Reducing fall risk while managing pain and insomnia: Addressing polypharmacy in an 81-year-old woman

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Introduction

As people age, the effects of medications (particularly in causing side effects like orthostatic hypotension and impaired balance) can become more pronounced. The potential for medications to contribute to symptoms must always be considered. During admissions to the Bruyère Geriatric Day Hospital (GDH), medication reviews focus on reducing polypharmacy and optimizing medication appropriateness by minimizing medications that may be contributing to symptoms or that are no longer required, while maximizing effective therapy.

This case illustrates how medications, including a tricyclic antidepressant, beta blocker, calcium channel blocker and diuretic, can potentially contribute to orthostatic hypotension, dizziness and falls. We describe how some of these medications were successfully tapered and/or discontinued. We also highlight the importance of monitoring for adverse drug withdrawal events as changes are made and of reducing medications contributing to prescribing cascades, which are possibly no longer needed. A description of the GDH processes and, in particular, communication about medication-related care can be found in Appendix 1 (available online at www.cpjournal.ca).

Patient case

An 81-year-old woman was referred to the GDH by her new family physician for assessment of

a long history of falls, difficulty with mobility and transfers, medication review, cognitive assessment, mood and future planning. She had been having difficulty with balance and falling backwards, often hurting the back of her head. Her gait was such that she described herself as “walking like a drunken sailor.” She had been having trouble sleeping recently, particularly with falling asleep again after waking and was often having daytime naps. Although she was independent in terms of her instrumental activities of daily living, her growing concern over these may have been contributing to her low mood. Her past medical history included type 2 diabetes with diabetic neuropathy, bioprosthetic aortic valve replacement, osteoarthritis, knee replacements, a remote deep vein thrombosis, visual impairment, vitamin B₁₂ and iron deficiencies, hypertension, eczema of the hands, occasional diarrhea and psoriasis. Blood work from her Family Health Team (FHT) revealed a B₁₂ level of 879 pmol/L (sufficient = >220 pmol/L) and ferritin of 65 mcg/L (31-70 mcg/L = reduced ferritin); current CrCL was 35 mL/min (using Cockcroft-Gault equation with ideal body weight). Medications were supplied in a biweekly blister pack. She stated that she hated taking pills.

Following the initial assessment, it was the team's opinion that her falls were due to a combination of impaired balance, diabetic neuropathy with sensory loss, osteoarthritis,

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KEY POINTS

- As people age, cardiovascular medications, including antihypertensive therapies, should be regularly reviewed when assessing common geriatric presentations such as falls, dizziness and hypotension.
- Beta blockers (and other cardiovascular medications) can successfully be discontinued in elderly patients but need to be tapered slowly to reduce the risk of adverse drug withdrawal events.
- Using nonpharmacologic approaches to insomnia can avoid the need for sedating medications that contribute to fall risk.
- The differential diagnosis of any sign or symptom should always include the question, "Could this be caused by a drug?"
- When conducting a medication review, pharmacists should always ask, "Is this drug still needed?"

muscle weakness and dizziness associated with postural hypotension. The GDH pharmacist, nurse, social worker, occupational therapist and physiotherapist were consulted. The GDH pharmacist conducted a medication assessment that included a 45-minute comprehensive patient interview, chart review and communication with both the patient and her FHT pharmacist. Each medication was assessed for indication, effectiveness, safety, compliance and patient understanding.¹ The results of the initial part of this assessment are outlined in Table 1.

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

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On review of the medications and keeping in mind the need to reduce the patient's fall risk, address insomnia, improve function and stop unnecessary medication use, the following medications were discontinued: amlodipine, amitriptyline and rabeprazole. The dose of

metoprolol was decreased without worsening of cardiovascular symptoms. Furosemide was initially decreased, but this resulted in greater shortness of breath and fatigue, so it was increased back to the original dose. Acetaminophen 500 mg was switched to acetaminophen extended-release (Tylenol Arthritis) 650 mg exclusively for better pain relief and to avoid acetaminophen overdose. Pain improved and the patient was eventually able to sleep without medication. With limited program time remaining, suggestions were made to the FHT pharmacist and family physician regarding stopping vitamin B₁₂ (done), decreasing rosuvastatin dose (done) and reducing metformin (not done). Ultimately, the patient's endurance, dizziness, gait quality, standing tolerance, transfer technique and Berg Balance score improved significantly by discharge (the latter from 39 to 49/56, indicating a decrease from nearly a 100% fall risk to approximately a 50% fall risk)³; 6-minute walking distance improved from 750 to 870 feet; no further falls were reported during her admission. Chronological steps taken to implement the action plan are outlined in Table 3, and a final medication list is presented in Box 1.

