Strategies to reduce out-of-pocket medication costs for Canadians with peripheral arterial disease

Background: Given that peripheral arterial disease (PAD) disproportionately affects people of lower socioeconomic status, out-of-pocket expenses for preventive medications are a major barrier to their use. We carried out a cost comparison of drug therapies for PAD to identify prescribing strategies that minimize out-of-pocket expenses for these medications.

Methods: Between March and June 2019, we contacted outpatient pharmacies in Hamilton, Ontario, Canada, to assess pricing of pharmacologic therapies at dosages included in the 2016 American College of Cardiology/American Heart Association guideline for management of lower extremity PAD. We also gathered pricing information for supplementary charges, including delivery, pill splitting and blister packaging. We calculated prescription prices with and without dispensing fees for 30-day brand-name and generic prescriptions, and 90-day generic prescriptions.

Results: Twenty-four pharmacies, including hospital-based, independent and chain, were included in our sample. In the most extreme scenario, total 90-day medication costs could differ by up to $1377.26. Costs were affected by choice of agent within a drug class, generic versus brand-name drug, quantity dispensed, dispensing fee and delivery cost, if any.

Conclusion: By opting for prescriptions for 90 days or as long as possible, selecting the lowest-cost generic drugs available in each drug class, and identifying dispensing locations with lower fees, prescribers can minimize out-of-pocket patient medication expenses. This may help improve adherence to guideline-recommended therapies for the secondary prevention of vascular events in patients with PAD.

Graham R. McClure, MD, MSc
William F. McIntyre, MD
Peter Belesiotis, MD
Eric Kaplovitch, MD
Noel Chan, MD
Vinai Bhagirath, MD
Gurneet Chahill, MD
Abigail Hayes, MD
Gunsharan Sohi, MD
Wendy Bordman, MD
Richard P. Whitlock, MD, PhD
Sonia S. Anand, MD, PhD
Emilie P. Belley-Côté, MD, PhD

Accepted Oct. 31, 2022

Correspondence to:
E. Belley-Côté
David Braley Cardiac, Vascular and Stroke Research Institute
237 Barton St E
Hamilton ON L8L 2X2
emilie.belley-cote@phri.ca

Cite as: Can J Surg 2024 January 3;67(1). doi: 10.1503/cjsa.003722
A n estimated 1.5 million Canadians older than 40 years live with symptomatic peripheral artery disease (PAD), and globally it affects more than 230 million people, a burden that will rise substantially with the increasing prevalence of diabetes and smoking in developing countries. Peripheral artery disease has a similar prevalence as and worse prognosis than coronary artery disease but is the least-screened and least-treated manifestation of atherosclerosis.1–3 Although considerable resources are allocated to develop novel therapeutic approaches for atherosclerosis, the underuse of established guideline-recommended secondary prevention therapies remains a driving factor for excess adverse cardiovascular events in PAD.4 There has been insufficient focus on ensuring this optimal medical treatment. Studies have consistently documented substantial underuse of proven antithrombotic therapies and other secondary prevention medications (statins and angiotensin-converting-enzyme inhibitors), as well as poor uptake of smoking cessation strategies.5,6 Paradoxically, although patients with PAD experience nearly double the rate of major adverse cardiac events as patients with coronary artery disease, they are prescribed preventive medications at almost half the coronary artery disease rate.7 This disparity is associated with substantial additional cost. A Canadian study showed that the mean cost of a hospital stay for patients with any coronary artery disease was $1743, compared to $4677 for patients with PAD.8

Importantly, it has been reported that improved implementation of secondary prevention therapies in patients with PAD is associated with reduced all-cause mortality.9 Consequently, improving uptake of existing therapies could lead to substantial benefit.

Given that PAD disproportionately affects people of lower socioeconomic status, out-of-pocket expenses for medications are a major barrier to their use.10 Practical strategies to reduce medication costs are urgently needed to improve uptake of risk-reduction therapies.

We carried out a cost comparison of drug therapies for PAD to identify prescribing strategies that minimize out-of-pocket expense for these life-saving medications.

**METHODS**

The Hamilton Integrated Research Ethics Board waived the need for formal ethics approval for this study.

Between March and June 2019, we contacted outpatient pharmacies in Hamilton, Ontario, Canada11 to assess pricing of pharmacologic therapies for PAD at evidence-based dosages included in the 2016 American College of Cardiology/American Heart Association guideline for management of lower extremity PAD.12 We also gathered pricing information for supplementary charges, including delivery, pill splitting and blister packaging. Pharmacies responded to a standardized questionnaire (Appendix 1, available at www.canjsurg.ca/lookup/doi/10.1503/cjs.003722/tab-related-content). We calculated prescription prices with and without dispensing fees for 30-day brand-name and generic prescriptions and 90-day generic prescriptions. When multiple generic or brand-name options of the same drug were available, we selected the cheapest option. We estimated the average annual household income of the postal code in which the pharmacies were located based on Canadian Census data.13 To assess generalizability, we sampled pharmacies in Toronto, Ontario, and Winnipeg, Manitoba, using identical methods. All prices are presented in Canadian dollars. The perspective of an independent patient paying out of pocket was taken in all cases.

