Engaging physicians to prescribe more cost-effectively

Blueprint for change

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The cost of pharmaceutical spending in Canada continues to rise with concerning rapidity. In 2018 it was the fastest growing category of health care expenditures, at a rate of 3.2% per capita per year. Earlier estimates put total health care spending in 2018 at $253 billion, of which 15.7% was expected to be spent on drugs.[1] Canadians spent approximately $13.1 billion dollars out of pocket on prescription drugs in 2018.[2]

Controlling drug costs allows for an improved allocation of resources to other essential aspects of health care. Physicians' ongoing lack of awareness of drug costs remains a substantial obstacle to controlling spending on pharmaceuticals. A systematic review by Allan et al found that only 31% of physicians' estimates were within 25% of the actual drug cost, with the median estimate being 243% away from the true cost.[3] Medical students and physicians are well aware of the importance of drug costs, yet when asked, few were able to correctly estimate drug costs.[4]

Two of us (I.G. and J.R.L.) previously have encouraged mandating drug cost transparency but have not yet described the different levels through which this could be implemented.[5] Here we explore potential cost savings resulting from 3 progressively more informative methods of implementing drug cost transparency for physicians when prescribing through electronic health records in real time. In these models, drug costs would automatically appear to prescribing physicians at the point of writing a prescription and would use publicly available provincial drug formulary costs.

Financial implications of lack of awareness of drug costs

The financial consequences of physicians' lack of awareness of drug costs are profound. More than 8% of Canadians who received prescriptions in 2016 were unable to afford 1 or more drugs per year.[6] This directly leads to negative health outcomes, as patients are not taking medications as prescribed.[7,8] A particularly egregious example of this lack of knowledge is metformin, the most commonly prescribed medication for diabetes. According to the Ontario Drug Benefit Formulary,[9] the 90-day cost of 2 tablets twice daily of 500 mg of metformin is $8.92. This is in stark contrast to the 90-day cost of 2 tablets once daily of 1000 mg of slow-release metformin at $182.75. Should the prescribing physician be unaware of the price differences, the resulting increase in spending

for this single drug for 1 patient is $7051.07 over 10 years. Generic prices vary across the country; for example, the 10-year difference would be $9400 in Alberta.[10]

Littman and Halil[11] estimated the potential cost savings in 2013 in Canada if the medications that comprised the highest national spending had been substituted for lower-cost options. The framework they used considered efficacy, toxicity, cost, and convenience, and included statins, proton pump inhibitors, angiotensin-converting enzyme inhibitors, and selective serotonin reuptake inhibitors. For those 4 classes of drugs alone, the public spending in Canada was $856 million, and was $1.97 billion including private spending. The study's conservative estimate was that there would be $222 million in savings in public spending and $521 million in savings when including private spending for substituting lower-cost options. Their findings reflect only a small portion of the overall decrease in spending that could result from more cost-effective prescribing that does not affect therapeutic value.

Savings through drug cost transparency

Studies suggest that statistically significant differences in prescribing costs are realized when drug prices are provided to physicians.[12] Electronic prescribing (e-prescribing) with formulary decision support is an option that offers statistically significant cost savings for prescribed drugs.[12,13] A review by Choudhry et al found that introducing an e-prescribing system with decision support that promoted use of generic medications statistically significantly increased physician prescribing of lower-cost medications. One study they reviewed showed an increase of more than 20% in generic drug use, which was sustained for more than 2 years after the system had been implemented.[14]

Level 1: providing the cost of only the prescribed medication. The first level of e-prescribing with formulary decision support is the most basic of the 3 proposed levels. This level displays only the cost of the medication that is being prescribed by physicians. Physicians can then either continue to prescribe the same medication or choose to search for a lower-cost alternative by writing a new prescription. This method requires additional physician time to both consider and search for the cost of each alternative.

Unfortunately, simply showing the cost of an individual drug is unlikely to result in savings. A study by Fargo et al evaluated the implementation of a cost visibility tool for antibiotic prescriptions.[15] A number of ¢ or

$ symbols indicated to physicians the cost category of the antibiotic they were prescribing. Additionally, a link was provided to a list of antibiotics and their relative costs. The cost visibility tool did not result in a significant reduction in antibiotic spending. Although limited to antibiotics, this study suggests that providing only the cost of the prescribed drug might not be sufficient to lower overall spending.

