

Provincial Lower Limb Ischemia Primary Care Clinical Pathway

Quick
Links:

[Primer & Expanded details](#)

[Provider resources](#)

[Patient pathway](#)

[Provide feedback](#)

This pathway is only for patients without palpable pedal pulses (i.e., *dorsalis pedis* AND *posterior tibial* pulses are absent).

1. Lower Limb Ischemia Suspected (any of the following):

- Trophic/Colour changes
- Claudication leg pain when walking
- Forefoot pain at rest
- Persistent slow-healing infections (> 2 weeks)
- History of Peripheral Arterial Disease (PAD) or PAD suspected

2. Red Flags

Acute Limb Ischemia

- Abrupt Motor/Sensory Loss

6 “P”s of Arterial Occlusion:

- | | |
|------------------------------|-----------------|
| ✓ Pain | ✓ Pulselessness |
| ✓ Pallor | ✓ Paresthesia |
| ✓ Poikilothermia (cold limb) | ✓ Paralysis |

Chronic Limb-Threatening Ischemia

- Tissue loss, skin ulceration or digital gangrene (all types of gangrene)
- Constant pain in foot at rest WITH confirmatory feature of Peripheral Arterial Disease (PAD)

Emergency Consultation
Call RAAPID or Call 911

No Red Flags

Mild or No Pain

- Intermittent claudication/pain managed
- Can continue with work/life activities

Incorporate a high index of suspicion for lower limb ischemia when PAD is likely present

3. Investigations

- Ankle Brachial Index (Refer if ABI ≤ 0.40) or
- Toe Pressure (Refer $<40\text{mmHg}$) if ABI not available

Claudication Severity?

4. Management

- Assess and aggressively manage cardiovascular risk factors including prescribing statin, antihypertensive, and single antiplatelet medications
- Emphasize smoking cessation due to the disproportionate impact of smoking on claudication
- Encourage exercise to promote vessel collateralization
- Coach patient to return with specific signs/symptoms (rest pain and non-healing wounds)
- Consider antibiotics for infections in limb
- Consider dietitian support where available
- Access regional foot care clinics as appropriate (see expanded details)

Changes to limb presentation during ongoing management?

Return to top of algorithm and reassess for referral triggers

5. Do Not Delay Referral for Non-Invasive Vascular Lab Studies. If available in region, consider ordering ABI / TBI concurrent with referral.

Provincial Vascular Referral Pathway: Chronic Limb Threatening Ischemia

Initiate/continue aggressive management of cardiovascular risk factors during referral process.

Moderate/ Severe

- Pain unmanageable with walking but still resolves with rest
- Pain limits mobility (unable to walk $>20\text{m}$)
- Unable to work or engage in life activities
- ABI less than or equal to 0.40 (*If known)
- Absolute toe pressure less than 40 mmHg (*If known)

5. Provincial Vascular Referral Pathway: Asymptomatic Peripheral Artery Disease or Intermittent Claudication

This primary care pathway was co-developed Primary Care Physicians, Vascular Surgeons, Patient and Family Advisors, and the Alberta Health Services (AHS) Provincial Pathways Unit. It is intended to be used in conjunction with specialty advice services, when required, to support care within the medical home.

EXPANDED DETAILS

Pathway Primer

Peripheral arterial disease (PAD) is a widely prevalent condition in Canada. Recent evidence suggests that nearly 800,000 Canadians live with PAD, and approximately 10% of patients with intermittent claudication are likely to deteriorate within five years. Of the patients who develop critical limb ischemia (CLI), up to 30% will require a major amputation. Additional evidence demonstrates that Indigenous Canadians experience a disproportionate percentage of atherosclerotic diseases (Bonneau, et al., 2018).

Avoiding the major complications of limb ischemia is accomplished through early detection and management of PAD in the primary care setting. This pathway supports primary care providers in the conservative management of chronic vascular-related limb ischemia, which includes the promotion of lifestyle, diet, and medications related to cardiovascular risks. If conservative management is not effective, this pathway differentiates what clinical presentations would trigger either a non-urgent or an urgent referral to vascular specialty care.

Note: Vascular surgery services are in Calgary and Edmonton only. This has important implications for the timely identification, differentiation, and management of limb ischemia in primary care. Travel considerations may factor into the choice patients make regarding a *next-available* specialist or a *closest* specialist during the referral process.

