



Perioperative care of the elderly patient

ROBERT M. PALMER, MD

Patients age 65 and older account for 38% of discharges from acute nonfederal US hospitals and for 46% of all hospital days of care, even though they represent only 13% of the US population. Older patients typically have longer hospital stays, greater costs of care, and greater risks of adverse health outcomes related to surgical or medical problems than younger patients.¹⁻³

Older patients admitted to the hospital for hip fractures or other conditions that require surgery may have additional complicated medical problems that are not present in younger patients, making perioperative management more complicated.

This article reviews factors that put older patients at particular risk of perioperative complications and uses a case study to explore many of the complications that can arise during the postoperative management of an older patient. In doing so, it will illustrate the importance of a vigilant preoperative assessment, anticipating potential complications, and working to prevent them.

■ WHAT PUTS THE ELDERLY AT GREATER PERIOPERATIVE RISK?

Cognitive impairment. Older patients are more likely than younger patients to have cognitive impairment, either dementia prior to surgery or delirium related to the illness or following surgery.

Frailty, in which there is impaired homeostasis, also is common in older adults. Physiologic function in the organ systems of older adults is impaired as a result of the aging process, not just as a result of an acute or chronic illness. Frailty may predispose older patients to severe and multiorgan system failure even

from a relatively minor perturbation of surgery that would not affect the average younger patient.

Immobility and functional dependency are common in the older age group. Before surgery, older adults might be struggling to walk or perform independently their basic activities of daily living (ADLs). If the patient is already functionally impaired, anticipate significant postoperative problems related to weight-bearing, transfers, and independent ambulation.

Poor nutrition. Older patients also might present with poor nutrition from the presence of chronic diseases, from the illness they have near the time of surgery, or both. Poor nutrition complicates the postoperative management of these patients by impairing wound healing or by producing generalized sarcopenia, muscle loss, and weakness, thereby prohibiting successful rehabilitation.

Complicated transitions. Older patients may have complicated transitions from the hospital to home. Unlike a younger patient with a more straightforward medical case, the older patient may have chronic illnesses, cognitive impairment, and functional needs. These factors, together with the poor social support systems available to many older patients, may make a direct return home unlikely or make even a post-rehabilitation return home unsafe.

■ CASE PRESENTATION

An 82-year-old woman is admitted for hip fracture and undergoes successful open reduction and internal fixation. She has a history of osteoarthritis, systolic hypertension, and mild visual and hearing impairment. She is taking a beta-blocker, a thiazide diuretic, analgesics as needed, and a multivitamin.

Prior to the hip fracture she was independent in all of her basic ADLs and had no significant mobility problems despite her arthritis. She is a social drinker with no history of cigarette smoking. Review of systems reveals no significant cardiovascular, lung, or renal disease. Baseline laboratory studies are all normal, including complete blood count, basic metabolic panel, thyroid-stimulating hormone, and vitamin B₁₂.

From the Section of Geriatric Medicine, Department of General Internal Medicine, Cleveland Clinic Foundation, Cleveland, OH.

Address: Robert M. Palmer, MD, Department of General Internal Medicine, Cleveland Clinic Foundation, 9500 Euclid Avenue, A91, Cleveland, OH 44195; palmer@ccf.org.

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Assess the risk of delirium

Which of the following statements about this patient is most correct?

- A. She is at high (> 50%) risk of postoperative delirium
- B. She is at low risk of postoperative delirium
- C. Postoperative delirium can be prevented
- D. Surgery is not warranted because of a risk of delirium

This patient is at low risk of postoperative delirium based on the postoperative delirium prediction rule (**Table 1**) developed by Marcantonio et al,⁴ in which points are assigned to each preoperative risk factor for postoperative delirium and totaled to calculate the risk of delirium. This patient would receive 1 point for age, which would put her in the low-risk category, based on this scale. Although one can argue that every 82-year-old patient is at risk for postoperative delirium, this patient is at relatively low risk.