Discussion

Falls

Amitriptyline is associated with increased fall risk.⁴ The dose was slowly tapered and stopped. Orthostatic hypotension is an unfortunate consequence of antihypertensive therapy in the face of reduced baroreceptor function as people age.⁵ We began with tapering metoprolol and furosemide until monitoring revealed slight worsening of edema and shortness of breath. While these may have been symptoms of emerging heart failure, the patient had no previous diagnosis and her cardiac function was normal on echocardiogram. This process reveals the importance of slow tapering with both of these agents and monitoring for adverse drug withdrawal events.⁶ With metoprolol at a much lower dose and furosemide stabilized at its original dose, amlodipine tapering was attempted next, with successful discontinuation. Choosing a blood pressure target range appropriate to this diabetic patient older than 80 years (i.e., 120/60-140/90 mmHg) was key to helping support our decisions about stopping antihypertensives and monitoring impact.⁷ Since some of the patient's blood pressure measurements were less than

TABLE 1 History of medication experience

#	Drug	Reason for use (if known)	Knowledge, efficacy, compliance, goals and safety assessment	Duration (if known)
1	Ramipril 10 mg daily	Hypertension	BP at GDH initially ranging from 106/86-138/64 mmHg, most systolic <130 mmHg with occasional orthostatic hypotension	Unclear
2	Amlodipine 10 mg daily	Hypertension	Some left ankle swelling, recently on right as well	Unclear
3	Metoprolol 75 mg twice daily	Hypertension	FHT pharmacist states metoprolol was 25 mg twice daily prior to valve replacement, increased during hospitalization to 75 mg twice daily 2 years ago; no attempts to taper since; heart rate = 76	Several years
4	Furosemide 40 mg daily	Unknown	Using for ankle swelling?	Unclear
5	ASA 81 mg daily	Stroke prophylaxis (following bioprosthetic aortic valve replacement)	No bruising or bleeding	3 years
6	Rosuvastatin 10 mg daily	Hyperlipidemia	LDL = 1.2 mmol/L (last summer; info from FHT)	Many years
7	Metformin 500 mg, 2 tablets at breakfast, 1 at noon, 2 at supper	Diabetes	HbA1c = 7.9% (last summer; info from FHT)	About 9 years
8	Loperamide as needed	Diarrhea	One helps for 2 to 3 weeks, then diarrhea restarts	
9	Vitamin B ₁₂ 1200 mcg daily	B ₁₂ deficiency	B ₁₂ = 879 pmol/L (last winter; info from FHT)	Unclear
10	Ferrous fumarate 300 mg daily	Ferritin deficiency	Ferritin = 65 mcg/L (last winter; info from FHT)	Unclear
11	Amitriptyline 10 mg 2 tablets at bedtime	Sleep? Depression?	Patient uncertain of reason; naps during the day, can fall asleep in the evening but has difficulty getting back to sleep if up during the night	A long time
12	Rabeprazole 20 mg daily	Heartburn	Patient stated had not had heartburn in a long time (seems to have started in hospital after valve replacement)	About 3 years ago

Allergies/intolerances: sulfonamides, tetracyclines, quinolones, sulfamethoxazole/trimethoprim, glyburide. ASA, acetylsalicylic acid; BP, blood pressure; FHT, Family Health Team; GDH, Geriatric Day Hospital; HbA1c, glycosylated hemoglobin; LDL, low-density lipoprotein.

this target range, with none above the range, we felt comfortable reducing antihypertensive doses. Following reduction in antihypertensive medications, the patient's blood pressure stabilized at the lower end of the desired blood pressure range. No further episodes of orthostatic hypotension were noted.

To manage osteoporosis risk and reduce fall risk, a combination of calcium and vitamin D was added to the patient's regimen.⁸

The patient also worked with the GDH physiotherapist and occupational therapist to improve balance, gait and strength and to implement behavioural and environmental

