

Quality-Based Procedure Clinical Handbook

Non-Cardiac Vascular (Lower Extremity Occlusive Disease)

REVISED MARCH 2022

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List of Abbreviations

AA	Aortic Aneurysm
ABI	Ankle-brachial index
CACS	Comprehensive Ambulatory Classification System
CCI	Canadian Classification of Health Interventions
CCN	Cardiac Care Network of Ontario
CI	Confidence interval
CIHI	Canadian Institute for Health Information
CLTI	Chronic limb-threatening ischemia
DAD	Discharge Abstract Database
DI/IR	Diagnostic Imaging/Interventional Radiology
ECG	Electrocardiogram
ED	Emergency department
FY	Fiscal year
GEM	Growth and Efficiency Model
HBAM	Health-Based Allocation Model
HIG	HBAM Inpatient Grouper
LEOD	Lower extremity occlusive disease
LHIN	Local Health Integration Network
LOS	Length of stay
MET	Metabolic equivalent
MI	Myocardial infarction

MOH	Ministry of Health
MOHLTC	Ministry of Health and Long-Term Care
NACRS	National Ambulatory Care Reporting System
NCV	Non-cardiac vascular
NEC	Not elsewhere classified
OCCI	Ontario Case Costing Initiative
OHA	Ontario Hospital Association
PAD	Peripheral Arterial Disease
PCP	Primary Care Provider
QBP	Quality-Based Procedure
SCU	Special Care Unit
SLR	Standardized LOS Ratio
SMR	Standardized Mortality Ratio
SR	Standardized Ratio
SRR	Standardized 30-day Readmission Ratio
TBI	Toe-brachial index
WTIS	Wait Time Information System

Preface

The Non-Cardiac Vascular (NCV) Lower Extremity Occlusive Disease (LEOD) Quality-Based Procedure (QBP) subgroup was introduced in FY 2013/14 based on the initial QBP Clinical Handbook from February 2013 (which was later revised in September 2013 and January 2014).

Since that time, this QBP Clinical Handbook has been updated to include additional procedures and coding revisions, as summarized below.

Ontario Health - CorHealth Ontario

Ontario Health - CorHealth Ontario is a key advisor to the Ministry of Health (MOH) providing overall leadership and strategic direction to support the planning and delivery of high quality cardiac, vascular, and stroke care in the province. Together with its partners including the MOH, hospitals, and care providers, Ontario Health - CorHealth Ontario plays a central role in the system to improve the quality, efficiency, accessibility, and equity of cardiac, stroke, and vascular services for patients across Ontario.

Ontario Health - CorHealth Ontario and working groups of clinical, technical and health data experts, and other stakeholders have played an integral role in the initial planning, development and revision of this QBP Clinical Handbook.

March 2022 Revision Summary

A revision to the LEOD QBP Clinical Handbook was made in March 2022. The updates are summarized below.

1. Expanding the LEOD revascularization definition to include non-elective procedures; and
2. Revisions to the Canadian Classification of Health Intervention (CCI) codes included as part of the LEOD revascularization definition.

The former definition of the LEOD QBP excluded a substantial proportion of lower extremity revascularization cases. In fiscal year (FY) 2019/20, 23% of all LEOD procedures done annually in Ontario qualified for the LEOD QBP by its former definition. Expanding the LEOD QBP definition to include non-elective repairs (and formally adding outpatient procedures to the QBP following the February 2021 revision) will increase the proportion of QBP-qualifying cases to approximately 73%. LEOD procedures for trauma, iatrogenic injury, and other non-identified indications account for the remaining 27% of repairs.

Updates to the QBP Clinical Handbook patient groupings are summarized in Table 1.

Table 1. Summary of March 2022 Updates to LEOD Groupings

QBP Clinical Handbook (March 2022 Updates)	QBP Clinical Handbook (February 2021)
<p>Elective LEOD Revascularization Includes inpatient and outpatient (see Notes) Includes aortoiliac and infrainguinal</p>	<p>Elective LEOD Revascularization Includes inpatient and outpatient (see Notes) Includes aortoiliac and infrainguinal</p>
<p>Non-Elective LEOD Revascularization Includes aortoiliac and infrainguinal</p>	

Notes:

1. As communicated by the MOH in February 2021 (and updated Frequently Asked Questions in May 2021), the NCV QBP is being expanded in phases; in Phase 1 (FY 2020/21 and FY 2021/22), the QBP Clinical Handbooks (AA and LEOD) were updated (in February 2021) to include outpatient procedures, and hospitals were provided with flexibility to use inpatient QBP funding for outpatient procedures; in Phase 2 (FY 2022/23), the QBP Clinical Handbooks were updated (in March 2022) to include non-elective and advanced AA procedures, and the NCV QBP will be formally updated to include outpatient, non-elective and advanced AA procedures.
2. Since NACRS cannot distinguish between elective and non-elective, all **outpatient** cases are included under Elective LEOD Revascularization.
3. All groups include **open** and **endovascular** procedures.
4. See section 3.1 for definitions of aortoiliac and infrainguinal patient groups.
5. See section 3.2 for definitions (inclusion/ exclusion criteria).

The rationale for the update is provided below.

I. Inclusion of Non-Elective Procedures

The LEOD QBP Clinical Handbook now includes both elective and non-elective lower extremity revascularization procedures.

The QBP expansion to include non-elective cases will increase the scope of lower extremity revascularization procedures that qualify for QBP funding, thereby promoting consistent

funding of these procedures under the same funding envelope, irrespective of how the patient was admitted, and setting the foundation for a future population-based approach to service provision.

The MOH relies on information from Canadian Institute for Health Information (CIHI) databases to reconcile volumes of QBP-qualifying procedures completed at each hospital. Elective and non-elective QBP volumes will follow separate volume allocation and reconciliation processes consistent with MOH practice.

Full details of the updated LEOD inclusion criteria are provided in section 3.0 “*Description of this QBP*”.

II. Code Revisions

In previous versions of the LEOD QBP Clinical Handbook, many CCI codes were listed in full code format. In this revision, the codes are presented in truncated form to increase the clarity and simplify the list of included codes.

Following a code review, the following LEOD CCI codes were included based on alignment as a principal procedure for LEOD revascularization:

- 1KE57LA, 1KE87, 1KT57LA, 1KG57LA, 1KE57GQ, 1KT57GQ, 1KG57GQ – codes for extraction/excision of arteries;
- 1KT80LA, 1KT87, 1KT80GQ – codes for vessels of the pelvis, perineum and gluteal region which includes the internal and external iliac arteries; and
- 1KE35, 1KG35 – codes for pharmacotherapy (local) of the abdominal arteries not elsewhere classified (NEC) and arteries of the leg NEC, respectively

In addition, the following LEOD CCI codes were excluded based on misalignment or non-specificity as a principal procedure for LEOD revascularization:

- 1KE76MU – includes bypass, abdominal arteries terminating in abdominal vessels;
- 1KE80GQ, 1KE80LA – include repair specific to celiac, mesenteric and renal arteries;
- 1KG76MZ – includes bypass of artery to vein for long-term hemodialysis;
- 1KY80 – includes partial revision of arteriovenous fistula and repair of artery with vein;
- 1KV80 – includes repair of an artery, not elsewhere classified; and
- 1KY50GP – includes arteriovenous fistula and dilation of artery with vein

Full details of the updated LEOD CCI codes are provided in section 3.0 “*Description of this QBP*”.

