Managing polypharmacy in a 77-year-old woman with multiple prescribers

Barbara Farrell BScPhm PharmD, Véronique French Merkley MD, Wade Thompson HBSc

A 77-year-old woman was referred to a geriatric day hospital with concerns about mobility and falls, pain, constipation, cognition and polypharmacy. Comorbidities included cerebrovascular disease, coronary artery disease, hypertension, dementia, fibromyalgia, myositis, bipolar disorder, arthritis, remote duodenal ulcer and hypothyroidism. A stroke 3 years earlier resulted in increasing difficulties with transfers and ambulation, leading to 3–4 falls weekly. Chronic pain was attributed to fibromyalgia. The patient was frustrated by her loss of independence, because she now required daily assistance with washing and dressing. Staff at her retirement residence managed her complex medication regimen (see Box 1 for the list of medications). Placement in a long-term care facility was being considered.

At presentation, the patient was wheelchair-bound and heavily sedated, which made the interview and assessment difficult. She had had near-falls while attempting to transfer herself from her wheelchair and was unable to stand unsupported. Orthostatic hypotension was noted (drop in blood pressure from 118/64 mm Hg while reclining to 80/50 mm Hg after standing). The patient accepted a 12-week admission to the geriatric day hospital, and twice-weekly transportation was organized. A multidisciplinary team, including a pharmacist, a nurse, a social worker, an occupational therapist and a physiotherapist, was consulted. Results of blood-work were normal except for a low calcium level (2.17 [normal 2.20–2.65] mmol/L). Using the Cockcroft–Gault equation with ideal body weight, we calculated her creatinine clearance to be 30 mL/min, which we considered to be low for her age.

Initial visits led to the development of an interprofessional plan. The pharmacist assessed the medication list, evaluating each medication for indication, effectiveness, safety, compliance and patient understanding.1 The patient’s personal experience with medications was difficult to ascertain because of her sedation. Results of the initial medication assessment are outlined in Appendix 1 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.122012/-/DC1). Signs and symptoms were assessed to identify drug-related causes.2 The complete medication assessment is outlined in Box 2.

Throughout the admission, several medication changes were made (Appendix 2, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.122012/-/DC1). The patient participated in physiotherapy and exercise to address deconditioning. The occupational therapist reviewed daily activities and fall-prevention strategies. The patient’s leg strength and balance improved (her Berg Balance score increased from 18 to 31 out of 56). She progressed from using a wheelchair to walking 150 m with a cane. No falls were reported from the fourth week of admission onward.

Despite a reduction in her analgesic medica-
presentations, her pain did not worsen, in part because nonpharmacologic coping strategies were used. She reported having increased self-confidence and independence in daily activities. Her constipation resolved. She became much more alert and resumed old hobbies such as knitting. The social worker provided supportive counselling sessions, and the patient incorporated relaxation strategies into her daily routine. The patient’s mobility and cognition improved, and she sought opportunities to interact with other patients and participate in activities. She reported improved nighttime sleeping and no more daytime napping. Once medications affecting cognition were minimized, a reassessment with neuropsychology ultimately showed findings in keeping with the size and location of her stroke, but no dementia.

The patient’s daily pill burden decreased from 32 to 17 pills by the end of the 12-week admission. A final medication list is presented in Box 3. A recommendation was sent to her neurologist requesting reassessment of galantamine; at follow-up 1 year later, the drug was no longer being taken.

Discussion

When multiple prescribers are involved in caring for a patient with several chronic diseases, the number of medications can quickly accumulate. Family physicians may be reluctant to modify or stop medications prescribed by consultants or started in hospital. No one person may have an overall view of how the combination of medications affects the patient, and subsequent negative additive effects may go unnoticed and unmanaged. Figure 1 illustrates the interplay between the patient’s medications and the possible effects on sedation, cognition, constipation and risk of falls.

Anticholinergic load

Anticholinergic load, characterized by the cumulative effect of drugs with anticholinergic properties, can result in sedation, cognitive dysfunction, unsteadiness, orthostatic hypotension, tachycardia, dry mouth, constipation and vision problems. Ultimately, the risk of falls increases and function is impaired. Anticholinergic toxicity owing to a decline in cholinergic transmission and increased permeability of the blood–brain barrier.