TABLE 2 Medication care plan

#	Drug-related problem	Action plan	Monitoring (team)
1 2 3 4	Orthostatic hypotension and fall risk could be contributed to by: <ul style="list-style-type: none"> • Amitriptyline (indication unknown) • High furosemide dose (which may not be required as patient appears to have dependent edema, not HF) • High metoprolol dose (which may not be required as no history of CAD, AF, MI) • High amlodipine dose (may not be required as BP less than target; also contributing to ankle edema?) 	<ul style="list-style-type: none"> • Taper amitriptyline to 10 mg qhs for 1 week, then stop (if needed for sleep, consider low-dose trazodone) • Taper furosemide to 20 mg daily for 1 week, then 10 mg daily for 1 week, then stop • Taper metoprolol to 50 mg twice daily for 2 weeks, then 25 mg twice daily for 2 weeks (stop if possible) • Taper amlodipine to 5 mg daily for 1 week, then stop 	Orthostatic hypotension Sleep BP target (diabetic; >80 years): 120/60-140/90 mmHg Shortness of breath, ankle edema, fatigue, angina
5	Patient's osteoarthritis pain is significant (8-10/10) and would benefit from regular use of acetaminophen	Start acetaminophen 500 mg—2 tablets 3 times daily	Pain (visual analog scale)
6	Patient may no longer need rabeprazole (no heartburn × many months)	Taper rabeprazole to 10 mg daily × 1 week, then stop (use simethicone or calcium carbonate for rebound heartburn)	Rebound heartburn (2-4 weeks)
7	Vitamin B ₁₂ may no longer be needed (level = 879 pmol/L last winter) especially if rabeprazole stopped	Consider stopping vitamin B ₁₂	B ₁₂ levels (in 6 months)
8	Periodic diarrhea could be contributed to by high dose of metformin (higher than recommended given low CrCl); eliminating lunchtime dose would likely have little impact on HbA1c and would simplify regimen	Decrease metformin to 1000 mg bid	Resolution of diarrhea and no need for loperamide (nurse) HbA1c target (>80 years) = 8%
9	Low LDL (1.2 mmol/L) and considering indication is for primary prevention; consider decreasing dose of rosuvastatin	Consider reducing rosuvastatin to 5 mg daily	
10	Risk of osteoporosis + falls; would benefit from addition of calcium and vitamin D	Add calcium carbonate/vitamin D 600 mg/400 IU (Caltrate Select) twice daily	

AF, atrial fibrillation; BP, blood pressure; CAD, coronary artery disease; HbA1c, glycosylated hemoglobin; HF, heart failure; LDL, low-density lipoprotein; MI, myocardial infarction.

measures to reduce fall risk. The GDH nurse provided education for behavioural management of orthostatic hypotension should it recur. Her equipment needs were addressed by occupational therapy to ensure safe transfers, and she was consequently better able to perform her activities of daily living.

Pain

Pain, by its contribution to muscle weakness and effect on balance and gait, is associated with fall risk.⁹ The patient rated her back pain at 8-10/10. Attempts to manage pain had included starting acetaminophen 1000 mg 3 times daily and a small dose of codeine at bedtime as needed for a limited

TABLE 3 Intervention timeline

Initial pill burden: 17 pills/day Initial number of medications: 11	
Week 1	<ul style="list-style-type: none"> • Decrease amitriptyline to 10 mg at bedtime × 1 week • Start trazodone 25 mg at bedtime • Counsel on sleep hygiene • Start acetaminophen 500 mg (2 tablets 3 times daily)
Week 2	<ul style="list-style-type: none"> • Hold trazodone 25 mg for 1 week • Stop amitriptyline • Decrease rabeprazole to 10 mg × 1 week
Week 3	<ul style="list-style-type: none"> • Stop trazodone • Stop rabeprazole
Week 4	<ul style="list-style-type: none"> • Decrease furosemide to 20 mg every morning • Decrease metoprolol to 50 mg twice daily
Week 5	<ul style="list-style-type: none"> • Start calcium 600 mg/vitamin D 400 IU twice daily • Start codeine 15-30 mg at bedtime when needed
Week 6	<ul style="list-style-type: none"> • Increase furosemide to 40 mg daily • Decrease metoprolol to 25 mg twice daily
Week 7	<ul style="list-style-type: none"> • Decrease amlodipine to 5 mg daily • Switch acetaminophen 500 mg 2 tablets 3 times daily to acetaminophen extended-release 650 mg 2 tablets at breakfast, 1 at supper, 1 at bedtime; counsel on acetaminophen toxicity risk • Stop codeine
Week 8	<ul style="list-style-type: none"> • Stop amlodipine • Stop loperamide

Final pill burden: 19 pills/day
Final number of medications: 10

period during an exacerbation, in addition to continuing physiotherapy. She had also begun taking acetaminophen extended-release 650 mg independently. Her total acetaminophen dose was in excess of the maximum daily dose of 4000 mg, so her regimen was changed to only the longer-acting acetaminophen extended-release 1300 mg in the morning and 650 mg at dinner and bedtime. Ultimately, close attention to a regular regimen with monitoring resulted in resolution of pain (0/10) and the patient was very pleased.

