Managing chronic diseases in the frail elderly: More than just adhering to clinical guidelines

Barbara Farrell, BScPhm, PharmD, FCSHP; Salima Shamji, MD, CCFP, FCFP, CoE;
Dan Dalton, BSc, BScPhm

Introduction

Polypharmacy is a common result of managing multiple chronic diseases. While applying guidelines and adjusting medications to reach clinical targets, health care practitioners may inadvertently worsen quality of life. For example, a typical response to a high A1c level in a person with type 2 diabetes would be to increase oral hypoglycemic doses or add another medication to reach target; certainly, hypoglycemia would not be immediately suspected. Similarly, it might be difficult to think of reducing doses of heart failure medication when side effects such as hypotension are detected. Patients referred to the Bruyère Geriatric Day Hospital (GDH) for a 12-week admission and seen for medication review have an average of 9 drug-related problems, the most common of which include no longer needing a medication and suffering from an adverse effect.¹

This case illustrates how addressing hypoglycemia by reducing medication use and addressing low blood pressure by reducing heart failure medications were effective in reducing fall risk. Taking steps to improve pain control, mood and sleep disturbances assisted in restoring function and ultimately improved medication adherence, diabetic control and quality of life for the patient. A description of the GDH processes and, in particular, communication about medication-related care can be found in Appendix 1 (available online at cph.sagepub.com/supplemental).

Patient case

A 79-year-old man was referred to the GDH for assessment of cognition, pain, falls, difficulty with mobility and transfers, mood, dizziness and insomnia. His medical history was significant for prostate cancer, low back pain secondary to severe spinal stenosis, long-standing depression, osteoarthritis of the hips and knees, myocardial infarction 7 years previously with coronary artery bypass grafting (CABG), left-sided heart failure secondary to ischemic cardiomyopathy (NYHA class II), bilateral total knee replacements, type 2 diabetes, moderate sensory neural hearing loss, 3 previous upper gastrointestinal bleeds and bilateral cataract surgery. Blood work revealed mildly elevated potassium (5.3 mmol/L) and elevated random blood glucose (12.7 mmol/L); creatinine clearance was 54 mL/min (using the Cockcroft–Gault equation with ideal body weight). The patient was filling his own dosette (3 weeks at a time) and stated he took his medications twice daily—between 8 and 10 AM and then at 6 PM—in addition to bedtime sedatives. Medication adherence had been questioned in the past, and he brought to his admission assessment several empty vials that should already have been refilled.

On initial examination, the patient's chief complaint was his lack of mobility, caused by pain and shortness of breath on exertion. He described a sharp, shooting pain as well as aching pain (ranging from 7 to 10 out of 10 on a visual analogue scale [VAS]) in his lower

This article is one of several prepared as part of a collaboration between the Geriatric Day Hospital of Bruyère Continuing Care, the Canadian Medical Association Journal, Canadian Family Physician and the Canadian Pharmacists Journal to assist clinicians in the prevention and management of polypharmacy when caring for older patients in their practices.

KNOWLEDGE INTO PRACTICE

- Even in the face of elevated A1c, monitor for signs and symptoms of hypoglycemia in older persons.
- Fall risk can be increased by several classes of drugs including hypoglycemics, antihypertensives and sedatives; their impact on falls should be assessed on a regular basis.
- Opioids can be safely used in elderly people when started slowly and monitored carefully and can offer significant benefit to control pain and improve quality of life.

back that radiated down both legs, and he had multiple areas of back tenderness to palpation as well as significant left shoulder pain. His shortness of breath had been long-standing since his CABG, and he required frequent breaks when performing his instrumental activities of daily living (IADLs) and activities of daily living (ADLs). His history of depression, which he attributed to his pain, included lack of interest in social activities, poor sleep, anxiety, poor appetite and passive suicidal ideation. He had fallen 3 or 4 times in the last 6 months and admitted to having episodes of dizziness, particularly when changing positions and sometimes accompanied by nausea; this resulted in significant anxiety around fear of falling. He was noted to have low blood pressure (BP) and orthostatic hypotension, with a first lying BP of 94/54 to 70/47 mmHg on standing and several days later a lying BP of 105/60 to 72/44 mmHg on standing. Because of complaints of dizziness and generally feeling unwell, the patient was advised to start a log book to track his blood glucose levels to identify whether hypoglycemia could be playing a role; several lows between 3.3 and 3.6 mmol/L with no apparent pattern were quickly noted. Pain, lack of sleep, low BP, orthostatic hypotension, anxiety and possibly hypoglycemia were felt to have been contributing to falls. The GDH pharmacist, nurse, social worker, occupational therapist, recreation therapist and physiotherapist were consulted. The GDH pharmacist conducted a medication assessment, which included a 45-minute comprehensive patient interview, chart review and communication with both the patient and the family physician. Each medication was assessed for indication, effectiveness, safety, compliance and patient knowledge.² The results of the initial part of this assessment are outlined in Table 1.