**RESULTS**

We contacted 24 pharmacies: 4 hospital-based, 16 chain-based and 4 independent (Table 1). The average annual household income of the postal code in which the pharmacies were located ranged from $41396 to $190813.

We observed substantial variation in cost for each individual agent, as well as variation between drugs in the same class (Table 2) and between brand-name drugs and the generic version (Table 3).14 Differences in cost for 90-day supplies of the same single agent sold at different pharmacies and/or produced by 2 different companies ranged from $11.55 to $57.23 for generic drugs and from $45.51 to $650.07 for brand-name drugs. Results for pharmacies in Toronto and Winnipeg did not appear to differ substantially from those for Hamilton (data not shown).

Dispensing fees ranged from $3.89 to $13.00 (Table 1) and were charged per medication fill/refill; this resulted in tripled fees for 30-day versus 90-day prescriptions. Delivery service was offered by 20 pharmacies (83%), at no added cost in 16 of the 20 (80%). Pill splitting and blister packaging were offered by 23 pharmacies (96%), at no additional cost in all cases.

**Net cost difference**

The maximum potential 90-day cost difference for guideline-based15 medical PAD therapy consisting of an angiotensin-converting-enzyme inhibitor/angiotensin receptor blocker, a statin, and either clopidogrel monotherapy or low-dose rivaroxaban and acetylsalicylic acid (ASA) was $1377.26 (Table 4). When we included only generic medication options, the maximum potential 90-day cost difference was $106.18 (Table 5).

**DISCUSSION**

We found substantial variation in the cost of medications within the same drug class for secondary prevention in
patients with PAD. Cost differences were driven by choice of agent, generic versus brand-name drug selection, quantity dispensed and where medications were ultimately dispensed from. By selecting the least expensive options, prescribers could reduce the cost of secondary prevention medication by up to $1377.26 every 90 days. When we considered only generic medication options, the patient cost savings was $106.18 every 90 days.

As shown in both Canadian and international settings, medication cost affects compliance.\textsuperscript{15,16} Populations of lower socioeconomic status, such as patients with PAD, are more vulnerable to this factor. Given that Canadian per capita expenditures on prescription medications rank among the highest in the world, second only to those in Switzerland,\textsuperscript{17} we need to recognize the importance of strategically selecting medical therapies to limit patient cost and promote adherence. Reduction of expenditures on prescription medications may further result in system-level efficiencies, such as reductions in insurance costing and other consumer expenses, which, in turn, may further improve adherence.

Although concern may be raised regarding the interchangeability of generic and brand-name medications, a systematic review and meta-analysis showed the lack of significant difference in efficacy between these 2 groups.\textsuperscript{18} In light of this and the substantial cost disparity observed in the present study, it is difficult to justify continued prescription of brand-name agents, particularly in populations of low socioeconomic status.
With regard to cost differences based on dispensing institution, our results suggest that chain pharmacies provide the lowest dispensing fees to consumers. However, this may reflect differences in services and counselling provided by each service location. Further investigation is required to better understand this disparity.

The combination of low-dose rivaroxaban (2.5 mg twice daily) and ASA reduces rates of major adverse cardiac and limb events (including major amputation) in patients with PAD while maintaining an acceptable bleeding profile.14 Cost is a barrier to using this combination, with 70% of vascular surgeons in a Canadian survey citing cost as their principal concern with direct oral anticoagulant prescribing.19 Our study shows that the combination of low-dose rivaroxaban and ASA remains less expensive than brand-name Plavix (Bristol-Myers Squibb Pharmaceutical Group) monotherapy, although it is more expensive than generic clopidogrel. Regardless, given the proven efficacy of low-dose rivaroxaban and ASA, we do not believe that these cost differences should drive clinical decision-making.

Ultimately, the variability in pharmacy pricing shows the utility of collective bargaining through a national pharmaceutical care plan.20 Our findings show that the net cost savings achievable through such a program would be...
Table 5. Lowest- and highest-cost regimen for a 90-day supply of guideline-based\textsuperscript{12} medical therapy, generic drugs only, including dispensing fee