February 2021 Revision Summary

A revision to the LEOD QBP Clinical Handbook was made in February 2021. The rationale for the update is provided below.

Inclusion of Same Day (Outpatient) Procedures

Through engagement with administrative and clinical experts aimed at identifying opportunities to streamline and increase transparency of vascular activity included in the vascular QBPs, it became apparent that the definition of the LEOD QBP excluded the majority of LEOD revascularization cases. This was subsequently validated through Ontario Health - CorHealth Ontario's vascular reporting strategy which utilized information from CIHI administrative databases to measure the indication for lower extremity revascularization at all Ontario hospitals providing this service. In FY 2018/19, only 39% of CIHI-coded lower extremity revascularization procedures qualified for the LEOD QBP by its former definition. Expanding the definition to include same day (outpatient) procedures will increase the proportion of QBP-qualifying cases to 65% of all CIHI-coded lower extremity revascularization cases done in Ontario hospitals. This number is likely higher, however, given the under-reporting of same day procedures done in the interventional radiology suite in the National Ambulatory Care Reporting System (NACRS).

It is recognized and well-documented that, through advances in technology and process, LEOD revascularization can safely and effectively be conducted as a same day procedure in carefully selected patients. In particular, the use of endovascular interventions has increased the ability to care for patients without a hospital stay but with similar long-term outcomes. As such, these endeavors should be supported and expanded whenever possible to optimize patient outcomes with best value. The LEOD QBP Clinical Handbook has thus been updated to include same day procedure cases.

Inclusion of LEOD revascularization same day (outpatient) procedures into the QBP is also a logical step from a health resource utilization perspective as it will have the additional benefit of supporting the shift towards minimally invasive and less resource-intensive treatment modalities, thus freeing up vascular operating room time and inpatient beds and promoting faster patient recovery time at home.

With respect to **funding**, hospital vascular programs are funded for non-QBP-qualifying LEOD revascularization procedures through their hospital global budget and through the LEOD QBP for those procedures that qualify. This fragmentation has added to a complex administrative environment for the coordination, planning and management of a vascular program, one that

can at least be partially mitigated by the addition of same day LEOD procedures into the QBP. QBP expansion will ensure consistent volume management and funding of LEOD revascularization under one funding envelope, irrespective of how the patient was admitted, and sets the foundation towards a population-based approach to vascular service provision.

With respect to **reporting**, details about inpatient procedures were mandated for entry into CIHI databases as were details about same day (outpatient) procedures completed in fully equipped operating rooms, hybrid operating rooms and catheterization labs. However, there remained an unknown number of LEOD procedure volumes performed on a same day (outpatient) basis in diagnostic imaging/interventional radiology (DI/IR) suites where CIHI reporting was not mandatory. The absence of reporting of these procedures in NACRS presented data gaps that contributed to challenges with transparently and comprehensively estimating volumes of LEOD procedures at individual hospitals and provincially. To address this challenge, Ontario Health - CorHealth Ontario, in consultation with vascular stakeholders, worked with the MOH, CIHI and hospitals to communicate mandatory reporting of these cases into CIHI databases as of FY 2020/21.

Full details of the LEOD same day inclusion criteria are provided in section 3.0 *“Description of this QBP”*.

1.0 Purpose

Provided by the Ministry of Health

This QBP Clinical Handbook offers a compendium of the evidence-based rationale and clinical consensus driving the development of the policy framework and implementation approach for this QBP.

The clinical recommendations in this document and any subsequent adjustments to the funding model for these procedures are not intended to take the place of the professional skill and judgment of health care providers.

As with all QBPs, hospitals can supplement volumes as required using their global budgets, and changes to the QBP funding model do not impact physician billing.

2.0 Introduction to Quality-Based Procedures

Provided by the Ministry of Health

QBP's involve clusters of patients with clinically related diagnoses or treatments. QBP's use an evidence- and quality-based selection framework that identifies opportunities for process improvements, clinical redesign, improved patient outcomes, enhanced patient experience, and potential cost savings.

The evidence-based framework used data from the Discharge Abstract Database (DAD) adapted by the MOH for its Health-Based Allocation Model (HBAM) repository, which preceded the Growth and Efficiency Model (GEM).

The HBAM Inpatient Grouper (HIG) groups inpatients according to diagnosis or treatment for most of their inpatient stay. Day surgery cases are grouped in NACRS by the principal procedure they received.

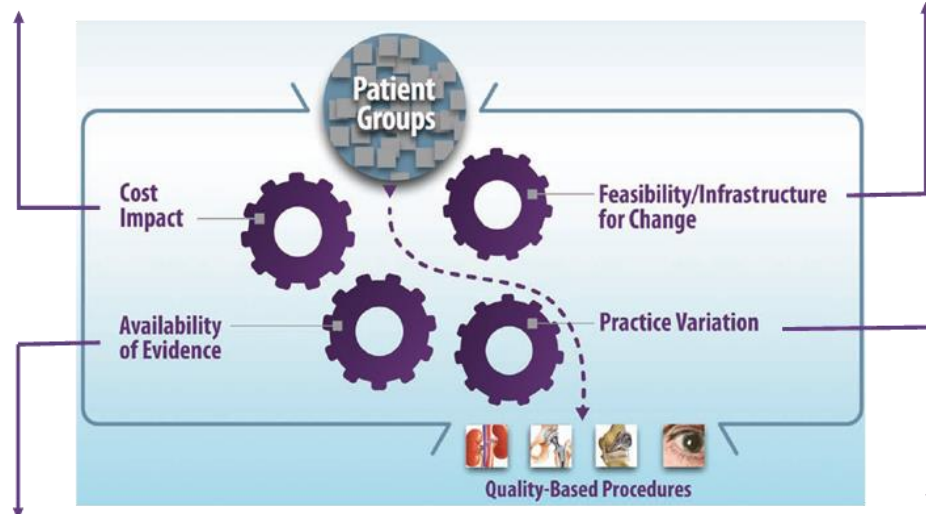
Additional data were used from the Ontario Case Costing Initiative (OCCI). Evidence in publications from Canada and from other jurisdictions and in World Health Organization reports was also used to determine patient clusters and to assess potential opportunities.

The evidence-based framework assessed patients as presented in Figure 1. This framework identified QBP's that have the potential to both improve quality outcomes and reduce costs.

Figure 1. Evidence-Based Framework for QBPs

- Does the clinical group contribute to a significant proportion of total costs?
- Is there significant variation across providers in unit costs/ volumes/ efficiency?
- Is there potential for cost savings or efficiency improvement through more consistent practice?
- How do we pursue quality and improve efficiency?
- Is there potential areas for integration across the care continuum?

- Are there clinical leaders able to champion change in this area?
- Is there data and reporting infrastructure in place?
- Can we leverage other initiatives or reforms related to practice change (e.g. Wait Time, Provincial Programs)?