1. Limb Ischemia Suspected

It is estimated that between 2-3% of young healthy individuals will have an absent dorsalis pedis artery pulse on palpation [1]. The absence of a pedal pulse without any of the accompanying signs of poor perfusion suggests that there is no underlying vessel stenosis. Explore other causes for patients who complain of leg muscular/cramping pain with exercise.

The following signs and symptoms suggest the presence of lower limb ischemia for inclusion into this pathway:

Patient Symptoms/Chief Complaint(s)

- Muscular/cramping leg pain while walking (possible claudication)
- Forefoot/top of foot pain at rest
- Lower limb pain that emerges while in a recumbent position

Physical Exam

- Trophic/colour changes to a single limb
- Cool mottled limb (unilaterally)
- Persistent, slow healing limb infections (*excluding osteomyelitis)
- Presence of early-stage gangrene
 - **Dry** gangrene is most associated with peripheral arterial disease. Early onset of dry gangrene is characterized by the presence of dry and shriveled skin that looks brown, purplish, blue, or black.
 - **Wet** or gas gangrene is most associated with diabetic vasculopathy and infections.



Confirmatory Features/Differential Diagnoses

For this pathway, it is important to confirm that the poor perfusion is caused by a vascular issue. Establishing a differential diagnosis for pain, the source of infections, and whether an issue is local to a single limb are all important diagnostic considerations.

Differential Diagnosis for pain [3]:

- Vascular-related pain occurs after an interval of recumbency. Claudication (muscle related) limb pain at rest is listed as a confirmatory feature. The pain is also exacerbated by walking (claudication).
- Diabetic neuropathy pain is not related specifically to recumbency. Patients may lose light-touch sensation (mono-filament test) and experience a decreased vibratory sense. The [Diabetes Foot Care Clinical Pathway](#) is a comprehensive guide that includes the evaluation of peripheral arterial disease.
- Night cramps (mimics claudication) cramps in a calf muscle and will wake the patient from sleep. The differentiator is that pain is relieved by massaging the muscle, by walking, or using anti-spasmodic agents.
- Arthritis pain in the metatarsal bones may cause foot pain. It is not associated with recumbency.
- Sciatica pain felt originating in the gluteal region and typically travels down one leg. A differentiating characteristic is that pain typically goes away within a few weeks, and pain that can be relieved by stretching, ice packs and OTC pain medication [4].

Etiology of Infection: A confirmatory sign for inclusion into this pathway is the presence of persistent infections in the limb. It is important to differentiate between perfusion-based infections and those infections caused by environmental factors such as cold, wet, and/or unsanitary conditions.

All gangrene infections require careful and timely management, but all infections may not need a vascular referral. Identifying the underlying cause should help guide the urgent management of this clinical presentation. Gangrene infections that do not respond to conservative management in the community should be referred to vascular specialty care (See **Red Flags** on the first page algorithm).

Unilateral Findings: Poor perfusion can cause neurological symptoms such as paresthesia and diminished function. The differentiator for vascular causes is that the signs and symptoms are isolated to a single limb, and they have the accompanying features of lower limb ischemia (claudication leg pain, cool mottled limb, slow healing infections, etc.) which suggests a local vascular cause versus a systemic neurological cause.

2. Red Flags

Acute Limb Threat

An emergent referral is required when lower limb ischemia presents with abrupt motor/sensory loss. The abrupt onset and loss of function is consistent with a major vessel occlusion due to an embolus.

Large Vessel Occlusion: Acute lower limb ischemia is most often related to an arterial occlusion. In rarer circumstances, limb ischemia is venous based (phlegmasia). The etiology of a large vessel occlusion includes exacerbation of thrombosis in a previously patent vessel, direct tissue trauma, an arterial aneurysm, or a proximal embolus migrating into the limb [2]. The occlusive process can be gradual as in the presence of deteriorating patency from atherosclerosis, or the occlusion can be more sudden as in the presence of a migrating embolus.

Clinical presentations: Proximal occlusion of a large vessel from an embolus will develop symptoms over a period of hours. The symptoms can range from worsening claudication to a complete paralysis of the limb. In the case of an embolus, the patient will often be able to articulate the moment their symptoms began. The six "P"s of acute arterial occlusion are:

- | | |
|---|-----------------------------------|
| i. Pain | iv. Pulselessness |
| ii. Pallor | v. Paresthesia |
| iii. Poikilothermia (cold limb) | vi. Paralysis (Red Flag) |

Chronic / Progressive Limb Threatening Ischemia

The presentations that warrant a referral for *Chronic Limb Threatening Ischemia*:

Tissue Loss, ulcerations, or gangrene:

Wet Gangrene: Characterized by swelling, blistering, and a wet appearance of the skin that is typically associated with diabetes, vasculopathy, or infection. The infection will spread rapidly and must be treated immediately.