■ REDUCING THE RISK OF DELIRIUM

Once a patient's risk factors are identified, is it possible to reduce the risk of postoperative delirium? An attempt was made to answer this question by evaluating postoperative care among 126 consenting patients age 65 and older who were admitted to an orthopedic surgery service for emergency hip fracture repair.⁵ Subjects received a baseline assessment and were randomized to receive one of two types of postoperative care: usual care or proactive geriatric consultation, which began preoperatively or within 24 hours of surgery. For patients assigned to proactive geriatric consultation, a geriatrician made daily visits and targeted recommendations based on a structured protocol. Among the interventions recommended by the geriatrician were:

- Supplemental oxygen
- Restoring serum sodium, potassium, and glucose to normal limits
- Stopping high-risk medications
- Assuring adequate nutritional intake
- Getting the patient out of bed on postoperative day 1
- Treating severe pain.

The consultation-based intervention reduced the incidence of postoperative delirium: the delirium rate was 50% in those receiving usual care vs 32% in those receiving the proactive geriatric consultation.⁵ Most studies in which postoperative delirium was evaluated in older patients demonstrate a risk of delirium of approximately 50%. Some of these patients have severe delirium, in which they are agitated, uncooperative, and threaten to walk out of the hospital, so

TABLE 1

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to reprint this table online.

Please see original source table (table 6) in:
Marcantonio ER, Goldman L, Mangione CM, et al. A clinical prediction rule for delirium after elective non-cardiac surgery. JAMA 1994; 271:134-139.

preventing delirium is key to successful postoperative care and rehabilitation.

High-risk medications

The list of potentially inappropriate medications⁶ for patients at risk for delirium is a long one, but a few classes of drugs carry particular risk of postoperative acute confusion or delirium.

Anticholinergic drugs encompass a wide range of agents used to treat a variety of diseases, and include bladder relaxants, drugs for Parkinson disease, and other agents not traditionally thought of as having anticholinergic properties (eg, antihistamines, especially first-generation agents such as diphenhydramine and hydroxyzine), all of which can increase the risk of postoperative delirium. These medications should be avoided in older patients, even low-risk ones, to try to prevent postoperative delirium.

Benzodiazepines (eg, alprazolam, clonazepam) can cause an agitated, confused state and increase the risk of falls and are therefore contraindicated in hospitalized older patients.

Meperidine is a high-risk medication because it has a long-acting metabolite that is neurotoxic. This toxin accumulates with repeated doses, so it should be avoided. Other opioids, such as morphine sulfate, are better suited for use in older patients.

H₂-receptor antagonists. At high doses, H₂-receptor antagonists—most notoriously cimetidine—can cause delirium.

Functional status affects prognosis

In frail older patients, use of functional status measures (eg, ADLs) is essential in the perioperative period to assess clinical progress.

ADLs indicate how well a patient can transfer from a bed to a chair and how well the patient bathes, dresses, and ambulates.

Depressive symptoms. Older patients with depressive symptoms, including patients who have undergone hip surgery, have prolonged hospitalizations, have worse in-hospital outcomes, and are less likely to have good long-term outcomes.

Cognitive dysfunction is a common functional status measure that confounds the outcomes of hospitalization. Cognitive abilities should be assessed, and most importantly, delirium or acute confusion must be detected so that offending medications can be stopped or fluid and electrolyte problems aggressively treated. A brief test of attention (eg, a digit span of five numbers) can be helpful to detect patients with cognitive impairment.

Nutrition. Although the data are sparse, some evidence suggests that nutritional supplements given to patients following hip surgery may improve outcomes and reduce mortality.⁷

■ **POSTOPERATIVE DAY 2:
PATIENT IS WEAK AND IN PAIN**

On postoperative day 2, the patient appears weak, slightly confused, and is not eating. The neurologic examination is normal, but she is crying in pain.

The most important next step is to:

- A. Order increased physical therapy
- B. Begin an antidepressant
- C. Insert a nasogastric feeding tube
- D. Increase doses of analgesics

The best answer is to increase doses of analgesics because the patient's pain must be managed before rehabilitation can continue. Ordering physical therapy might be appropriate, but this patient is not likely to benefit from physical therapy until she has adequate pain control. Because the patient was healthy at baseline, considering an antidepressant or a feeding tube would be premature. Those treatments might be indicated, however, if she had symptoms of depression or became malnourished.