STOP HERE: If you are using this case report for group discussion, go to Appendix 2 (cph.sagepub.com/supplemental) for instructions, discussion questions and blank worksheets. You may print out the above case description and Table 1 for discussion prior to moving on to reading about the results of the medication assessment.

Signs and symptoms were assessed to determine potential drug causes.³ The complete medication assessment is outlined in Table 2.

STOP HERE: If you are using this case report for group discussion, go to Appendix 3 (cph.sagepub.com/supplemental) for instructions, discussion questions and blank worksheets. You may print out the above case description and Table 2 for discussion prior to reading about how the care plan was implemented.

A number of changes were made to reduce fall risk, optimize pain management and mood and address issues of adherence. The patient's frequent hypoglycemic episodes, noted on his logbook, were eliminated by stopping his sitagliptin and switching his glyburide to gliclazide MR. To reduce the risk of falls and dizziness, lorazepam and eplerenone were stopped, trazodone was reduced and ramipril was lowered from 10 mg to 5 mg; final BP range in the latter third of his admission was 112/78 to 135/86; his symptoms of dizziness improved. To manage mood, pain control and sleep, the patient was started on venlafaxine XR as well as long-acting acetaminophen and hydromorphone, which was eventually converted to Hydromorph Contin. This led to an improvement in pain from 10/10 to 5/10 on a VAS. There were no adverse drug withdrawal events with any tapering, including the benzodiazepine. Because the GDH nurse had observed the patient make several errors while filling his dosette, his community pharmacist was consulted to begin providing filled blister packs and the patient agreed. The reduction in sedating, blood pressure-lowering and blood sugar-lowering medications, along with improved pain control and other health care professional interventions, led to fewer episodes of dizziness, improved sleep and mood and an increase in 6-minute walk from 195 to 310 m. No further falls were reported in the last half of the program attendance. Chronological steps taken to implement the medication changes throughout the admission are outlined in Table 3, and a final medication list is presented in Box 1.

TABLE 1 History of medication experience*

#	Drug	Reason for use (if known)	Knowledge, efficacy, compliance, goals, safety assessment	Duration (if known)
1	ASA 81 mg daily	Secondary prevention	Myocardial infarction with CABG in 2004 BP: Day 1 (lying 95/45; standing 70/47) Day 3 (lying 105/60; standing 72/44) No bruising or bleeding	Since 2004.
2	Metoprolol 50 mg, ½ tablet twice daily			
3	Ramipril 10 mg daily			
4	Atorvastatin 40 mg daily			
5	Eplerenone 25 mg daily	Heart failure	K ⁺ : 5.3 at GDH admission; no changes in SOB since eplerenone started; no complaints of paroxysmal nocturnal dyspnea.	Eplerenone very recently added.
6	Metformin 500 mg, 2 tablets twice daily	Diabetes	<ul style="list-style-type: none"> A1c = 0.081. At GDH, blood sugar ranged from 6.1 to 13.2 (post). Hypoglycemic episodes (several noted on log between 3.3 and 3.6). 	?
7	Glyburide 10 mg twice daily			?
8	Sitagliptin 100 mg daily			?
9	Vitamin D 1000 IU 2 tablets daily	Osteoporosis	Takes when remembers—not in dosette (no level available).	?
10	Trazodone 100 mg at bedtime when needed	Insomnia	<ul style="list-style-type: none"> Taking both trazodone and lorazepam regularly. Having nightmares routinely. 	?
11	Lorazepam 1 mg at bedtime		Dose recently reduced from 2 mg.	?
12	Lactulose 30 mL when needed	Constipation	Taking as needed (constipation sometimes followed by diarrhea).	?
13	Metamucil 1 tbsp daily	Constipation	Started at GDH preadmission assessment.	1 month
14	Tolterodine 1 mg twice daily	Nocturia	Finding very helpful for bladder control; up to bathroom 0-3 times/night.	?
15	Pantoprazole 40 mg daily	Upper GI bleed history	<ul style="list-style-type: none"> Upper GI bleeds 2004, 2008; patient told to take for life. Recently reduced from twice daily. 	Many years
16	Vitamin B ₁₂ 1200 µg daily	B ₁₂ deficiency	Level at GDH admission: 434 pmol/L.	?