- Is there a clinical evidence base for an established standard of care and/or care pathway? How strong is the evidence?
- Is costing and utilization information available to inform development of reference costs and pricing?
- What activities have the potential for bundled payments and integrated care?

- Is there variation in clinical outcomes across providers, regions and populations?
- Is there a high degree of observed practice variation across providers or regions in clinical areas where a best practice or standard exists, suggesting such variation is inappropriate?

Practice Variation

Patient transition including discharge locations, expected length of stay (LOS), and readmissions are captured by CIHI and can be analyzed on the basis of diagnosis and treatment, age, sex, comorbidities and complexities, and other condition-specific data. Large practice or outcome variance can represent opportunity to improve patient outcomes by reducing this practice variation and focusing on evidence-informed practice. A large standard deviation from expected LOS and costs are flags to such variation. Ontario has detailed case-costing data for all patients discharged from a case-costing hospital from 1991 onwards, as well as daily resource use and cost data by department, by day, and by admission.

Availability of Evidence

Much Canadian and international research has been undertaken to develop and guide clinical practice. By use of these recommendations and those of the clinical experts, best-practice

guidelines and clinical pathways can be developed for QBPs, and appropriate evidence-informed indicators can be established to measure performance.

Feasibility/Infrastructure for Change

Clinical leaders are integral to this process. Their knowledge of 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 provided rationale-for-care pathways and evidence-informed practice.

Cost Impact

The implementation of an evidence-based funding methodology can help to promote efficiencies and standardize costs. The introduction of evidence into practice for a set of patient clusters through the QBP Clinical Handbook and evidence-based framework for QBPs can also demonstrate opportunities to link quality with funding.

2.1 How Will QBPs Encourage Innovation?

Implementing evidence-informed pricing for the targeted QBPs 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 use for the QBPs and further assist in developing evidence-informed pricing.

Implementation of a “price x volume plus quality” strategy for targeted clinical areas will motivate 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 can include better discharge planning, eliminating duplicate or unnecessary investigations and paying greater attention to the prevention of adverse events (e.g., postoperative 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 this QBP

LEOD, also referred to as **peripheral arterial disease (PAD)**, is the result of progressive narrowing and/or obstruction of the lumen of arteries to the lower extremities secondary to atherosclerosis or related disorders. Moreover, patients with LEOD are at high risk for the development of vascular disease in other areas of the body (e.g., the coronary and cerebrovascular system) and, as a consequence, have a high incidence of myocardial infarction (MI), stroke, and vascular-related death.

As such, in addition to revascularization, treatment involves risk factor modification including smoking cessation, increased physical activity such as participation in supervised walking programs, hypertension control, diabetes therapy, management of lipids, dietary advice, and weight reduction to decrease long-term cardiovascular risk and to prevent disease progression. Use of cholesterol lowering medication, anti-platelet agents, anti-thrombotic agents, and angiotensin-converting enzyme inhibitors have all been demonstrated to reduce MI, stroke, and cardiovascular death in randomized trials in LEOD patients.

In the medical literature, LEOD is defined by a measured **ankle-brachial index (ABI)** of <0.9 . In one major population study, LEOD prevalence as defined by a measured ABI of <0.90 was 12.2% (95% confidence interval [CI] = 10.9-13.5%) in the population over 60 years old. LEOD prevalence increased with age and 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 United States-based primary care population study reported that the prevalence of LEOD was 29% as determined by an ABI of ≤ 0.90 in patients over age 70 years and patients between the ages of 50 and 69 years who also had a history of cigarette smoking or diabetes.

LEOD is a progressive and dynamic disease that is accurately described by a continuum of clinical symptoms and features. On a population level, of patients assessed to have LEOD by ABI criteria, many will present with intermittent claudication (muscular pain and discomfort in the legs that occurs with walking and is relieved by rest). Further, it is estimated that 5-20% of patients with intermittent claudication or asymptomatic disease will progress to **chronic limb-threatening ischemia (CLTI)** within a 5-year period if untreated, and approximately 50% of patients who present with CLTI have no prior documented history of LEOD.

Patients with intermittent claudication are considered stable and management typically includes patient education, risk factor modification, and exercise. Revascularization by an **endovascular** (e.g., angioplasty, stenting) and/or **open** (e.g., bypass, endarterectomy) approach

for patients with intermittent claudication should be reserved for those where there is significant functional or lifestyle-limiting disability.

Patients with CLTI, typically defined as leg pain at rest, gangrene, or a lower-limb ulcer that has not showed signs of healing in more than a 2-week duration, require risk factor modification, optimized medical management, and education and should be assessed for candidacy for revascularization. Revascularization in patients with CLTI may be offered as a planned, ‘elective’ procedure or may be required on an urgent/emergent ‘non-elective’ basis. Without timely medical management and appropriate revascularization, these patients are at high risk of amputation. A meta-analysis (13 studies and 1527 patients) of the natural history of untreated CLTI found that, during a median follow-up of 12 months, both the mortality rate and the per-patient amputation rate were 22%, although there was marked heterogeneity between studies. Successful limb salvage revascularization for patients with CLTI may be achieved through either endovascular and/or open revascularization procedures.

3.1 Patient Groups

This revised QBP Clinical Handbook (March 2022 Revision) is for the provision of open or endovascular LEOD revascularization, in either an inpatient or same day (outpatient) procedure setting and done either electively or non-electively. LEOD revascularization is classified into 2 cohorts based on anatomical level:

1. **Aortoiliac:** refers to revascularization procedures in which the primary target lesion(s) are located in inflow vessels (e.g., aorta, common iliac arteries, external iliac arteries and internal iliac arteries)
2. **Infrainguinal:** refers to revascularization procedures in which the primary target lesion(s) are located in outflow and/or runoff vessels (e.g., including and distal to the common femoral arteries)

The following table summarizes the updated scope of the LEOD revascularization groupings.

Table 2. Updated Scope of LEOD Groupings

Open	Endovascular	Aortoiliac	Infrainguinal	Inpatient	Outpatient ¹
Elective LEOD Revascularization					
✓	✓	✓	✓	✓	✓

¹ Since NACRS cannot distinguish between elective and non-elective, all outpatient cases are included under Elective LEOD Revascularization.

Open	Endovascular	Aortoiliac	Infrainguinal	Inpatient	Outpatient ¹
Non-Elective LEOD Revascularization					
✓	✓	✓	✓	✓	✗

3.2 Inclusion and Exclusion Criteria

Principal Intervention codes for LEOD revascularization have been aligned with the aortoiliac and infrainguinal cohorts. Intervention codes are from the 2018 Canadian Classification of Health Interventions (CCI).²

In previous versions of the LEOD QBP Clinical Handbook, many CCI codes were listed in full code format. In this March 2022 Revision, the codes are presented in truncated form to increase the clarity and simplify the list of included codes.