■ **POSTOPERATIVE DAY 3:
WHAT IS CAUSING ELECTROLYTE IMBALANCE?**

On postoperative day 3, the patient is still weak. Laboratory evaluations show a creatinine level of 0.5 mg/dL, a sodium level of 128 mmol/L, and a potassium

level of 3.4 mmol/L.

The most likely reason for these low levels of electrolytes is:

- A. Frailty (impaired homeostasis)
- B. Excessive intravenous (IV) saline
- C. Polydipsia

The major issue in this patient is frailty and impaired homeostasis. Acute illness causes a sudden decline in physical functioning, and if measures aren't taken to prevent further decline or return patients to their baseline strength level, then the resultant loss of strength is identified clinically as frailty.

Physiologic frailty results from failure of multiple organ systems: brain failure, which includes acute confusion or delirium; heart failure, when diastolic dysfunction pushes the patient over the edge (producing symptoms or signs of heart failure); and renal failure, whether it is the inability to excrete the free water load or the occurrence of prerenal azotemia in the postoperative period.⁸

Preventing frailty in older patients requires identifying those at risk and aggressively managing them after the acute illness, in this case major surgery, to successfully restore them to their baseline level of strength.

In considering the other two possible answers to the question above, polydipsia would be reasonable to assume if this patient had psychogenic polydipsia, for example, and wasn't able to effectively excrete a free water load. Excessive IV saline would be more likely to cause hypernatremia rather than the hyponatremia that we see in this patient.

■ **POSTOPERATIVE DAY 4:
PAIN IS CONTROLLED, COGNITION IS IMPROVED**

By postoperative day 4, the patient's pain is controlled and her cognition has improved. Her diet is poor. She now takes short, shuffling steps and is unsteady.

The most important next step is to:

- A. Begin treatment for Parkinson disease
- B. Increase physical therapy
- C. Begin nasogastric tube feedings
- D. Reduce the level of analgesic therapy

Increasing physical therapy is the appropriate next step. The medical staff should try to transfer the patient, have her bear weight, increase her range-of-motion exercises, and have her perform low-impact aerobic exercise, such as walking to the physical therapy department or walking up and down the hallway. As the patient progresses, more aggressive measures can be implemented, such as low-intensity resistive exercises

using bands, tubes, and weights. Following hospital discharge, rehabilitation can be increased to include high-intensity exercises using machines or pulleys.

The other options should be considered and might be appropriate in other circumstances. For example, reducing analgesic therapy might be considered if this patient's cognitive function were impaired, if she were having hallucinations, or if she had received meperidine and was experiencing psychosis, nausea, or seizures. However, her cognition has improved and she does not have constipation, fecal impaction, or vomiting, and her bowels are moving, indicators that her analgesic profile is reasonably good.

Nasogastric tube feeding would be reasonable to consider at this point—it's postoperative day 4 and she is still not eating well—but this patient clinically seems to be turning the corner. With help from dietitians, nutrition support, and supplements, improving her nutritional status should be possible. This patient is a good candidate for oral feeding with or without nutritional supplements because she is alert, has normal swallowing mechanics, and is normally nourished or only mildly malnourished. The markedly malnourished patient would require more aggressive intervention with IV fluids or nasogastric tube feeding, nutritional support, and dietetic counseling.

In this patient, beginning treatment for Parkinson disease would be inappropriate because her parkinsonian symptoms are probably caused by deconditioning and generalized weakness. In addition, this patient's baseline neurologic examination was normal, and she has no history of Parkinson disease.

■ POSTOPERATIVE DAY 5: CAN THE PATIENT GO HOME?

On postoperative day 5, the patient appears well and is eating and walking with the assistance of a walker. She refuses to be admitted to a skilled nursing facility and asks if she can go home.