*Intolerances: morphine (hallucinations).

ASA, acetylsalicylic acid; BP, blood pressure; CABG, coronary artery bypass graft; GDH, Geriatric Day Hospital; GI, gastrointestinal; SOB, shortness of breath.

Discussion

Addressing hypoglycemia in the face of high A1c

Elderly individuals show signs of hypoglycemia that include confusion, delirium, dizziness, weakness and falls. In the face of an elevated A1c, it is still important to consider hypoglycemia as a significant contributor to any of these presenting symptoms in an older person. For

the patient described here, it is possible that sitagliptin had been recently added without considering glucose level patterns or that its potential impact, in addition to the glyburide, on hypoglycemia had not yet been identified. In this patient, a diabetic log book revealed several hypoglycemic episodes from 3.3 to 3.6 mmol/L with no particular pattern. Given the recent introduction of sitagliptin and the patient's

TABLE 2 Medication care plan

#	Drug-related problem	Action plan	Monitoring (team)
1 2	Despite A1c of 0.081, glucose in normal range at GDH; several hypoglycemia (3.3-3.6) episodes; would benefit from <ul style="list-style-type: none"> Reducing/stopping sitagliptin. Reducing glyburide or changing to gliclazide (less prone to cause hypoglycemia; can be given daily). 	<ul style="list-style-type: none"> Taper and stop sitagliptin. Taper glyburide and consider change to gliclazide MR 30 mg daily. 	Blood glucose targets: <ul style="list-style-type: none"> Pre 4-7 mmol/L Post 5-10 mmol/L Random <14 mmol/L A1c target: 7%-8.5%
3	Depression (lack of interest in social activities, anxiety, poor sleep and appetite, passive suicidal ideation): Would benefit from an antidepressant.	<ul style="list-style-type: none"> Start escitalopram 10 mg daily for 1 week. If tolerated, increase escitalopram to 20 mg daily. 	Mood; SSRI side effects (nausea, tremor, dry mouth, dizziness, dizziness, palpitation, syncope, etc.) Serotonin syndrome—also on trazodone (anxiety, sweating, etc.)
4 5	Patient has knee and hip pain limiting function; would benefit from addition of acetaminophen and/or low-dose hydromorphone.	<ul style="list-style-type: none"> Start Tylenol Arthritis—2 tablets twice daily. If not effective, start hydromorphone 0.25 mg 4 times daily as needed and increase dose gradually as needed; switch to Hydromorph Contin 3 mg daily when total daily dose is 3 mg. 	Pain Drowsiness, confusion Constipation (consider regular lactulose if needed)
6 7 8	Orthostatic hypotension and low blood pressure contributed to by <ul style="list-style-type: none"> Ramipril Metoprolol Trazodone (orthostatic hypotension) 	<ul style="list-style-type: none"> Decrease ramipril to 5 mg daily and if systolic remains <120, decrease to 2.5 mg daily. Consider decreasing metoprolol to 12.5 mg twice daily (or change to bisoprolol 2.5 mg or 1.25 mg daily). Taper trazodone to 50 mg at bedtime, followed by 25 mg at bedtime. 	BP <130/80 (diabetic, <80 years old; but systolic does not need to be <120) Heart failure (e.g., SOB, edema) Orthostatic hypertension Heart rate Sleep
9	Hyperkalemia likely caused by eplerenone with ramipril (K = 5.3 mmol/L).	Stop eplerenone.	Potassium Heart failure (e.g., SOB, edema)
10	Not taking vitamin D routinely; reduce to 1000 units daily to reduce pill burden.	Include vitamin D as regular medication in dosette and medication chart; will reinforce reason for use.	