Table 3. Elective LEOD

General Inclusion Criteria		General Exclusion Criteria
Age greater or equal to 20		Principal intervention is abandoned Out-of-hospital
Inpatient	Same Day (Outpatient)	
Admit category is 'L' (elective) HIG Codes: 182, 183, 185	CACS Codes: C213, C214	
CACS = Comprehensive Ambulatory Classification System; HIG = Hospital Inpatient Grouping		
Pathway	Approach and Principal Intervention (CCI code)	
	Open	Endovascular
Aortoiliac	1.JM.76.MI.^ - Bypass, arteries of arm not elsewhere classified, terminating in	1.KE.35.^ – Pharmacotherapy (local), abdominal arteries not elsewhere classified (NEW)

² The LEOD QBP technical definitions in this clinical handbook were informed using the 2018 CCI codes and have been validated against and remain in alignment with the 2022 CCI code updates.

	<p>lower limb artery [e.g., axillofemoral bypass]</p> <p>1.KE.50.LA.^ – Dilation, abdominal arteries not elsewhere classified, using open approach [e.g., arteriotomy]</p> <p>1.KE.57.LA.^ – Extraction, abdominal arteries not elsewhere classified, using open approach (NEW)</p> <p>1.KE.76.MZ.^ – Bypass, abdominal arteries not elsewhere classified, bypass terminating in vessels of leg</p> <p>1.KE.87.^ – Excision partial, abdominal arteries not elsewhere classified (NEW)</p> <p>1.KT.50.LA.^ – Dilation, vessels of the pelvis, perineum and gluteal region, using open approach [e.g., arteriotomy]</p> <p>1.KT.57.LA.^ – Extraction, vessels of the pelvis, perineum and gluteal region, using open approach (NEW)</p> <p>1.KT.76.MZ.^ – Bypass, vessels of the pelvis, perineum and gluteal region, terminating in vessels of the leg, [e.g., external iliac to common femoral artery]</p> <p>1.KT.80.LA.^ – Repair, vessels of the pelvis, perineum and gluteal region, using open approach (NEW)</p> <p>1.KT.87.^ – Excision partial, vessels of the pelvis,</p>	<p>1.KE.50.GQ.^ – Dilation, abdominal arteries not elsewhere classified, using percutaneous transluminal approach</p> <p>1.KE.57.GQ.^ – Extraction, abdominal arteries not elsewhere classified, using percutaneous transluminal approach (NEW)</p> <p>1.KT.50.GQ.^ – Dilation, vessels of the pelvis, perineum and gluteal region, using percutaneous transluminal approach</p> <p>1.KT.57.GQ.^ – Extraction, vessels of the pelvis, perineum and gluteal region, using percutaneous transluminal approach (NEW)</p> <p>1.KT.80.GQ.^ – Repair, vessels of the pelvis, perineum and gluteal region, using percutaneous transluminal approach (NEW)</p>
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	perineum and gluteal region, using open approach (NEW)	
Infrainguinal	<p>1.KG.50.LA.^ – Dilation, arteries of leg not elsewhere classified, using open approach [e.g., arteriotomy]</p> <p>1.KG.57.LA.^ – Extraction, arteries of leg not elsewhere classified, using open approach (NEW)</p> <p>1.KG.76.MI.^ – Bypass, arteries of leg not elsewhere classified, terminating in lower limb artery [e.g., femoropopliteal]</p> <p>1.KG.80.LA.^ – Repair, arteries of leg not elsewhere classified, using open approach</p> <p>1.KG.87.LA.^ – Excision partial, arteries of leg not elsewhere classified, using open approach</p>	<p>1.KG.35.^ – Pharmacotherapy (local), arteries of leg not elsewhere classified (NEW)</p> <p>1.KG.50.GQ.^ – Dilation, arteries of leg not elsewhere classified, using percutaneous transluminal approach</p> <p>1.KG.57.GQ.^ – Extraction, arteries of leg not elsewhere classified, using percutaneous transluminal approach (NEW)</p> <p>1.KG.80.GQ.^ – Repair, arteries of leg not elsewhere classified, using percutaneous transluminal approach and (endovascular) stent with synthetic graft [e.g., stent graft]</p>

Table 4. Non-Elective LEOD

General Inclusion Criteria	General Exclusion Criteria
Age greater or equal to 20	Principal intervention is abandoned Out-of-hospital
Inpatient	
Admit category is ‘U’ (urgent/emergent) (non-elective) HIG Codes: 182, 183, 185	
HIG = Hospital Inpatient Grouper	

Pathway	Approach and Principal Intervention (CCI code)	
	Open	Endovascular
Aortoiliac	Same as Elective LEOD	Same as Elective LEOD
Infrainguinal	Same as Elective LEOD	Same as Elective LEOD

3.3 Initial Rationale for Choosing this QBP

LEOD was initially identified as a QBP using the evidence-based framework presented in Figure 1 with the findings summarized in Table 5 below.

Table 5. Evidence-Based Framework for Lower Extremity Occlusive Disease

Cost Impact	Feasibility/Infrastructure for Change
<ul style="list-style-type: none"> In FY 2010/11, there were 3,059 elective LEOD 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> There was significant variation in average total LOS and costs for these services (typical patients only). The average case cost for elective LEOD revascularization in FY 2010/2011 was \$14,854 and the min/max case costs were <\$1,000 and \$300,000 respectively. These data include open and endovascular procedures. Standardizing best practices and models of care may result in cost savings and improve quality and efficiency in the delivery of care to patients. Centralization of NCV 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. 	<ul style="list-style-type: none"> There were clinical leaders in vascular care who are willing to act as champions for positive change. The Cardiac Care Network of Ontario (CCN) was building infrastructure and relationships with vascular care providers in the development of a provincial Vascular Care Network. CCN had MOHLTC support to develop a NCV clinical outcomes registry. Select elective vascular surgery procedures are monitored and publicly reported through the Access to Care Wait Time Information System (WTIS).

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. • American College of Cardiology/American Heart Association 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 was available for reference. • Payments and integrated care were potentially going to be bundled by disease severity (symptoms and presentation). 	<ul style="list-style-type: none"> • There was considerable variation in wait times, case volumes and clinical outcomes across service providers, e.g., 30-day mortality, LOS and re-admission rates. • Facility LEOD revascularization case volumes ranged from < 5 to 283 procedures in FY 2010/11. <p>At hospitals with annual LEOD revascularization case volumes ≥ 5:</p> <ul style="list-style-type: none"> • The provincial average total 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 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. • The average Special Care Unit (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.

	<ul style="list-style-type: none"> • The identified practice variations that existed would benefit from an overarching, provincial strategy that is premised on best practices and standards of care. • NCV 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. • Essential to the successful deployment of such coordinated action would be a prospectively maintained provincial database to follow designated quality indices.
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3.4 Initial Application of the Evidence-Based Framework

Initial analysis of FY 2010/11 administrative data from Ontario hospitals suggested that there were variations across the province with respect to wait times and risk-adjusted clinical outcomes for elective revascularization of LEOD.

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, for Priority 3 is ≤ 56 days and for Priority 4 is ≤ 182 days.

The only LEOD revascularization intervention reported in the WTIS was femoral popliteal/tibial bypass surgery. In FY 2010/11, there were 522 Priority 3 and 315 Priority 2 femoral popliteal/tibial bypass surgeries in Ontario; a Priority 3 to Priority 2 ratio of approximately 1.7:1. Priority 3 to Priority 2 ratios across Local Health Integration Networks (LHINs) ranged from 6:1 to 0.25:1.