Level 2: providing the costs of both the prescribed medication and therapeutic alternatives. The second level of drug cost transparency involves automatically displaying the costs of alternative drugs within the same therapeutic category as the medication the physician proposes to prescribe. For example, when a physician writes a prescription for atorvastatin a listing of provincial formulary costs of other statins would automatically pop up. This would enable a readily accessible comparison of therapeutically equivalent options at the point of prescribing. Therapeutic equivalents are drugs that achieve the equivalent therapeutic outcomes with similar side effects but have a different chemical structure than the initially chosen medication. Several studies have evaluated the cost savings resulting from this method.

In a study by Fischer et al, community-based primary care providers who had previously used handwritten prescriptions were given e-prescribing software with decision support.[16] In this study, preferred medications requiring lower copayments appeared in green, nonpreferred medications appeared in blue, and medications not covered by insurance appeared in red. While only 20% of prescribers used e-prescriptions in 2005, there was a calculated annual savings of $845 000 (US) per 100 000 patients, with an estimated savings of $3.91 million (US) annually per 100 000 patients if all prescribers had been using e-prescriptions during the study period. This figure could reasonably be expected to increase by a factor of 4 to 5 given the now widespread use of e-prescriptions but would also be affected by the increased cost of drugs since that time.

Another study by Newman et al[17] displayed 4 levels of cost categories ($, $$, $$$, $$$$) alongside antibiotic susceptibility information. This simple intervention demonstrated a 31.3% decrease in the average cost per unit of antibiotics prescribed. Prescribers found this low-cost intervention to be very intuitive to use.

McMullin et al[18] instituted an e-prescribing system with decision support in a primary care setting. The system required the physician to select a diagnosis, at which point a screen appeared containing a brief clinical message with a list of prescribing options labeled as preferred, covered, or high copay. This intervention group showed a decrease of 9.1% in the use of targeted high-cost medications, compared with an 8.2% increase in the control group, which had not been provided the cost information. The use of this system also included

evidence-based encouragement to prescribe more cost-effectively. The result was a savings of $850 per prescriber per month, which more than offset the monthly system cost of $150 per prescriber.

Level 3: providing the cost of the prescribed medication and therapeutic alternatives together with prompts. The third level of drug cost transparency incorporates levels 1 and 2 but includes prompts that advise physicians of more cost-effective alternatives and requires them to override proposed alternatives. Strong evidence supports this method and indicates it would result in the highest cost savings of the 3 proposed levels.

Stenner et al[19] implemented alerts at the point of prescribing that recommended cost-effective alternatives for statins, serotonin receptor agonists, intranasal steroid sprays, and proton pump inhibitors. In this study, a pop-up alert appeared when a physician prescribed a nonrecommended therapy, encouraging the use of a lower-cost, therapeutically equivalent drug. The study demonstrated quarterly savings of $200 000 (US), or $800 000 (US) annually for the 45 000 members of the health plan where the study was undertaken. Extrapolating the data to the entire United States population resulted in an estimated savings of $5.7 billion (US).

Zuker et al[20] created a system that incorporated therapeutically equivalent and generic substitutions for existing medications in the formulary of a health maintenance organization. When a physician entered a prescription, a list of therapeutically equivalent medications appeared, with the preferred drug highlighted at the top. If the physician did not choose to prescribe the preferred drug, a brief form appeared requesting the physician indicate the reason for declining the more cost-effective alternative. This intervention took physicians only seconds to complete. Physicians were more likely to ignore suggestions when there was too long a list of medication substitutions from which to choose. This suggests that presenting too many choices could be detrimental to cost-efficient drug prescribing. Overall, this study showed an estimated cost savings of 5% without compromising quality of care.

Gipson et al[21] implemented a computerized alert system to inform physicians, at the point of prescribing, of an equivalent lower-cost medication for 3 commonly prescribed high-cost drugs in 2 academic medical centres in Washington State. The prescriber was then required to cancel the order and replace it with a more cost-effective alternative or to override the alert. The alerts were self-explanatory, so no education on use of the system was provided. They found savings of $99 400 (US) annually for the 180 patients studied, replicating cost savings observed in other studies that have used electronic cost alerts.[22] Combining alerts with an educational program resulted in continued prescribing of cost-effective medications by the physicians during the following year. However,

this conclusion was based on a single drug (intravenous chlorothiazide). Most respondents found the alerts to be self-explanatory and believed that in the absence of such alerts drug cost information was otherwise not easily or reliably available.