<table>
<thead>
<tr>
<th>Variable</th>
<th>Lowest-cost regimen</th>
<th>Highest-cost regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angiotensin-converting-enzyme inhibitors</td>
<td>90-d ramipril (generic) 11.83</td>
<td>30-d lisinopril (generic) 76.01</td>
</tr>
<tr>
<td>Antiplatelet agents</td>
<td>90-d ASA (generic) 10.35</td>
<td>30-d ASA (generic) 21.90</td>
</tr>
<tr>
<td>Direct factor Xa inhibitors</td>
<td>90-d rivaroxaban (brand-name) 129.15</td>
<td>30-d rivaroxaban (brand-name) 129.15</td>
</tr>
<tr>
<td>Statins</td>
<td>90-d rosuvastatin (generic) 19.71</td>
<td>30-day rosuvastatin (generic) 50.16</td>
</tr>
<tr>
<td>Potential cost savings, $</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total quarterly cost</td>
<td>171.04</td>
<td>277.22</td>
</tr>
<tr>
<td>Potential quarterly savings</td>
<td>106.18</td>
<td>—</td>
</tr>
<tr>
<td>Total monthly cost</td>
<td>57.01</td>
<td>92.41</td>
</tr>
<tr>
<td>Potential monthly savings</td>
<td>35.40</td>
<td>—</td>
</tr>
</tbody>
</table>

ASA = acetylsalicylic acid.

substantial and, given the documented effect of cost on medication adherence,\textsuperscript{15,16} would almost certainly improve patient outcomes.

In addition to the strategies that we outline, other potential cost-saving measures warrant consideration to optimize patient drug costing. These include options such as pill splitting to minimize cost, and system-level interventions such as the involvement of interdisciplinary care partners, including social work and family health team navigators, aimed at identifying potential drug coverage plans that patients may be eligible for. In addition, multiple jurisdiction-specific electronic resources have been developed to facilitate improved dissemination of cost differences among dispensers and available coverage options (Appendix 2, available at www.canjsurg.ca/lookup/doi/10.1503/cjs.003722/tab-related-content).

Limitations

We assumed that all drugs within a class provide equivalent effect, with the exception of antithrombotics.\textsuperscript{12} In addition, cost variations may differ in provinces other than those sampled, as well as in other communities, such as rural or First Nations, and may vary over time; health care providers may need to assess costs in their own community.\textsuperscript{21} The disparities illustrated here represent potential cost savings only. The actionability of these differences is dependent on current prescribing practices, assessment of which was outside the scope of this study.

Although this study specifically assesses prescribing of vascular protective medication, it is important to consider that medication expenses for comorbid conditions, such as diabetes, which are common in PAD populations, likely compound prescribing disparities and result in substantial additional excess cost. Medication costing should continue to be taken into consideration when optimizing these comorbidities. In addition, barriers to medication adherence are multifactorial and likely include barriers at the patient, prescriber and system levels. Additional strategies such as polypill designs to reduce pill burden may further improve adherence rates.\textsuperscript{22}

CONCLUSION

By opting for prescriptions for 90 days or as long as possible, selecting the lowest-cost generic drugs available in each drug class and identifying dispensing locations with lower fees, prescribers can minimize out-of-pocket patient medication expenses. Minimizing out-of-pocket medication costs may help improve adherence to guideline-recommended therapies for the secondary prevention of vascular events in patients with PAD.

Affiliations: From the Division of Vascular Surgery, McMaster University, Hamilton, Ont. (McClure); the Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ont. (McClure, McIntyre, Whitlock, Anand, Belley-Côté); the Population Health Research Institute, Hamilton, Ont. (McClure, McIntyre, Chan, Bhagirath, Whitlock, Anand, Belley-Côté); the Department of Medicine, McMaster University, Hamilton, Ont. (McIntyre, Chan, Bhagirath, Anand, Belley-Côté); the Michael G. DeGroote School of Medicine, McMaster University, Hamilton, Ont. (Belesiotsi, Chahill, Hayes, Sohi, Bordman); the Department of Medicine, University of Toronto, Toronto, Ont. (Kaplovitch); and the Division of Cardiac Surgery, McMaster University, Hamilton, Ont. (Whitlock).

Competing interests: William McIntyre reports consulting fees from Tri-Med, and payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Servier Laboratories and Bayer. Noel Chan reports funding from the Canadian Institutes of Health Research and the Heart and Stroke Foundation, outside the submitted work, and honoraria for talks from Diagnostica Stago and Boehringer. Vinai Bhagirath reports an unrestricted educational grant from Pfizer, outside the submitted work, and honoraria from Bayer. Richard Whitlock reports grants from AtriCure and Bayer, outside the submitted work; consulting fees from PhaseBio Pharmaceuticals, Artirion and AtriCure, payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AtriCure and LeMaitre Vascular, and support for attending meetings and/or travel from AtriCure and Boehringer Ingelheim. He has participated on a data safety monitoring board and advisory board for Artirion and PhaseBio. Sonia Anand reports consulting fees from Janssen Pharmaceuticals and Bayer, outside the submitted work. Emilie Belley-Côté reports grants or contracts from Bayer, BMS-Pfizer and Roche Diagnostics, outside the submitted work. No other competing interests were declared.

Content licence: This is an Open Access article distributed in accordance with the terms of the Creative Commons Attribution (CC BY-NC-ND 4.0) licence, which permits use, distribution and reproduction in any medium, provided that the original publication is properly cited, the use is noncommercial (i.e., research or educational use), and no modifications or adaptations are made. See: https://creativecommons.org/licenses/by-nc-nd/4.0/.

References