These results may continue to reflect variation in surgeons' assessment of patient 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 with a range from 6 to 40 days. The average provincial wait time for a Priority 3 patient was 40 days with a range from 19 to 77 days. These results indicate an opportunity to improve equitable access to NCV care across Ontario.

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. A SR greater than 1.0 indicates that the outcome, following adjustments for age and comorbidity, occurred at a frequency greater 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. Reported below are the SRs for in-hospital mortality, LOS and 30-day readmission. For these initial analyses, inpatient data from FY 2008/09 and FY 2009/10 for all patients older than 17 years were used.

- The **standardized mortality ratio (SMR)** for endovascular LEOD revascularization ranged from 0.4 to 3.6 and for open revascularization ranged from 0.7 to 3.9.
- The **standardized LOS ratio (SLR)** for endovascular LEOD revascularization ranged from 0.7 to 1.3 and for open revascularization ranged from 0.9 to 1.3.
- The **standardized 30-day readmission ratio (SRR)** for endovascular LEOD revascularization ranged from 0.4 to 2.1 and for open revascularization ranged from 0.6 to 1.2 for open repair.

Inclusion of LEOD as a QBP provides opportunities to ensure equitable access to standardized NCV 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 were 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 NCV procedures at a hospital, regional, and provincial level by way of a clinical NCV outcomes registry. Outcomes should be risk-adjusted to enable meaningful comparisons with common standards and benchmarks as well as comparisons between providers.

It was thought at the time that a NCV outcomes registry would support the acquisition of data to determine current procedural volumes, case cost, and develop projections of future volumes as well as provide a quality tool to aid clinical decision-making and service delivery planning and be a valuable resource for research initiatives.

Furthermore, there was strong interest within the vascular community and CCN to work together with the Ministry, LHINs, and other provincial programs on the development and implementation of a program model that would leverage current expertise, resources, infrastructure, and established networks to ensure NCV care was able to fully benefit from provincial oversight and management.

3.5 Initial Objectives of this QBP

The key objectives of the LEOD QBP were to:

- Improve health outcomes of LEOD patients;
- Manage the cost of surgical and endovascular care for the treatment of LEOD on the healthcare system;
- Be accountable to patients with LEOD;
- Ensure equitable access to standardized care for the treatment of LEOD across Ontario; and
- Address service gaps and/or need for capacity and infrastructure management to determine future development needs

3.6 Documentation and Clinical Engagement

Documentation in CIHI administrative databases of LEOD revascularization cases was, at the time, incomplete. Details about all inpatient procedures were mandated for entry into CIHI databases. Details about same day procedures completed in fully equipped operating rooms,

hybrid operating rooms and catheterization labs were also mandated for entry into CIHI databases; however, there were other procedure room environments where it was not mandatory to enter same day procedure details into CIHI databases. An example of such a procedure room environment is diagnostic imaging/interventional radiology (DI/IR) suites. This example was relevant given that lower extremity revascularization procedures are performed in DI/IR suites in addition to other environments such as fully equipped operating rooms and hybrid operating rooms.

For those cases that were initially documented in CIHI administrative databases, an 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 was unclear as were the risk factors that predict outcomes. Further to the absence of clear diagnostic information, outcome indicators were limited in the available administrative databases making it difficult to identify areas in which to focus quality improvement efforts. To improve LEOD care, it was recommended that improved data collection including standardized reporting and data entry with attention provided to the collection of specific quality indicators was required. Recommendations to improve data collection included:

- **Provider coding:** data should be classified at the provider or specialty level.
- **Diagnostic coding:** should be improved to clearly reflect the presentation of symptoms and should be simplified and limited to one code each for claudication, critical ischemia, and acute ischemia. There were more than 20 LEOD diagnostic codes, most of which did not clearly identify the reason for intervention.
- **Procedure coding:** location attributes should be added to provide greater visibility into the anatomical location of the procedure (e.g., above knee, below knee or both) as the location of the revascularization affects cost and expected patient outcome.
- **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 NCV outcomes registry.
- **Documented evidence** that a patient with claudication received an adequate trial of a supervised walking exercise program prior to surgery should be mandatory.

Based on these recommendations, the **Vascular Registry** was developed and implemented provincially in April 2014 to enable the collection and reporting of risk-adjusted patient outcomes.

With the introduction of CorHealth Ontario's **Information and Digital Strategy** in June 2018, CorHealth Ontario continued to focus on opportunities to enhance the value of reporting while reducing the data burden on hospitals. CorHealth Ontario engaged vascular clinical and administrative stakeholders through a formal Task Group with the aim of defining data needs to support health system vascular performance monitoring and improvement. The recommendations from the Task Group were used to inform decisions around current data acquisition practices as well as data reporting.

In 2018, through ongoing engagement with the Task Group and CorHealth Ontario's Vascular Leadership Council, and in collaboration with ICES, CorHealth Ontario developed a **provincial vascular reporting strategy**. Following an extensive literature review and a consultation and validation process, key patient characteristics, procedure characteristics and outcome indicators were identified as initial metrics to provide insight into provincial vascular health system performance. As the recommended characteristics and indicators could reasonably be satisfied through existing administrative databases, the Vascular Registry was decommissioned in May 2019.

CorHealth Ontario released an inaugural **Vascular Volumes and Outcomes Report** in March 2020 using data from health care administrative data sources which were risk-adjusted where appropriate. Subsequent reports are released annually. Ontario Health - CorHealth Ontario will continue to work with the MOH and CIHI to address important data gaps and will rely on collaborative stakeholder input to shape the focus and scope of future data collection, analysis, and reporting.

4.0 Best Practices to Guide Implementation

The provincial Discharge Abstract Database (DAD) was used initially as the primary source of evidence to describe practice and outcomes variation across Ontario for LEOD revascularization procedures. This work was conducted to support the Vascular Services Quality Strategy for Ontario that was submitted by CCN to the MOHLTC in May 2012.

The clinical significance of these data was validated by consensus of the **Ontario Vascular Services Advisory Committee** which had a membership of vascular surgeons, vascular interventional radiologists and hospital administrators from academic and community hospitals from across Ontario.

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 that was formed to advise on the initial development of this QBP was a subcommittee of the Vascular Care Working Group (see Membership).

The panel members were engaged in this process through face-to-face meetings, teleconference, and email exchange which allowed the opportunity to review and evaluate relevant guidelines, literature, and data (see References), and to provide expertise and input and arrive at expert consensus for the initial content of this handbook.

Best practices were subsequently reviewed and updated by a review panel of vascular specialists, vascular program administrators, and health data experts (see 2020 Review Panel Membership) and are reflected in this revised handbook.

4.1 Best-Practice Clinical Pathways

Two pathways are recommended to describe best practices for the treatment of LEOD based on the clinical presentation of the patient.