With polypharmacy so prevalent in the older population, it is not surprising that an older patient could be taking several anticholinergic medications that contribute to or worsen the presentation of geriatric syndromes such as confusion and falls. In our patient’s situation, several of her medications (amitriptyline, carbamazepine and cyclobenzaprine) are medium to highly anticholinergic, whereas others (diltiazem, furosemide, morphine and oxazepam) are mildly anticholinergic. The contribution of these drugs to the patient’s symptoms is shown in Box 2, and interventions to reduce the anticholinergic load are outlined in Appendix 2.

Additive CNS depression

As noted in Figure 1, the combination of multiple psychoactive agents likely contributed to poor balance, falls, sedation and impaired cognition in our patient. Individually and in combination, tricyclic antidepressants, muscle relaxants, benzodiazepines, hypnotics, alcohol and other sedating medications, and anticonvulsants can result in additive CNS depression. Antidepressants can be very sedating in combination with other medications that can cause sedation. Anticholinergic drugs are known to cause sedation and anticholinergic drugs can increase the risk of falls. Adding a medication to one that may already be contributing to these effects can compound the problem. Antidepressants and antipsychotics are known for their anticholinergic effects and the risk of falls is increased.

Table 1: Initial list of medications

<table>
<thead>
<tr>
<th>Medication, dosage</th>
<th>Reason for use, if known</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quinapril 40 mg/d</td>
<td>CAD/hypertension</td>
</tr>
<tr>
<td>Amlodipine 5 mg/d</td>
<td>CAD/hypertension</td>
</tr>
<tr>
<td>Diltiazem ER 360 mg/d</td>
<td>CAD/hypertension/angina</td>
</tr>
<tr>
<td>Acetobutol 200 mg twice daily</td>
<td>CAD/hypertension/angina</td>
</tr>
<tr>
<td>Nitroglycerin patch 0.6 mg/h at bedtime</td>
<td>CAD/angina</td>
</tr>
<tr>
<td>Nitroglycerin spray 0.4 mg/spray as needed</td>
<td>CAD/angina</td>
</tr>
<tr>
<td>Furosemide 40 mg/d</td>
<td>Edema</td>
</tr>
<tr>
<td>Dipyridamole/ASA 200/25 mg twice daily</td>
<td>Stroke in 2008</td>
</tr>
<tr>
<td>Rosuvastatin 20 mg twice daily</td>
<td>Stroke in 2008</td>
</tr>
<tr>
<td>Levothyroxine 0.088 mg/d</td>
<td>Thyroid ablation</td>
</tr>
<tr>
<td>Triiodothyronine 18 µg/d</td>
<td>Unclear if COPD or asthma</td>
</tr>
<tr>
<td>Salbutamol 100 µg/puff, 2 puffs four times daily if needed</td>
<td>Unclear</td>
</tr>
<tr>
<td>Galantamine ER 16 mg/d</td>
<td>Dementia</td>
</tr>
<tr>
<td>Morphine 10 mg at bedtime</td>
<td>Pain (fibromyalgia)</td>
</tr>
<tr>
<td>Acetaminophen 650 mg every 4–6 h as needed</td>
<td>Pain (fibromyalgia)</td>
</tr>
<tr>
<td>Cyclobenzaprine 5 mg three times daily</td>
<td>Pain (fibromyalgia)</td>
</tr>
<tr>
<td>Glucosamine 500 mg twice daily</td>
<td>Pain (type of arthritis unclear)</td>
</tr>
<tr>
<td>Amitriptyline 75 mg at bedtime</td>
<td>Insomnia</td>
</tr>
<tr>
<td>Oxazepam 15 mg at bedtime</td>
<td>Insomnia</td>
</tr>
<tr>
<td>Lactulose 15 mL/d as needed</td>
<td>Constipation</td>
</tr>
<tr>
<td>Magnesium hydroxide 311 mg, 1–2 tablets at bedtime</td>
<td>Constipation</td>
</tr>
<tr>
<td>Fibre in water</td>
<td>Constipation</td>
</tr>
<tr>
<td>Bisacodyl, 2 pills as needed</td>
<td>Constipation</td>
</tr>
<tr>
<td>Suppository?</td>
<td>Constipation</td>
</tr>
<tr>
<td>Cranberry 500 mg three times daily</td>
<td>Bladder</td>
</tr>
<tr>
<td>Carbamazepine 200 mg twice daily</td>
<td>Post-stroke seizure prophylaxis</td>
</tr>
<tr>
<td>Omeprazole 20 mg/d</td>
<td>History of duodenal ulcer</td>
</tr>
<tr>
<td>Levofoxacin 250 mg/d</td>
<td>Urinary tract infection</td>
</tr>
</tbody>
</table>

