A call for integrated foot care and amputation prevention pathways for patients with diabetes and peripheral arterial disease across Canada

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Dear Editor,

Leg amputation is a devastating complication of diabetes and peripheral arterial disease (PAD). While most diabetic and many PAD-related amputations are preventable, foot care and amputation prevention efforts remain shockingly disjointed in Canada. Primary prevention efforts are often not supported by clear referral networks when foot wounds, gangrene, or infection arise. Acute care of these complications may also lack the required multidisciplinary input from a range of experts: foot specialists (chiropody/podiatry), wound care nursing, surgeons, physicians, occupational and physical therapists, social workers, and pharmacists. Furthermore, multi-morbidity and social marginalization can hinder compliance with treatment recommendations and sustained secondary prevention.

Evidence-based guidelines exist to inform best practice around screening and the key pillars of evaluation and treatment—wound care, pressure offloading, treatment of infection, assessment, and treatment of arterial insufficiency (Botros et al. 2017; National Institute for Health and Care Excellence 2015; Hingorani et al. 2016). However, anyone involved in foot care in Ontario can attest to the fact that

patients frequently fail to navigate the disjointed services necessary to prevent limb loss. In the United States and Europe, limb preservation programs and accredited specialty centres consistently achieve inspiring results (Neville and Kayssi 2017; Khan et al. 2018; Morbach et al. 2016). Their success is underpinned by prompt evaluation, multidisciplinary expertise, and dedicated resources. No such centres exist in Canada. Furthermore, variable population density across large regions creates a unique challenge in providing consistent health services to patients at risk of limb loss. Geography has been shown to be an important determinant of cardiovascular health across Canada (Tu et al. 2017). Amputations due to diabetes and peripheral arterial disease are likely no exception.

On this premise, we recently sought to characterize variation in the rate of amputation due to diabetes and peripheral arterial disease across Ontario. From population-based administrative health datasets, which were linked using unique encoded identifiers and analyzed at the Institute for Clinical Evaluative Sciences (ICES), all diabetes or PAD-related lower extremity minor and major amputations were identified between April 1, 2011 and March 31, 2016, among residents over the age of 40. Age- and sex-adjusted amputation rates were determined for each of the 14 administrative health regions (Local Health Integration Networks) in addition to crude rates in specified subgroups: lowest income quintile, dialysis patients, and patients living in long-term care. The adjusted rate of minor (foot) or major (above the ankle) amputations ranged from 5.37 to 21.45 per 100,000 person-quarters (Fig. 1). The adjusted rate of major amputations ranged from 2.47 to 12.62 per 100,000 person-quarters. Regions that are sparsely populated had the highest amputation rates, whereas the lowest amputation rates were seen in more densely populated regions. The same regions were high or low outliers whether looking at rates of any (minor or major) amputation, major amputations alone, diabetic patients alone, PAD patients alone, or the pre-specified subgroups.

The geographical expanse of Canada is likely an important barrier to consistent and coordinated delivery of various health

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Fig. 1 Age- and sex-standardized rates of minor or major amputations for diabetes or peripheral arterial disease across Ontario

services. Integrated trauma systems for severely injured patients and regionalization of cancer care have, however, helped overcome geographic barriers to care and save lives (MacKenzie et al. 2006; Canadian Partnership Against Cancer 2015). With respect to amputation prevention, multidisciplinary evaluation and intervention for complex wounds and arterial insufficiency could be directed towards dedicated centres of excellence, ideally modeled on limb preservation centres in the US and Europe (Neville and Kayssi 2017; Khan et al. 2018; Morbach et al. 2016). However, screening in primary care and outpatient foot care are as, if not more, important than acute care of foot complications. In order to maximize sustained patient compliance, outpatient foot care for both primary and secondary prevention must be offered at or near their home rather than at potentially distant centres of excellence. Regional foot care and amputation prevention efforts must, therefore, integrate primary care, outpatient foot clinics, hospital services, home care, and rehabilitation expertise to help preserve mobility and independence. A recent example

of an integrated provincial pathway exists in Alberta (Alberta Health Services 2017). The Albertan initiative includes a recommended foot screening tool, assessment and referral guidelines, online resources for patients and healthcare providers, as well as defined multidisciplinary high-risk foot teams. Ultimately, due to geography, demographics, and the opportunity costs of resource allocation decisions, every region will require tailored solutions suited to their communities. However, in all instances, an ounce of amputation prevention is worth a pound of treatment.

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