1. Treatment of patients who will benefit from an **elective** revascularization procedure (Figure 2); and
2. Treatment of patients who require an urgent/emergent **non-elective** revascularization procedure (Figure 3)

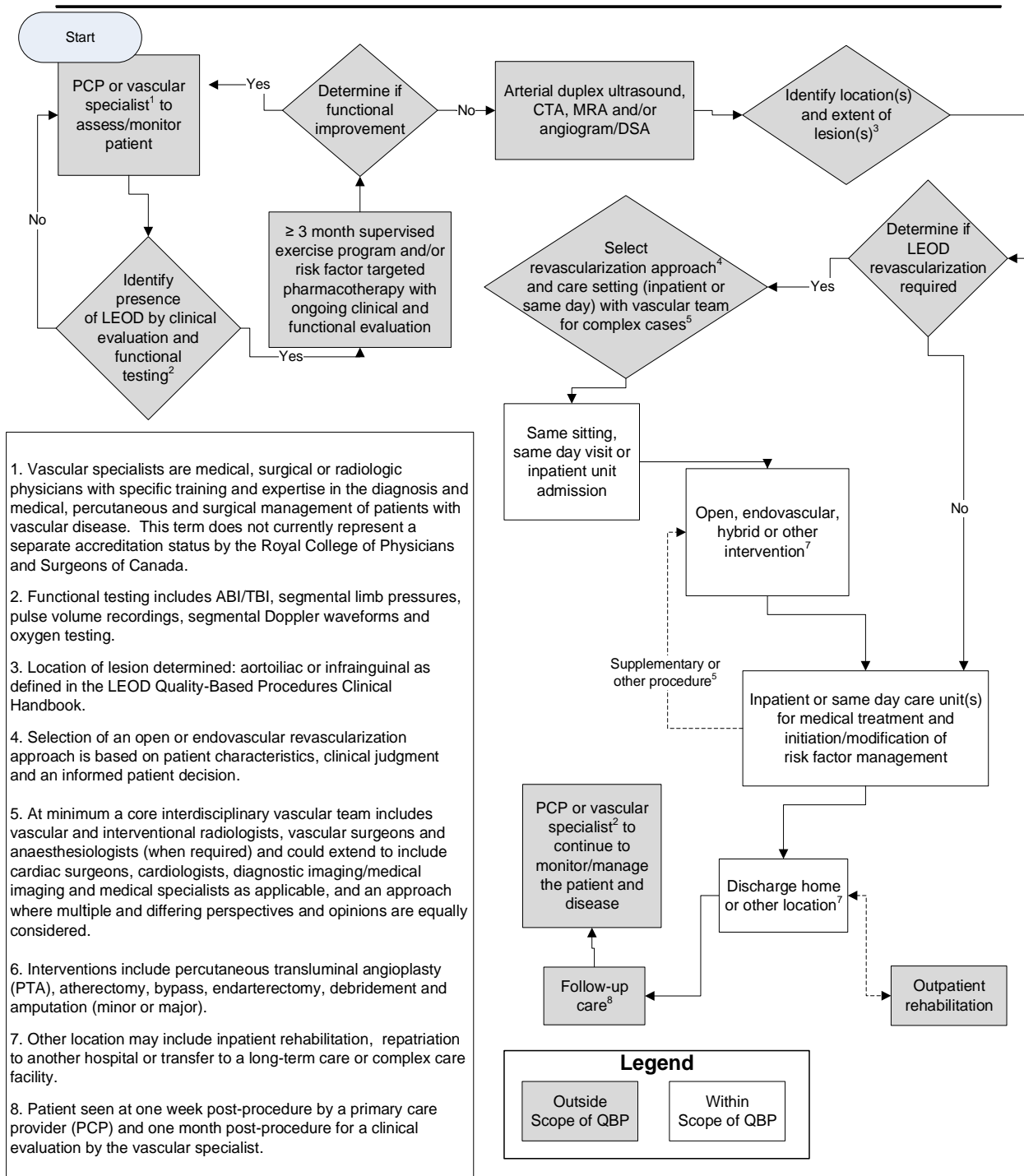
Both clinical pathways describe the continuum of care from initial patient presentation in a physician office or hospital to post-discharge follow-up care and on-going patient management.

QBP funding, however, currently only includes the period that a patient is in hospital to receive treatment for LEOD.

The patient clinical pathways are not treatment practice guidelines. They represent the most common journey of LEOD patients through the healthcare system during the periprocedural time period, and are focused on quality, coordination, and efficiency of care.