Note: ASA = acetylsalicylic acid, CAD = coronary artery disease, COPD = chronic obstructive pulmonary disease, ER = extended release.
Box 2: Complete assessment of medications for potential drug-related problems and resulting medication care plan

<table>
<thead>
<tr>
<th>Potential drug-related problem</th>
<th>Action plan</th>
<th>Monitoring (team)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low blood pressure and orthostatic hypotension (and frequent falls)</td>
<td>1. Immediate: - Stop nitroglycerin patch - Decrease furosemide to 20 mg/d - Stop amiodipine 2. 1 wk later: decrease acetabutol to 100 mg twice daily; consider further decrease in future 3. Future: if needed, consider reducing quinapril, because current daily dose is at maximum 4. Future: consider reducing diltiazem ER to 240 mg/d if possible</td>
<td>Resolution of orthostatic hypotension Angina/use of nitroglycerin as needed Blood pressure target: 120/65 mm Hg to 140/90 mm Hg Decrease in falls Improvement in renal function: repeat serum creatinine once quinapril dose reduced</td>
</tr>
<tr>
<td>Orthostatic hypotension, poor balance, excessive sedation and frequent falls</td>
<td>1. Decrease amitriptyline to 50 mg at bedtime for 1 wk, then to 25 mg for 2 wk, then stop if possible 2. Decrease cyclobenzaprine to twice daily (morning and bedtime); reduce frequency further if possible or reduce dose to 2.5 mg; eventually stop if possible (note: patient finds this medication most effective for pain control, so may be hardest to taper) 3. Re-evaluate usefulness of morphine and taper or stop if possible 4. Consider tapering carbamazepine to 100 mg twice daily and eventually stopping 5. Once effect of above changes assessed, begin tapering oxazepam</td>
<td>Sleep initiation Pain control Resolution of orthostatic hypotension Decrease in excessive sedation Improvement in balance, decrease in falls Seizure control Thyroid-stimulating hormone levels (decrease in carbamazepine may alter levothyroxine requirements)</td>
</tr>
<tr>
<td>Reduced cognition</td>
<td>1. See above for recommendations to reduce anticholinergic load, and for tapering morphine and diltiazem 2. Consider reassessing need for galantamine once above medication changes are made</td>
<td>Forgetfulness, difficulty finding words, apraxia</td>
</tr>
<tr>
<td>Constipation (stools infrequent, straining)</td>
<td>1. See above for recommendations to reduce anticholinergic load, and for tapering morphine and diltiazem 2. Stop lactulose, fibre supplement, bisacodyl and suppository 3. Start polyethylene glycol 3350, 15 mL in water daily</td>
<td>Reduced straining</td>
</tr>
<tr>
<td>Risk of hypermagnesemia and associated toxicity (e.g., hypotension and cramps)</td>
<td>Stop magnesium</td>
<td>Consider checking magnesium level</td>
</tr>
<tr>
<td>Risk of bradycardia, atioventricular block</td>
<td>1. Consider further tapering of acetabutol and possible discontinuation (as above) 2. Consider reducing diltiazem ER dose (as above) also or instead of step 1</td>
<td>Heart rate Angina</td>
</tr>
<tr>
<td>Omeprazole: ongoing need unclear (duodenal ulcer several years ago but no heartburn)</td>
<td>1. Stop omeprazole and start rabeprazole 10 mg/d (least expensive proton pump inhibitor on provincial drug formulary) for 2 wk, then stop 2. Use calcium carbonate or alginate or low-dose ranitidine as needed for rebound heartburn</td>
<td>Rebound heartburn for 2–4 wk</td>
</tr>
<tr>
<td>Rosuvastatin: not needed twice daily given potency and half-life</td>
<td>1. Reduce rosuvastatin to 20 mg once daily 2. Consider requesting cholesterol levels from nursing home to confirm whether patient is at LDL target</td>
<td>LDL target &lt; 2.0 mmol/L</td>
</tr>
<tr>
<td>Salbutamol: not needed if no shortness of breath and not being used</td>
<td>Stop salbutamol</td>
<td>Shortness of breath</td>
</tr>
<tr>
<td>Levofoxacin: taken daily, but prescribed only for 10 days more than a month ago</td>
<td>Stop levofoxacin</td>
<td></td>
</tr>
<tr>
<td>Concomitant amitriptyline and levofoxacin use: can cause prolonged QT interval</td>
<td>1. Taper and stop amitriptyline as suggested 2. Stop levofoxacin</td>
<td></td>
</tr>
<tr>
<td>Glucosamine: benefit unlikely given questionable efficacy in osteoarthritis pain control and low dose (doses of 1.5 g/d in clinical trials)</td>
<td>Stop glucosamine</td>
<td></td>
</tr>
<tr>
<td>Patient at increased risk of falls but is not receiving prophylaxis for osteoporosis</td>
<td>1. Start vitamin D 1000 IU/d 2. Once constipation has resolved, start elemental calcium 500 mg twice daily (review options with patient) 3. Consider bone density scan and bisphosphonate if indicated and if renal function improves</td>
<td></td>
</tr>
</tbody>
</table>