Solution to level 3 alert fatigue

One potential concern is that level 3 might produce too many alerts and that this might result in alert fatigue, leading to a high level of alert overrides.[23] To overcome this problem, Gipson et al suggested that alerts that were frequently overridden should be removed from the system unless there was clear therapeutic benefit to retaining them.[21]

A second way to diminish alert fatigue would be to change the default option when prescribing. In a default system a higher-cost medication would be automatically substituted with a lower-cost, therapeutically equivalent medication, but physicians would have the option to override the substitution and revert to the original medication with a single click.[24] Automatically defaulting to lower-cost drugs with an override option has resulted in substantial and sustained shifts toward prescribing preferred drugs.[24,25] A recent study by Monsen et al[26] implemented an interruptive alert design for 4 high-cost medications, which resulted in estimated savings of $127000 (US) per year at 210 outpatient clinics. To avoid alert fatigue, the alerts were concise and had clear instructions on how to dismiss them.

Benefits of level 3 versus level 1 cost visibility

Pevnick et al[27] examined 2 types of prescribing decision support. Noninterruptive decision support features a symbol indicating costs that appear adjacent to the prescribed medication. Interruptive decision support provides alerts to the physician at the point of prescribing. The authors found that interruptive alerts made a statistically significant difference in changing physician prescribing behaviour in favour of preferred medications from 61% with noninterruptive decision support to 78%.[27] Noninterruptive decision support that displayed only the cost tier of the medication at the time of prescribing did not significantly change prescribing behaviour, suggesting superiority of a level 3 approach versus that of level 1.

Conclusion

Cost savings are best optimized by using interruptive decision support that requires physicians to opt out of prescribing the lowest-cost therapeutically equivalent drug when they have selected a higher-cost drug. Implementing such a blueprint for change in Canada would result in substantial savings in drug spending and improved prescribing. Additional research is needed to directly compare savings of a level 3 approach versus a level 2 approach and to assess the cost, estimated savings, and best way to implement a level 3 system in Canada.