Figure 2. Treatment of Elective Lower Extremity Occlusive Disease

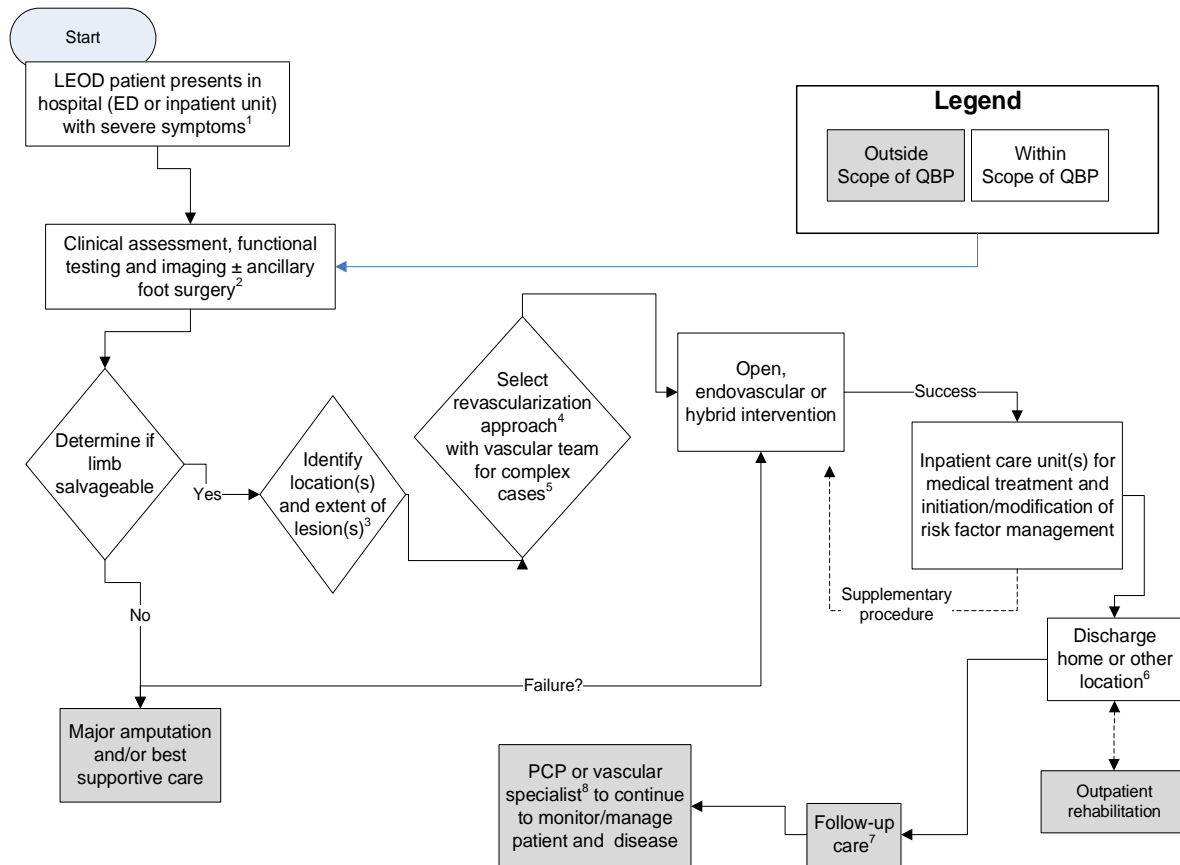
Elective LEOD Clinical Pathway



1. Vascular specialists are medical, surgical or radiologic physicians with specific training and expertise in the diagnosis and medical, percutaneous and surgical management of patients with vascular disease. This term does not currently represent a separate accreditation status by the Royal College of Physicians and Surgeons of Canada.
2. Functional testing includes ABI/TBI, segmental limb pressures, pulse volume recordings, segmental Doppler waveforms and oxygen testing.
3. Location of lesion determined: aortoiliac or infrainguinal as defined in the LEOD Quality-Based Procedures Clinical Handbook.
4. Selection of an open or endovascular revascularization approach is based on patient characteristics, clinical judgment and an informed patient decision.
5. At minimum a core interdisciplinary vascular team includes vascular and interventional radiologists, vascular surgeons and anaesthesiologists (when required) and could extend to include cardiac surgeons, cardiologists, diagnostic imaging/medical imaging and medical specialists as applicable, and an approach where multiple and differing perspectives and opinions are equally considered.
6. Interventions include percutaneous transluminal angioplasty (PTA), atherectomy, bypass, endarterectomy, debridement and amputation (minor or major).
7. Other location may include inpatient rehabilitation, repatriation to another hospital or transfer to a long-term care or complex care facility.
8. Patient seen at one week post-procedure by a primary care provider (PCP) and one month post-procedure for a clinical evaluation by the vascular specialist.

Figure 3. Treatment of Non-Elective Lower Extremity Occlusive Disease

Non-elective LEOD Clinical Pathway



1. Patients with severe symptoms including pain, ischemic rest pain, non-healing ulcers, tissue loss, gangrene, infection and/or loss of motor or sensory function (excluding trauma patients)
2. Ancillary foot surgery including toe or foot amputation and wound debridement.
3. Location and extent of lesion: aortoiliac or infrainguinal as defined in the LEOD Quality-Based Procedures (QBP) Clinical Handbook.
4. Selection of an open or endovascular revascularization approach is based on patient characteristics, clinical judgement and an informed patient decision.
5. At minimum a core interdisciplinary vascular team includes vascular and interventional radiologists, vascular surgeons and anaesthesiologists (when required) and could extend to include cardiac surgeons, cardiologists, diagnostic imaging/medical imaging and medical specialists as applicable, and an approach where multiple and differing perspectives and opinions are equally considered.
6. Other location may include inpatient rehabilitation, repatriation to another hospital or transfer to a long-term care or complex care facility.
7. Patient seen at one week post-procedure by the primary care provider (PCP) and one month post-procedure for a clinical evaluation by the vascular specialist.
8. Vascular specialists are medical, surgical or radiologic specialists with specific training and expertise in the diagnosis and medical, percutaneous and surgical management of patients with vascular disease. This term does not currently represent a separate accreditation status by the Royal College of Physicians and Surgeons of Canada.

4.2 Comprehensive Lower Extremity Occlusive Disease Care

In 2015, CCN released the **Ontario Current State Assessment and Proposed Program Framework: Acute Care Vascular Service**. The framework describes three distinct levels of hospital-based vascular programs. The levels are organized such that:

- A Level 1 program provides the most comprehensive vascular services.
- All levels assume a baseline of services including assessment, diagnostic testing, intervention, and follow-up.
- All vascular programs have the necessary infrastructure, equipment, and clinical expertise to provide at minimum a composite of at least **50 cases/year of open abdominal aortic aneurysm repair, carotid endarterectomy, and LEOD revascularization** either by open and/or endovascular approaches.
- The complexity of procedures should reflect the clinical expertise and experience within the program as well as appropriate resources and infrastructure.

A complete list of recommended criteria for Level 1, Level 2, and Level 3 vascular centers is found in the [Ontario Current State Assessment and Proposed Program Framework: Acute Care Vascular Service](#).

Assessment

Prior to intervention, patients presenting with claudication due to LEOD should have:

- a. Clinical evaluation and functional testing confirming a diagnosis of LEOD; and
- b. An adequate trial (at least 3 months) of supervised exercise therapy and pharmacologic risk factor modification (e.g., treatment for hypertension, diabetes, hypercholesterolemia, and smoking)

If no functional improvement is observed after at least 3 months of exercise therapy and risk factor modification, it is reasonable to complete imaging assessment(s) to identify the location(s) and extent of lesion(s). Both endovascular and open revascularization therapeutic options should be considered and the approach for intervention (open or endovascular) should be based on patient characteristics, clinical judgment, and an informed patient decision.

Pre-Procedural Care

1. Appropriate physiologic risk assessment/management of co-morbidities is undertaken when possible
 - a. Cardiac risk assessment and stratification

- i. Testing could include: 12-lead ECG in patients with documented clinical risk factor(s); left-ventricular function test in patients with dyspnea or prior heart failure; non-invasive stress testing in patients with poor (less than 4 METs) or unknown functional capacity and three or more clinical risk factors, where clinical risk factors include: ischemic heart disease, compensated or prior heart failure, 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 myocardial infarction (MI, within one month of planned intervention), decompensated heart failure, significant arrhythmias, severe valvular disease
 - b. Respiratory/pulmonary
 - i. Respiratory assessment could include: patient history, physical examination, determination of functional capacity, response to bronchodilators, arterial blood gas analysis
 - c. Renal
 - ii. Renal function assessment could include: serum creatinine, creatinine clearance and/or glomerular filtration rate
 - d. Assessment of atherosclerotic risk factors
 - e. Appropriate anesthesiologist/another specialist assessment as required
2. Appropriate anatomical imaging must be available, including available CT workstation(s) that allow centerline measurements and multiplanar CT reconstructions
3. Patient consultation & informed consent. Standardized consent forms would ensure that all patients in Ontario receive consistent information from which to inform their decision

Intra-Procedural Care

1. Appropriate pre-procedural pharmacologic risk reduction (e.g., antibiotic delivery and deep vein thrombosis prophylaxis)
2. Procedure undertaken or supervised by an appropriately trained & certified practitioner
3. General/regional/local anesthesia and/or sedation provided by a practitioner who is experienced in sedation/anesthesia for vascular interventions
4. Nursing staff appropriately trained in vascular care
5. An appropriately equipped and accredited hospital
6. Completion of pre-procedural checklist
7. Access to appropriate imaging and interventional equipment

Post-Procedural Care

1. Access to a special care unit or step-down unit
2. Access to dialysis
3. Access to 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 with access to home nursing support for surgical wounds
3. Evidence-based wound therapy for foot ulcers, wounds, and amputation sites; ideally provided in interprofessional dedicated wound clinics
4. Access to rehabilitation services including amputee and prosthetic services

Follow-up Care

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

Adoption of the evidence-based best-practice recommendations provided in the LEOD revascularization QBP pathways is expected to improve patient outcomes through:

1. Refined indications for intervention;
2. Increased use of supervised walking exercise programs;
3. Access to treatment with the least invasive and most effective therapy;
4. Reduced rate of complications secondary to pre-operative care and maximized risk reduction;
5. Maximized wound healing secondary to careful management; and

6. Availability of risk-adjusted outcomes with provincial comparisons to enable practice adjustments to improve patient outcomes

5.0 Implementation of Best Practices

The provincial DAD was used initially as the primary source of evidence to describe practice and outcomes variation across Ontario for LEOD revascularization repair. Although there is already a high level of care provided to patients receiving LEOD revascularization, there are variabilities in outcomes and indicators of efficiency across Ontario suggesting opportunities for improvements in the delivery of this core NCV 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: LOS, 30-day readmission rates, operative mortality, and availability 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 LEOD revascularization and other NCV services, formation of a **network** of NCV care was proposed with the primary goals to enhance quality of care and outcomes and provide timely access for NCV care.

