes include changes in incidence and prevalence of PAD as well as a change in the number of hospitals providing core non-cardiac vascular services. Where service providers observe large changes in their desired volumes there should be collaboration between administrators and health care practitioners to determine the appropriate strategies to address new volume targets.

The geographic locations of the hospitals that provide non-cardiac vascular services are widely distributed throughout the province; however, the distribution does not necessarily match population density or other demographic factors. The inequality in the provision of non-cardiac vascular services will require re-evaluation regarding resource location and allocation as well as consideration of models of care that can service larger areas with expertise and efficiency such as a “hub and spoke” model or a “Centres of Excellence” model, which is already in place in some regions.

8.0 Performance evaluation and feedback

It is the opinion of our expert work group that the provincial health abstract databases have been designed to capture primarily administrative and procedural information. This design limits the application of these databases to provide valuable information on the quality of clinical outcomes and service provided. To ensure that the most informative data are collected enhancements to the current databases will be necessary or clinical outcomes registries should be developed. The Cardiac Care Network of Ontario and its Vascular Care Work Group (VCWG) have initiated processes to establish a provincial, prospective non-cardiac vascular outcomes database that could be used in a collaborative manner to track standardized performance and to inform development of future non-cardiac vascular quality indicators. CCN and the VCWG are committed to continue to review and develop indicators and methods for collecting standardized data.

Describe the evaluation metrics including quality indicators for lower extremity revascularization.

Currently the quality of care provided to vascular patients who require elective lower extremity revascularization in Ontario is high, with outcomes comparable or superior to other Canadian and international jurisdictions; however, there are regional discrepancies in the quality of care provided throughout the province. In order to better understand the regional differences, services in need of improvement and to achieve and maintain the highest level of care possible it is imperative that a mechanism is in place to continuously monitor and report outcomes from which improvement strategies can be developed. For this QBP, our expert panel endeavoured to identify quality indicators that will provide the largest insights into areas for care improvement and cost restriction. Three quality indicators (QI's) are recommended that could be implemented immediately (i.e. the data are available and are high quality). As well, other QI's that are important for monitoring quality of care but for which data may not currently be available or, current data appears to contain inherent weaknesses are suggested for future development. The proposed indicators align with the Integrated Quality Based Procedure Scorecard developed by the MOHLTC Health Quality Branch. Detailed technical descriptions of each of the QI's are provided the accompanying document entitled: *Technical Notes, Recommended Quality Indicators, Non-Cardiac QBPs*.

Quality Indicators for Immediate Implementation:

1. Risk adjusted in-hospital mortality rate.
2. Total length of stay.
3. Percentage of post-operative myocardial infarctions.

Quality Indicators for Future Development:

1. Re-operative rates (those that occur during the incident hospital admission, are unplanned and are required in order to address the initial lower extremity revascularization).
2. Major amputation occurring within 2 months of revascularization procedure. Suggested amputation groupings are: above knee, below knee/ above ankle.
3. Compliance with DVT prophylaxis protocols.
4. Graft patency and/ or improved ABI.
5. Surgical site infection rates.

The QI's recommended herein focus primarily on the QBP scorecard effectiveness and value dimensions. Development of a comprehensive QI program that has the capacity to track and evaluate numerous indicators across each of the ministry scorecard dimensions with high specificity and data quality would be best achieved through the development of a provincial non-cardiac vascular outcomes registry that is tied together with the provincial wait times database. Mandatory participation in the wait times database and a provincial non-cardiac vascular outcomes registry will enable ongoing surveillance of access to care, integration of services across the care continuum, appropriateness of services provided, clinical effectiveness and will enable reliable ongoing evaluation of the value of services provided. Moreover, the output of a provincial registry will be relevant and meaningful to clinicians, hospital administrators and government payers.

9.0 Support for Change

Will there be additional supports deployed by the agency/ relevant partners to support adoption of the new funding policy?

Vascular specialists and other health care professionals that provide care for PAD patients are highly enthusiastic to create a network within Ontario that will foster and support collaboration, continuous quality improvement and increase efficiencies in non-cardiac vascular care. In 2011 the Cardiac Care Network of Ontario together with Ontario's non-cardiac vascular services providers and other stakeholder groups formed the Ontario Vascular Services Advisory Committee and developed a consensus-based framework for a provincial quality strategy aimed at improving access to non-cardiac vascular care and non-cardiac vascular health outcomes for Ontarians. The strategy, entitled: "A Vascular Services Quality Strategy for Ontario" was submitted to the MOHLTC in May, 2012.

Development of a provincial non-cardiac vascular care network will have direct and measurable benefit to patients, providers and the government including support of the QBP funding initiative and will:

Support the aims of ground-breaking quality legislation including the Excellent Care for All Act, 2010.

Provide a provincially unified focus aimed to improve patient access and outcomes in non-cardiac vascular care and drive quality and accountability of non-cardiac vascular service delivery.

Create coordinated planning, clinical networks, access, quality reporting and data management resulting in equitable and timely delivery of quality non-cardiac vascular services that are standardized and evidence-based.

Provide timely baseline and prospective data on the utility of non-cardiac vascular services enabling informed estimates of future needs for these services and understanding of actual and anticipated costs, resulting in focused spending for services.

Increase systems efficiencies and improve outcomes for non-cardiac vascular patients across Ontario.

Create a network that will foster an environment where providers can partner to identify and develop evidence-based best practices/standards of care protocols.

CCN remains a committed partner in the efforts to develop a non-cardiac vascular care network and to continue to provide input into the HSFR strategy and lead the change management related to the QBP for elective repair of lower extremity occlusive disease.

Will there be additional field supports deployed by the Ministry to support adoption of the new funding policy? [to be completed by Health Quality Branch, MOH]

Describe role of Agency, Clinical Expert Advisory Group and Ministry in the development and implementation of <QBP> [to be completed by Health Quality Branch, MOH]

10.0 Frequently Asked Questions

11.0 Membership

Include membership of the Clinical Expert Advisory Groups and of any relevant supporting/ advisory groups who have assisted in the development of the lower extremity occlusive disease QBP.

Vascular Care Clinical & Technical Working Group QBP Sub-Committee	
Dr. Thomas Forbes (Clinical Group Chair)	London Health Sciences Centre
Dr. Andrew Dueck	Sunnybrook Health Sciences Centre
Dr. Thomas Lindsay	University Health Network, Toronto General Hospital
Dr. Marc Pope	Trillium Health Centre
Ms. Nancy Hunter (Technical Group Chair)	Cardiac Care Network of Ontario
Mr. Darren Gerson	Rouge Valley Health System
Ms. Karen Orescanin	Hamilton Health Sciences Centre
Ms. Filomena Travassos	Trillium Health Centre
Ms. Linda Welham	Southlake Regional Health Centre
Ms. Kori Kingsbury	Cardiac Care Network of Ontario
Mr. Mike Setterfield	Cardiac Care Network of Ontario
Mr. John Lohrenz	Cardiac Care Network of Ontario
Ms. Bernadette Verhiel	Cardiac Care Network of Ontario