Insomnia

Management of insomnia in the elderly remains challenging. As we tapered amitriptyline, we initially prescribed “as-needed” trazodone in its place, as the patient had increased difficulty sleeping. While similar to tricyclic antidepressants in terms of side effects, significant

safety concerns in the elderly and little evidence of efficacy, trazodone can occasionally be useful in helping stop sedatives to which patients are sometimes quite emotionally attached.¹⁰ The nurse counselled her regarding sleep hygiene, discouraging daytime napping and use of caffeine or alcohol and avoiding eating in the few hours before bedtime. With these simple nonpharmacologic measures, the patient reported significant improvement in her ability to sleep through the night and ultimately did not use any trazodone.

Prescribing cascades and unnecessary drugs

Prescribing cascades occur when an adverse drug reaction is interpreted as a new condition and is treated with another medication.¹¹ The differential diagnosis of any sign or symptom should always include the question, “Could this be caused by a drug?” If yes, the indication

BOX 1 Medication schedule at Geriatric Day Hospital discharge**Breakfast**

Ramipril 10 mg
 Metoprolol 25 mg
 Furosemide 40 mg
 ASA 81 mg
 Metformin 500 mg (2 tablets)
 Acetaminophen extended-release 650 mg (Tylenol Arthritis) (2 tablets)
 Vitamin B₁₂ 1200 mcg
 Calcium carbonate/vitamin D 600 mg/400 IU (Caltrate Select)

Lunch

Metformin 500 mg
 Ferrous fumarate 300 mg

Supper

Metformin 500 mg (2 tablets)
 Metoprolol 25 mg
 Acetaminophen 650 mg extended-release (Tylenol Arthritis) (1 tablet)
 Calcium carbonate/vitamin D 600 mg/400 IU (Caltrate Select)

Bedtime

Rosuvastatin 10 mg
 Acetaminophen 650 mg (1 tablet)

for the causative agent should be reassessed. The patient's proton pump inhibitor may have contributed to her B₁₂ deficiency. In this case, the patient no longer needed rabeprazole, as she had not had heartburn in many years and had no other compelling indications for continued use. If she had been continuing on amlodipine, this might have increased her risk of heartburn by virtue of its effect on lower esophageal sphincter tone; in a sample of 241 patients with no previous gastrointestinal symptoms, 35% developed such symptoms after initiation of a calcium channel blocker.¹² Amlodipine can also cause ankle swelling in as many as 10% of patients.¹³ Both the proton pump inhibitor and amlodipine were tapered and stopped with no incidences of heartburn and improvement in ankle edema. We considered the possibility that the patient's high dose of metformin may have contributed to her diarrhea. However, by discharge her diarrhea had resolved and loperamide was no longer needed. Given excellent blood sugar control at the GDH and

her low CrCl, a recommendation was made to her FHT pharmacist and family physician to reduce the metformin dose. Although the diarrhea was not identified initially as obviously drug related, it could potentially have been caused by rabeprazole, amitriptyline and/or metoprolol,^{14,15} so it was possible that stopping the first 2 drugs and lowering the dose of the other may have helped resolve this symptom.

Addressing polypharmacy

Although the patient's pill burden increased slightly, her medication therapies were ultimately optimized. Documented improvements were seen particularly in her decreased risk for falls, improvement in physical endurance and pain and better sleep. These medication changes were facilitated through collaboration with her FHT pharmacist, who provided the indications for many medications and recent laboratory values such as low-density lipoprotein (LDL) and B₁₂ levels. With this collaboration, other drug-related problems such as lowering the dose of rosuvastatin and metformin or stopping vitamin B₁₂ were pursued following GDH discharge.

Conclusion

This case highlights how dose reduction and elimination of medications that are no longer needed can significantly improve an older patient's perception of quality of life in terms of reduced fall risk and increased satisfaction with medication regimen. By assessing each medication for its indication, effectiveness, safety and compliance, we were able to gradually taper or discontinue several medications, which contributed to improved balance, reduced fall risk and helped to reduce prescribing cascades. Gradual tapering of medications, with monitoring for adverse drug withdrawal events, was accomplished with biweekly visits to the GDH over a 10-week period. The patient happily reported no longer "walking like a drunken sailor" and was pleased with the attention to addressing the benefits and risks of each of her medications. Approximately 1 year later, the FHT team reported that no further falls had been documented. A thorough medication review, ongoing symptom management by the interprofessional team and communication and collaboration with the patient's family physician and FHT pharmacist were essential in reducing the risk of falls and managing insomnia and pain. ■

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