Note: CNS = central nervous system, ER = extended release, LDL = low-density lipoprotein.
anticonvulsants and opioids are known to cause excessive central nervous system (CNS) depression and increase the risk of falls in older people. The substantial sedation that may have been a result of additive CNS depressant effects made assessment of the patient’s cognition challenging.

Keeping in mind the importance of finding the lowest effective dose of any medication being used, we reduced the patient’s cyclobenzaprine dose and, when anxiety increased following cessation of carbamazepine, reinstated that drug at a small dose. This led us to suspect that the original indication might have been bipolar disorder, not post-seizure prophylaxis; however, we had difficulty assessing this without documentation from the original prescriber. Arrangements were made for follow-up with a geriatric psychiatrist after discharge. Amitriptyline was tapered and stopped; morphine was also stopped following interventions to help the patient cope with pain. Recommendations were made to the patient’s family physician to continue with the oxazepam tapering following discharge from the day hospital.

Multiple cardiovascular agents
Given our patient’s low blood pressure and orthostatic hypotension, as well as the likely contribution of several of the cardiovascular medications to recurrent falls, we stopped the nitroglycerin patch and amlodipine and reduced the furosemide dose. Given the increased risk of

---

**Box 3: Medication schedule at discharge**

**In the morning**
- Quinapril 40 mg
- Diltiazem ER 360 mg
- Furosemide 10 mg
- Levothyroxine 0.088 mg
- Tiotropium 18 µg
- Dipyridamole/ASA 200/25 mg
- Galantamine ER 16 mg
- Cranberry complex 500 mg
- Polyethylene glycol 3350 15 mL
- Vitamin D 1000 IU

**At supper**
- Dipyridamole/ASA 200/25 mg
- Cranberry complex 500 mg

**At bedtime**
- Cyclobenzaprine 5 mg
- Oxazepam 15 mg
- Cranberry complex 500 mg
- Rosuvastatin 20 mg
- Carbamazepine 100 mg

**As needed**
- Nitroglycerin spray 0.4 mg/spray
- Acetaminophen 650 mg
- Saliva substitute

Note: ASA = acetylsalicylic acid, ER = extended release.

---

![Figure 1: Interplay between the medications of a 77-year-old woman referred to a geriatric day hospital and their possible effects on sedation, cognition, constipation and risk of falls. CNS = central nervous system.](image-url)
Practice
dosage was simplified to once daily to reduce tribute to poor adherence.16 Drug-induced consti-
cultures, all of which have been shown to con-
ention of the patient’s level of frailty and coronary artery disease.15 The patient was also able to consistently implement strategies to man-
age orthostatic hypotension that were taught to her by the nurse.