Dry Gangrene: is characterized by the presence of dry and shriveled skin that looks brown, purplish, blue, or black (see section 1 above).

Constant foot pain at rest:

Pain is located across the top of the foot and toes. Pain is made worse by elevating the affected leg. Pain may be accompanied by a cool and mottled lower limb. Pain while at rest indicates that the vascular stenosis has progressed to the point where distal tissues are no longer perfused adequately.

3. Investigations

Important Note: The goal of this pathway is to ensure that rapid access to specialty care is based on signs and symptoms of vascular insufficiency (e.g., severe claudication). Referral to Vascular specialty does not require Ankle Brachial Index (ABI) values or toe pressure lab values because that requirement could unnecessarily delay access to surgical interventions. However, if one or both of those values become known during management, the Primary Care Provider should consider referring to Vascular specialty with an ABI of ≤ 0.4 or a toe pressure of < 40 mmHg.

Test Results

- Non-Invasive Vascular Lab Study: During ongoing management, obtaining a Doppler ultrasound and ABI can provide additional insight into the severity of the occlusion. An ABI ≤ 0.4 and/or a toe pressure of less than 40mmHG with accompanying claudication should trigger a *chronic limb threat* referral.
- Bloodwork: Assess and aggressively manage cardiovascular risk factors. A lipid panel and HgA1C informs clinical management.

Note: A CT scan is not recommended as a routine evaluation for chronic limb ischemia. However, during the referral process the vascular specialist may determine that a CT is required for their clinical planning.

4. Management in the Primary Care Setting

The management of lower limb ischemia in Primary Care is focused on supporting the underlying cardiovascular risk factors.

- **Aggressive Management of Cardiovascular Risk Factors:** An aggressive multi-pronged approach using medications, along with promoting lifestyle and diet modification, is necessary.
Emphasize smoking cessation: [AlbertaQuits \(healthiertogether.ca\)](https://healthier.together.ca) Smoking cessation information. Evidence demonstrates a strong link between smoking and claudication [5,6].
- Encourage exercise to promote vessel collateralization:
 - [Alberta Healthy Living Program | Alberta Health Services](#) (All five provincial zones)
 - [Supervised Exercise Programs](#) (Not in all communities)
 - [Prescription to get active](#)
 - [Healthier Together](#)
- **Patient Coaching:** [Peripheral Arterial Disease \(myhealth.alberta.ca\)](https://myhealth.alberta.ca) Sudden and acute exacerbation of ischemia can occur in patients with pre-existing peripheral arterial disease. Helping patients to recognize the signs and symptoms of red flags and/or alarm features is a key component of management. Patients should be advised to access medical care immediately if concerning signs/symptoms develop. The accompanying patient pathway provides guidance for patients.
- Consider Dietitian Support where available.

Lower Limb Assessment Clinics

High risk foot teams and wound assessment clinics are in all five provincial zones (North, Edmonton, Central, Calgary, South). Consider these resources during ongoing management in the Primary Care setting.

Link: [Diabetes Foot Care Clinical Pathway Toolkit | Alberta Health Services](#)

5. Referral Process

Referral pathways are guidelines to help referring providers know what information, labs and diagnostic imaging are required with their referral to a specialty. These pathways are co-designed with Primary and Specialty Care, AHS Operations, and patients to ensure the right amount of information is included throughout the referral process to triage the patient as quickly as possible. To ensure referring providers have referral information at their fingertips, referral pathways may link to clinical pathways when available. AHS manages referral pathways and extensive work is ongoing as part of the [Alberta Surgical Initiative](#). If you have questions or want to know more about the referral pathway development process, please email access.ereferral@ahs.ca.

- **Emergency Consultation** – Call surgeon on call via [RAAPID](#) or call 911.
- Follow the [Provincial Vascular, Adult Referral Pathway](#) and use the [Facilitated Access to Specialized Treatment \(FAST\) Provincial Referral Form](#).
- [Alberta Referral Directory](#) is also a helpful resource for all referral information.