BP, blood pressure; GDH, Geriatric Day Hospital; SOB, shortness of breath; SSRI, serotonin-specific reuptake inhibitor.

wishes, sitagliptin was stopped first and then glyburide was tapered and changed to gliclazide MR (to reduce the likelihood of sulfonylurea-induced hypoglycemia).⁴ Consideration was given not just to eliminating hypoglycemia but also to identifying an appropriate A1c in this frail older man. Randomized controlled trials evaluating the effects of tight glycemic control in people with type 2 diabetes have shown an

increased risk of life-threatening hypoglycemic episodes, and this warrants a less aggressive approach to glucose management in the elderly population.⁵ Depending on the degree of frailty and life expectancy of older patients, various guidelines recommend target A1c levels between 7% and 9%.⁶ Limitations with using A1c as the main target for diabetes control include the influence of large fluctuations as well as

TABLE 3 Intervention timeline

Initial pill burden: 23 pills/day Initial number of medications: 16	
Week 1	<ul style="list-style-type: none"> • Add Tylenol Arthritis 1-2 tablets twice daily as needed. • Add escitalopram 10 mg in the morning. • Reduce vitamin D to 1000 IU daily and add to dosette.
Week 2	<ul style="list-style-type: none"> • Add hydromorphone 0.25 mg 4 times daily. • Increase escitalopram to 20 mg daily. • Patient stopped lorazepam on his own.
Week 3	<ul style="list-style-type: none"> • Increase hydromorphone to 0.5 mg 4 times daily. • Decrease escitalopram to 10 mg daily. • Decrease trazodone from 100 mg to 50 mg at bedtime.
Week 4	<ul style="list-style-type: none"> • Patient started on weekly blister pack from pharmacy. • Increase hydromorphone to 1 mg in the morning, 0.5 mg at noon, 0.5 mg at 4 PM and at 1 mg at 8 PM. • Decrease ramipril from 10 mg to 5 mg. • Decrease trazodone to 25 mg at bedtime. • Decrease sitagliptin to 50 mg daily.
Week 5	<ul style="list-style-type: none"> • Decrease sitagliptin to 25 mg daily for 1 week. • Stop eplerenone. • Stop hydromorphone. • Start Hydromorph Contin 3 mg in the morning. • Start venlafaxine XR 37.5 mg daily.
Week 6	<ul style="list-style-type: none"> • Stop sitagliptin. • Stop escitalopram. • Increase venlafaxine to 75 mg daily. • Decrease glyburide to 5 mg twice daily.
Week 7	<ul style="list-style-type: none"> • Stop Hydromorph Contin 3 mg. • Start Hydromorph Contin 4.5 mg daily. • Start lactulose 15 mL daily (instead of "as needed"). • Stop Metamucil.
Week 8	<ul style="list-style-type: none"> • Stop glyburide. • Start gliclazide MR 30 mg daily. • Stop metoprolol. • Start bisoprolol 1.25 mg daily. • Increase lactulose to 30 mL daily.
Week 9	<ul style="list-style-type: none"> • Stop Hydromorph Contin 4.5 mg. • Start Hydromorph Contin 3 mg twice daily.
Week 10	<ul style="list-style-type: none"> • Increase venlafaxine to 112.5 mg daily.
Final pill burden: 21 pills/day Final number of medications: 14	

inaccuracy in patients with renal disease or low hemoglobin. Given the lack of consensus data for glycemic targets in the elderly population, it is important to individualize targets for each

patient. The goal was to eliminate hypoglycemic episodes with blood glucose less than 4 mmol/L and keep random blood glucose levels below 14 mmol/L, recognizing that an A1c between

BOX 1 Medication schedule at GDH discharge**Morning**

Pantoprazole 40 mg
 Acetylsalicylic acid 81 mg
 Metformin 1000 mg (2 × 500 mg)
 Gliclazide MR 30 mg
 Tylenol Arthritis 1300 mg (2 × 650 mg)
 Hydromorph Contin 3 mg
 Venlafaxine XR 112.5 mg (37.5 mg + 75 mg)
 Vitamin D 1000 IU
 Tolterodine 1 mg

Evening

Lipitor 40 mg
 Metformin 1000 mg (2 × 500 mg)
 Tylenol Arthritis 1300 mg (2 × 650 mg)
 Bisoprolol 1.25 mg

Bedtime

Ramipril 5 mg
 Tolterodine 1 mg
 Hydromorph Contin 3 mg
 Lactulose 15 or 30 mL
 Trazodone 25 mg (when needed)

7% and 8.5% would be acceptable. In addition to making medication changes, the GDH nurse provided patient education in accordance with diabetes guidelines. By discharge, the patient's blood glucose was within this range with no hypoglycemic episodes. Although the patient's oral hypoglycemic medication was reduced, his A1c subsequently decreased from 8.1% (on admission) to 7.4% by discharge (12 weeks later), potentially due to increased adherence using a simplified medication regimen and correctly prepared blister pack.