Other problems
We identified medications with no clear indication and those being used with questionable efficacy. For example, the patient had been taking omepra-
levofoxacin beyond 10 days may have been due to the transcription error; we notified the phar-
onging twice-weekly monitoring. The achieved tar-

Poor adherence with laxative use likely con-
tribute to the patient’s continued problems with constipation. The patient demonstrated a poor understanding of proper laxative use but also had a complex medication regimen and cognitive dif-
ficulties, all of which have been shown to con-
tribute to poor adherence.16 Drug-induced consti-
patation and poor adherence to laxative therapy meant several laxatives were started, which con-
tributed further to the pill burden. Regular doses of magnesium hydroxide in this setting of impaired renal function increased the risk of accumulation and toxicity. Several anticholinergic medications were stopped, along with all 5 laxatives. Polyethylene glycol 3350 at a dose of 15 mL once daily was started and resolved the constipation in about 1 week. The rosuvastatin increase in bioavailability and reduced renal excretion)14 as well as the drug’s potential to cause bradycardia and atrioventricular block when taken in combination with diltiazem, the dose of acebutolol was tapered and stopped. No rebound angina or tachycardia was reported during twice-weekly monitoring. The achieved target was a blood pressure in the range of 120/65 to 140/90 mm Hg, with the lower limit established because of the patient’s level of frailty and coronary artery disease.15 The patient was also able to consistently implement strategies to manage orthostatic hypotension that were taught to her by the nurse.

pill burden. Vitamin D was added to reduce the risk of falls and maintain bone strength.17

A medication chart with indications for each medication and the reasons for stopping or lowering doses of others was provided. The patient and family were educated regarding the use of this chart as a central tool to assist all her pre-
scribers in understanding how their medication changes could affect the patient’s care. A final copy was sent to the patient’s family physician with the discharge summary.

Conclusion
Polypharmacy is common among older patients. Several medications can be prescribed by different health care providers without assessment of the individual or additive impact of each drug on the overall function and well-being of the patient, or the ongoing need for each drug. In the case of our patient, several drugs caused or contributed to additive CNS depression, falls, cognitive difficulties and excessive sedation. An assessment of her medications for indication, effectiveness, safety and compliance identified drug-related contrib-
utors and allowed us to reduce her pill burden while optimizing her function and quality of life.

The close collaboration of the interprofessional health care team was instrumental. Interventions by different team members enabled subsequent medication changes, and medication changes facilitated additional interventions. Moreover, twice-weekly visits to a single location allowed the patient to receive close monitoring and ongoing support and to benefit from meaningful social interactions with her peers. Ultimately, an admission to a long-term care facility was no longer considered.

References

Hill; 2004.

Resources for clinicians
intellectual content and approved the final version submitted for publication.

Wade Thompson prepared the initial draft of the manuscript and conducted care of the patient. Wade Thompson prepared the initial draft of the manuscript and conducted care of the patient.

Affiliations: Geriatric Day Hospital of Bruyère Continuing Care (Farrell, French Merkley), University of Ottawa, Ottawa, Ont.; School of Pharmacy (Thompson), University of Waterloo, Waterloo, Ont.; Department of Family Medicine (Farrell, French Merkley), University of Ottawa, Ottawa, Ont.; School of Pharmacy (Thompson), University of Waterloo, Waterloo, Ont.

Contributors: Barbara Farrell and Véronique French Merkley were the clinicians involved in the care of the patient. Wade Thompson prepared the initial draft of the manuscript and conducted relevant literature searches. All of the authors revised the manuscript critically for important intellectual content and approved the final version submitted for publication.

Competing interests: Barbara Farrell received an honorarium from the journal Pharmacy Practice for an article on polypharmacy; she also received an honorarium from RxFiles for preparing and presenting workshops on the management of polypharmacy. No competing interests declared by Véronique French Merkley or Wade Thompson.

An expanded version of this article is available as a tool to teach about interprofessional approaches to the management of polypharmacy (see Appendix 3, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.122012/-/DC1).


We have partnered with Sheridan Press!

To purchase commercial article reprints and e-prints or to request a quote, please contact Matt Neiderer

Meadow Pride Health Services
Sheridan Content Services
800 635-7181 x8265
matt.neiderer@sheridan.com