The network should include stakeholders involved in the delivery of services, including interprofessional care providers in hospitals and outpatient centers, administrators with a standard approach to support evidence-based and effective diagnostic and therapeutic management for NCV patients and organizations with expertise in emergency referral and management. Ontario Health - CorHealth Ontario's **Vascular Leadership Council** currently exists as this network.

An organization-specific plan for the implementation of best practices 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;
- Performance measurement and monitoring of relevant clinical and process outcomes;
and
- A sustainability plan for maintaining the Best Practice Standards

Details of each of these steps are outlined in the '**Toolkit to Support the Implementation of Quality-Based Procedures**' published by the Ontario Hospital Association (OHA) available under general tools and resources on the [Health Quality Ontario QBP Connect](#) website.

According to the OHA, there are three key success factors to QBP implementation: senior leadership support, clinician engagement, and high-quality data. Furthermore, organizations should consider engaging patients in this process. Patient participation in the evaluation and implementation of the QBP is one of the ways in which patients' values and perspectives are heard and integrated into health decisions.

6.0 What Does it Mean for Interprofessional Teams?

A move towards standardization of best practices for treatment of LEOD will require hospitals to consider a coordinated and collaborative interprofessional vascular team approach to vascular care where multiple and differing perspectives and opinions are equally considered, and patient/caregiver informed choice is included.

The interprofessional vascular team should involve a network of care providers with various expertise including but not limited to vascular and interventional radiologists, surgeons (vascular, orthopedic, and plastics), nurses, nurse practitioners, internal medicine practitioners, anesthesiologists, intensive care practitioners, technologists, pharmacists, and allied health providers to facilitate continuity of inpatient, outpatient and rehabilitation care, and chronic disease management. Innovative solutions are required to plan for and meet the future vascular care human resource needs and maintain levels of service delivery.

The recommendations for interprofessional best-practice revascularization of LEOD are based on evidence from current guidelines (see References), current protocols and practice in Ontario hospitals, and consensus of subject matter experts (see Membership). Alignment of these recommendations with current clinical practice will vary across institutions, however it is felt that many hospitals are currently following similar practices.

7.0 Service Capacity Planning

In 2015, the CCN and its Vascular Care Working Group completed a current state analysis of provincial vascular services and developed the '**Ontario Current State Assessment and Proposed Program Framework: Acute Care Vascular Services**' framework for acute care vascular services in Ontario.

Using this framework as a guide, in 2016, CorHealth Ontario worked with hospitals to provide **Level 1-3 designations** to acute care vascular programs across the province. CorHealth Ontario then completed a re-evaluation of vascular programs in 2019, resulting in 9 hospitals with a Level 1 vascular program designation, 9 hospitals with a Level 2 vascular program designation, and 2 hospitals with a Level 3 vascular program designation in the province of Ontario. Additionally, in 2020, one hospital with a Level 3 vascular program was re-designated as a Level 2 vascular program.

The impact that QBP based funding will have on **hospital volumes** of LEOD revascularization remains to be determined; however, health service providers (clinicians and administration) will need to continue volume planning. Factors that could affect LEOD revascularization volumes include changes in incidence and prevalence of LEOD as well as a change in the number of hospitals providing core 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.

Ontario Health - CorHealth Ontario will continue to work with the MOH and collaborate with vascular stakeholders, including through the Ontario Health - CorHealth Ontario Vascular Leadership Council, to monitor and report provincial and hospital volumes and outcomes and provide leadership and strategic direction to support the planning, funding, and delivery of high-quality vascular care in the province.

8.0 Performance Evaluation and Feedback

To better understand volumes, patient outcomes, regional differences, and areas for quality improvement, the CCN and its Vascular Care Working Group established a provincial **Vascular Registry** as it was determined that the provincial health care administrative databases captured only administrative and procedural information.

The Registry was designed as a clinical database that was used for standardized collection of patient demographic, clinical, and procedure level information which could then be used for performance measurement, monitoring, and quality improvement.

As mentioned previously, with the introduction of CorHealth Ontario's **Information and Digital Strategy**, the focus shifted to enhancing the value of reporting while reducing the burden on hospitals for data collection. Through engagement with vascular stakeholders, a vascular reporting strategy was developed. As the recommended patient characteristics and outcome indicators could reasonably be satisfied through existing administrative databases, the Vascular Registry was decommissioned in May 2019.

CorHealth Ontario released to the 20 Ontario hospitals with vascular programs, an inaugural **Vascular Volumes and Outcomes Report** in March 2020. Data were from health care administrative data sources which were risk-adjusted where appropriate. Subsequent reports are released annually. Ontario Health - CorHealth Ontario will continue to work with the MOH and CIHI to address important data gaps and will rely on collaborative vascular stakeholder input to shape the focus and scope of future data collection, analysis, and reporting.

9.0 Support for Change

An Ontario network of engaged vascular specialists and other health care professionals that provide care for LEOD patients can foster and support collaboration, continuous quality improvement, and increase efficiencies in NCV care.

In 2011, CCN, together with Ontario's NCV services providers and other stakeholder groups, formed the **Ontario Vascular Services Advisory Committee** and developed an evidence- and consensus-based framework for a provincial quality strategy aimed at improving access to NCV care and NCV health outcomes for Ontarians. The strategy, entitled: **"A Vascular Services Quality Strategy for Ontario"** was submitted to the MOHLTC in May 2012.

Subsequently, CCN convened a **Vascular Care Working Group** to act on the recommendations of the strategy, and the **"Ontario Current State Assessment and Proposed Program Framework: Acute Care Vascular Services"** was developed in August 2015 which resulted in the designation of 21 hospitals with vascular programs in Ontario.

Ontario Health - CorHealth Ontario's Vascular Leadership Council continues to be an engaged and enthusiastic group of vascular leaders to provide direction and guidance to the organization. Ontario Health - CorHealth Ontario remains committed to providing leadership and strategic direction to support an Ontario network of vascular stakeholders and to continue to lead the change management related to this QBP.

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11.0 Membership

2013 Vascular Care Clinical & Technical Working Group QBP Sub-Committee

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Dr. Thomas Lindsay	University Health Network, Toronto General Hospital
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