Finding the balance with heart failure medications

While angiotensin-converting enzyme inhibitors, aldosterone antagonists and β -blockers have all demonstrated mortality benefits in patients with heart failure, their use always needs to be balanced with the emergence of side effects.⁷ In this case, our patient's dizziness, low BP and orthostatic hypotension were contributing to falls, significantly affecting his quality of life. Given his frailty and the known risks associated with low blood pressure in older, frail patients,^{8,9} we aimed for a blood pressure target range from

120/60 to 140/90. Additionally, patients who have diabetes mellitus and kidney disease and are taking angiotensin-converting enzyme inhibitors are at increased risk of developing hyperkalemia and subsequent arrhythmias¹⁰; our patient had a mildly high potassium level. We weighed the risks of the patient's low BP, orthostatic hypotension, dizziness and mildly high potassium against the potential cardiovascular mortality benefits of eplerenone, and the decision was made to stop the eplerenone and to reduce his ramipril dose. His BP rose to between 112/78 and 135/86 and his heart failure symptoms remained stable. These changes were communicated to his physicians via a medication chart that outlined reasons for all medication changes, which the patient was asked to share with all physicians.

Optimizing pain control

Elderly patients commonly suffer with chronic pain that often leads to sleep disturbances, depressed mood, anxiety, reduced mobility and loss of confidence in performing IADLs and ADLs. Long-acting acetaminophen given at regular intervals was initially effective in improving VAS pain levels from 10/10 to 7/10, but the pain relief lasted only for a couple of hours; even had the patient been willing to take the product 3 times daily, the duration of action was too short. Prescribers can be reluctant to initiate opioids in elderly people due to worry regarding side effects, particularly falls.¹¹ The patient himself was worried about narcotic use due to hallucinations that occurred with previous morphine use. However, the impact of pain on mobility was concerning, and therefore a very small dose of hydromorphone was initiated and gradually increased; no hallucinations were reported. Once the patient was taking about 3 mg throughout the day, a switch to a long-acting formulation each morning provided pain relief until evening. It was not possible to suddenly switch to 3 mg twice-daily dosing with the long-acting formulation, as this would have resulted in a large increase in dose. Instead, we gradually increased the dose until we were able to get closer to 6 mg in a 24-hour period, and then we split the dose to 3 mg twice a day for nighttime pain control as well. This regimen was ultimately effective in reducing VAS pain levels to 5/10. Improved pain control for our patient led to positive benefits with mood and his overall well-being. He began going to the movies again

with his wife and was able to sit through the show without pain. Although the patient's pain was ultimately well controlled, he began to develop constipation. This was resolved by increasing the dose of lactulose to 15 to 30 mL daily and stopping psyllium powder. Anticipating opioid-induced constipation and treating proactively can be challenging in the frail elderly, who we've seen experience diarrhea and fecal incontinence with only small doses of laxatives. Our approach has therefore been to be cautious, use laxatives as needed (in this case every 2-3 days) and monitor bowel function carefully, responding at the first sign of constipation quickly to establish daily laxative use.

Using an interprofessional approach to addressing falls, balance, mobility and mood

The patient's use of lorazepam and trazodone was thought to be contributing to his impaired mobility, balance and falls. Since these medications were used for sleep, and it was thought that his sleep difficulties were due to a depressed mood, he started on a trial of escitalopram 10 mg daily, followed by 1 week at 20 mg daily, for 5 weeks. While 5 mg daily would be the usual starting dose for a frail older patient, we elected to start with 10 mg due to the severity of his depressive symptoms and our ability to closely monitor the effect with his twice-weekly visits. With no significant improvement in symptoms after taking escitalopram, it was cross-tapered for 1 week with venlafaxine XR 37.5 mg before being discontinued, and the venlafaxine XR dose was then gradually increased to 112.5 mg. In this case, we had to balance the risk of falls associated with depression¹² with the risk of falls associated with antidepressant use.¹³ The patient also met with the GDH social worker routinely for counseling and with the recreation therapist to facilitate integration into a community exercise program. At discharge, the patient had notable improvements in both his overall mood (noted to be happier and joking during GDH visits, more positive outlook on life) and participation in activities and social events. Because of concerns over fall risk, the patient decided to stop his lorazepam 1 mg dose abruptly, with no rebound insomnia or other adverse drug withdrawal events. With improved pain, mood and then sleep, he was able to reduce his trazodone to 25 mg at bedtime when needed. While we would normally taper lorazepam to