BACKGROUND

About this pathway

- This pathway was developed in collaboration with Primary Care Providers, Vascular Surgeons, Patient and Family Advisors, and the Alberta Health Services (AHS) Provincial Pathways Unit.
- Condition-specific clinical pathways are intended to offer evidence-based guidance to support primary care providers in caring for patients with a range of clinical conditions.

Authors and conflict of interest declaration

- The authors represent a multi-disciplinary team. Names of the content creators and their conflict-of-interest declarations are available on request by emailing AlbertaPathways@ahs.ca.

Pathway review process, timelines

- Primary care pathways undergo scheduled review every two years, or earlier if there is a clinically significant change in knowledge or practice. The next scheduled review is June 2026. However, we welcome feedback at any time. Please send us your [feedback here](#).

Copyright information

This work is licensed under a Creative Commons Attribution-NonCommercial-Share Alike 4.0 International license. You are free to copy, distribute and adapt the work for non-commercial purposes, as long as you attribute the work to Alberta Health Services and abide by the other license terms. If you alter, transform, or build upon this work, you may distribute the resulting work only under the same, similar, or compatible license. The license does not apply to content for which the Alberta Health Services is not the copyright owner.



© 2024 Alberta Health Services

PROVIDER RESOURCES

Advice Options

Zone	Program	Online Request	Phone Number	Hours of operation	Anticipated Turnaround Time
Urgent Telephone					
All Zones	RAAPID 	N/A	North: 1-800-282-9911 780-735-0811 South: 1-800-661-1700 403-944-4486	7 days per week 24 hours	1 hour
Non-Urgent Telephone					
Edmonton, North	ConnectMD 	Online Request	1-844-633-2263	Mon - Fri 9am – 6pm*	2 business days
Calgary	Specialist Link 	Online Request	403-910-2551	Mon - Fri 8am – 5pm*	1 hour

*There are some exceptions to non-urgent telephone program hours of operation and exclusion.

You can request non-urgent advice at any point when uncertain about medications, next steps in treatment, investigations, or resources available.

Other resources

Resources	Link
Diabetes Foot Care SCN Pathway Toolkit	www.albertahealthservices.ca/scns/Page13331.aspx
Smoking Cessation	https://albertaquits.healthiertogether.ca/
Provincial Vascular, Adult Referral Pathway	www.albertahealthservices.ca/assets/info/aph/if-aph-provincial-vascular-referral-pathway.pdf

PATIENT RESOURCES

Resources	Link
Patient Pathway on MyHealth Alberta > A webpage and two PDF formats are available to allow for easy printing, download, or scanning a QR code with the patient's smart phone for more information at their convenience	https://myhealth.alberta.ca/HealthTopics/lower-limb-ischemia-pathway/Documents/lower-limb-ischemia-pathway-summary.pdf
Peripheral Arterial Disease (MyHealth Alberta)	https://myhealth.alberta.ca/health/pages/conditions.aspx?Hwid=aa105361

REFERENCES

1. K. Moore K., and A. Dalley, Clinically Oriented Anatomy. Fifth edition. Philadelphia: Lippincott Williams & Wilkins; 2006. [Dorsalis Pedis Artery - Physiopedia \(physio-pedia.com\)](https://www.physio-pedia.com/Dorsalis_Pedis_Artery_-_Physiopedia) [Accessed 7 June 2023].
2. M. Mitchell and J. Carpenter. "Clinical features and diagnosis of acute lower extremity ischemia". UpToDate.com. [Clinical features and diagnosis of acute lower extremity ischemia - UpToDate](https://www.uptodate.com/contents/clinical-features-and-diagnosis-of-acute-lower-extremity-ischemia) [Accessed 7 June 2023].
3. J. Santilli and M. Santilli, American Family Physician. [Chronic Critical Limb Ischemia: Diagnosis, Treatment and Prognosis | AAFP](https://www.aafp.org/afp/chronic-critical-limb-ischemia) [Accessed 7 June 2023].
4. USA Vascular Centers. "Leg pain: is it peripheral arterial disease or sciatica?" ([U.S. Vascular Centers](https://www.usvascularcenters.org/leg-pain-is-it-peripheral-arterial-disease-or-sciatica/)) [Accessed 7 June 2023].
5. National Library of Medicine, "The measured effect of stopping smoking on intermittent claudication," [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/7082968> [Accessed 9 June 2023].
6. National Library of Medicine, "Smoking and the Pathophysiology of Peripheral Artery Disease," [Online]. Available: www.ncbi.nlm.nih.gov/pmc/articles/PMC8429807 [Accessed 9 June 2023].