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References
1. Canadian Institute for Health Information. *National health expenditure trends, 1975 to 2018.* Ottawa, ON: Canadian Institute for Health Information; 2018.
2. Canadian Institute for Health Information. *Drug spending at a glance.* Ottawa, ON: Canadian Institute for Health Information; 2018. Available from: **https://www.cihi.ca/sites/default/files/document/nhex-drug-infosheet-2018-en-web.pdf.** Accessed 2020 Aug 18.
3. Allan G, Lexchin J, Wiebe N. Physician awareness of drug cost: a systematic review. *PLoS Med* 2007;4:e283.
4. Schutte T, Tichelaar J, Nanayakkara P, Richir M, van Agtmael M. Students and doctors are unaware of the costs of drugs they frequently prescribe. *Basic Clin Pharmacol Toxicol* 2017;120(3):278-83.
5. Gorfinkel I, Lexchin J. We need to mandate drug cost transparency on electronic medical records. *CMAJ* 2017;189(50):E1541-2.
6. Law M, Cheng L, Kolhatkar A, Goldsmith L, Morgan SG, Holbrook AM, et al. The consequences of patient charges for prescription drugs in Canada: a cross-sectional survey. *CMAJ Open* 2018;6(1):E63-70.
7. Tamblyn R, Eguale T, Huang A, Winslade N, Doran P. The incidence and determinants of primary nonadherence with prescribed medication in primary care: a cohort study. *Ann Intern Med* 2014;160(7):441-50.
8. Tamblyn R, Laprise R, Hanley JA, Abrahamowicz M, Scott S, Mayo N, et al. Adverse events associated with prescription drug cost-sharing among poor and elderly persons. *JAMA* 2001;285(4):421-9.
9. Ontario Drug Benefit Formulary/Comparative Drug Index [database online]. *Metformin.* Toronto, ON: Queen's Printer for Ontario; 2018. Available from: **https://www.formulary.health.gov.on.ca/formulary/results.xhtml?q=metformin&type=1.** Accessed 2020 Aug 18.
10. Alberta College of Family Physicians. *Price comparison of commonly prescribed pharmaceuticals in Alberta 2019.* Edmonton, AB: Alberta College of Family Physicians; 2019. Available from: **https://acfp.ca/wp-content/uploads/2019/02/ACFPPricingDoc2019.pdf.** Accessed 2020 Aug 18.
11. Littman J, Halil R. Potential effects of rational prescribing on national health care spending. More than half a billion dollars in annual savings. *Can Fam Physician* 2016;62:235-44 (Eng), e146-56 (Fr).
12. Goetz C, Rotman S, Hartoularos G, Bishop TF. The effect of charge display on cost of care and physician practice behaviors: a systematic review. *J Gen Intern Med* 2015;30(6):835-42.
13. Tamblyn R, Winslade N, Qian CJ, Moraga T, Huang A. What is in your wallet? A cluster randomized trial of the effects of showing comparative patient out-of-pocket costs on primary care prescribing for uncomplicated hypertension. *Implement Sci* 2018;13(1):7.
14. Choudhry NK, Denberg TD, Qaseem A; Clinical Guidelines Committee of the American College of Physicians. Improving adherence to therapy and clinical outcomes while containing costs: opportunities from the greater use of generic medications: best practice advice from the Clinical Guidelines Committee of the American College of Physicians. *Ann Intern Med* 2016;164(1):41-9.
15. Fargo KL, Johnston J, Stevenson KB, Deutscher M, Reed EE. Impact of a cost visibility tool in the electronic medical record on antibiotic prescribing in an academic medical center. *Hosp Pharm* 2015;50(6):496-504.
16. Fischer MA, Vogeli C, Stedman M, Ferris T, Brookhart MA, Weissman JS. Effect of electronic prescribing with formulary decision support on medication use and cost. *Arch Intern Med* 2008;168(22):2433-9.
17. Newman KL, Varkey J, Rykowski J, Mohan A. Yelp for prescribers: a quasi-experimental study of providing antibiotic cost data and prescription of high-cost antibiotics in an academic and tertiary care hospital. *J Gen Intern Med* 2015;30(8):1140-6.
18. McMullin ST, Lonergan TP, Rynearson CS. Twelve-month drug cost savings related to use of an electronic prescribing system with integrated decision support in primary care. *J Manag Care Pharm* 2005;11(4):322-32.
19. Stenner SP, Chakravarthy R, Johnson KB, Miller WL, Olson J, Wickizer M, et al. E-prescribing: reducing costs through in-class therapeutic interchange. *Appl Clin Inform* 2016;7(4):1168-81.
20. Zuker A, Heart T, Parmet Y, Pliskin N, Pliskin JS. Electronic notifications about drug substitutes can change physician prescription habits: a cross-sectional observational study. *Med Decis Making* 2011;31(3):395-404.
21. Gipson G, Kelly JL, McKinney CM, White AA. Optimizing prescribing practices of high-cost medications with computerized alerts in the inpatient setting. *Am J Med Qual* 2017;32(3):278-84.
22. Hulgan T, Rosenbloom ST, Hargrove F, Talbert DA, Arbogast PG, Bansal P, et al. Oral quinolones in hospitalized patients: an evaluation of a computerized decision support intervention. *J Intern Med* 2004;256(4):349-57.
23. Ancker JS, Edwards A, Nosal S, Hauser D, Mauer E, Kaushal R, et al. Effects of workload, work complexity, and repeated alerts on alert fatigue in a clinical decision support system. *BMC Med Inform Decis Mak* 2017;17(1):36.
24. Malhotra S, Cheriff AD, Gossey JT, Cole CL, Kaushal R, Ancker JS. Effects of an e-prescribing interface redesign on rates of generic drug prescribing: exploiting default options. *J Am Med Inform Assoc* 2016;23(5):891-8.
25. Patel MS, Day S, Small DS, Howell JT III, Lautenbach GL, Nierman EH, et al. Using default options within the electronic health record to increase the prescribing of generic-equivalent medications: a quasi-experimental study. *Ann Intern Med* 2014;161(10 Suppl):S44-52.
26. Monsen CB, Liao JM, Gaster B, Flynn KJ, Payne TH. The effect of medication cost transparency alerts on prescriber behavior. *J Am Med Inform Assoc* 2019;26(10):920-7.
27. Pevnick JM, Li N, Asch SM, Jackevicius CA, Bell DS. Effect of electronic prescribing with formulary decision support on medication tier, copayments, and adherence. *BMC Med Inform Decis Mak* 2014;14:79.

This article has been peer reviewed. *Can Fam Physician* 2020;66:723-5

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