reduce the risk of rebound insomnia and severity of other withdrawal symptoms, it appears that this patient was one of those individuals who do not experience withdrawal. Our usual approach to managing benzodiazepine tapering is published elsewhere.¹⁴

While tolterodine can also contribute to fall risk through its anticholinergic effect, it was felt that continued use at his stable and effective dose was justified for this patient, since rushing to the bathroom had previously been a problem and could increase fall risk.

The GDH occupational therapist provided fall prevention education, an assessment of additional home equipment needs and walker safety training. Twice-weekly physiotherapy was aimed at improving balance, strength and gait pattern. To reduce fall risk with rushing to the bathroom, the GDH nurse counseled the patient regarding nonpharmacological strategies for incontinence management such as regular toileting, incontinence aids, adequate fluid intake and reduction of caffeine intake. By discharge, the patient noted a reduction in the number of episodes of dizziness, with improved balance, no further falls and a significant increase in mobility. The GDH nurse taught behavioural management strategies for some ongoing orthostatic hypotension to reduce future fall risk, and a home exercise program was provided by the physiotherapist to maintain program gains.

Implementing strategies for medication management

With respect to organizing his medications, the patient agreed to meet with his community pharmacist regarding using a pharmacy-prepared blister pack after the GDH nurse observed dosette-filling errors. To further simplify his dosage regimen, his twice-daily metoprolol was switched to once-daily bisoprolol and his vitamin D reduced to 1 tablet daily. A medication chart, outlining specific reasons for each medication, description of changes and rationale for changes, was prepared by the GDH pharmacist, revised and reviewed periodically with the patient throughout his admission; overall, the patient felt more in control of his medications by discharge. A final copy was sent to the family doctor with the discharge summary, and the patient was encouraged to share this chart as a communication tool with all health care providers.

Conclusion

This case highlights the importance of conducting a medication review looking at the indication, effectiveness, safety and compliance for each medication, and of assessing each symptom carefully in the context of age, to determine whether symptoms can be drug-induced. Identifying a reasonable A1c target for the frail elderly, while avoiding hypoglycemia, was key to avoiding potentially damaging falls. Incorporating assessment of laboratory values, like potassium, into the safety monitoring of relevant medications identified an important

drug risk that was subsequently eliminated. Weighing the benefit of continuing heart failure medications against side effects like orthostatic hypotension and dizziness was important to ensure quality, not just quantity, of life. Interprofessional team contributions from social work, nursing, occupational therapy, recreation therapy and physiotherapy, concurrent with medication changes, helped reduce episodes of hypoglycemia and dizziness and improve mobility, pain, mood and sleep—all of which contributed to reduced fall risk and improved quality of life. ■

KEY RESOURCES

- Kwan D, Farrell B. Polypharmacy: optimizing medication use in elderly patients. *Pharm Pract* 2013;29(2):20-5.
- RxFiles Q&A: Individualizing glycemic targets for the frail elderly with T2DM. www.cfp.ca/content/suppl/2012/05/11/58.5.543.DC1/RxFiles_DiabetesElderly.pdf
- Canadian chronic pain management guidelines. www.canadianpainsociety.ca/pdf/PharmacologicalManagementChronicPain_CPS-GUIDELINES.pdf
- Switching antidepressants. www.mims.co.uk/Tables/882430/Switching-Antidepressants

From Bruyère Continuing Care (Farrell, Shamji), Bruyère Geriatric Day Hospital; Bruyère Research Institute (Farrell), C.T. Lamont Primary Health Care Research Centre; the Department of Family Medicine (Farrell, Shamji), University of Ottawa, Ottawa; the School of Pharmacy (Farrell, Dalton), University of Waterloo, Waterloo, Ontario. Contact bfarrell@bruyere.org.

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