The best next step is:

- Psychiatry consult to judge competence
- Family conference
- Call the patient's power of attorney designate for health care
- Discharge patient to home

In this case a family conference would be a helpful first step. When the diagnosis isn't clear or the patient has concurrent illnesses or psychosocial issues, a family conference will help do the following:

- Clarify the goals of therapy, the patient's wishes and values, and likely hospital outcomes

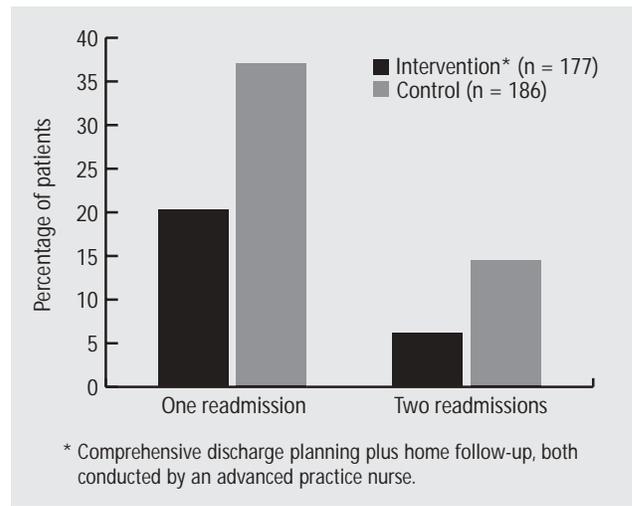


FIGURE 1. Comprehensive discharge planning reduced the number of hospital readmissions (within 24 weeks of index discharge) compared with usual care ($P \leq .01$) in a randomized trial of patients age 65 and older. Data from reference 9.

- Review advance directives
- Resolve conflicts in care management.

Family conferences that take place early in complicated cases and then periodically as needed are a worthwhile investment of time.

Regarding the other possible next steps, psychiatric consultation to judge competence might be indicated because the patient is refusing what appears to be appropriate therapy (in this case transitional care in a skilled nursing facility following major surgery and a complicated postoperative hospital stay). Nevertheless, this patient is cognitively normal, does not have a history or findings of dementia, and would be deemed to have intact medical decision-making capacity, so psychiatric consultation would not be appropriate at this time.

Calling the patient's power of attorney designate would be reasonable if she were unable to make an informed judgment for herself—for example, if she were delirious, in a coma, or severely demented. Again, this patient is not in that situation.

Discharging the patient to home is a reasonable option to consider with arrangements for home care intervention. The issue in this case is that the patient has had a complicated postoperative hospital stay, she is weak, and she has not been eating well, so she is likely to have an unplanned readmission to the hospital because she will probably not do well at home.

Sending her home may have been possible if comprehensive discharge planning had been instituted on day 1 of her hospitalization and a case manager or spe-

cially trained advanced practice nurse helped manage her in the hospital and then made home care visits once she was sent home. Comprehensive discharge planning conducted by an advanced practice nurse was shown to be effective in a randomized trial of high-risk patients age 65 and older (including those who had undergone hip fracture treatment).⁹ The study found that comprehensive discharge planning, which in this case also included home follow-up and telephone calls to the patient, reduced single readmissions and multiple readmissions (**Figure 1**),

lengthened the time between discharge and readmission, and reduced length of stay on readmission compared with a control group that did not receive the intervention.

■ SUMMARY

Perioperative management is typically more complicated in older patients than in younger patients and requires more assessment and evaluation before surgery as well as precautionary steps after surgery to manage these high-risk patients.

■ REFERENCES

1. **Kozak LJ, Owings MF, Hall MJ.** National Hospital Discharge Survey: 2001 annual summary with detailed diagnosis and procedure data. *Vital Health Stat 13* 2004; 156:1–198.
2. **Kozak LJ, Owings MF, Hall MJ.** National Hospital Discharge Survey: 2002 annual summary with detailed diagnosis and procedure data. *Vital Health Stat 13* 2005; 158:1–199.
3. Healthcare Cost and Utilization Project home page. Agency for Healthcare Research and Quality. Available at: <http://hcup.ahrq.gov/HCUPnet.asp>. Accessed September 2005.
4. **Marcantonio ER, Goldman L, Mangione CM, et al.** A clinical prediction rule for delirium after elective noncardiac surgery. *JAMA* 1994; 271:134–139.
5. **Marcantonio ER, Flacker JM, Wright RJ, Resnick NM.** Reducing delirium after hip fracture: a randomized trial. *J Am Geriatr Soc* 2001; 49:516–522.
6. **Fick DM, Cooper JW, Wade WE, Waller JL, Maclean JR, Beers MH.** Updating the Beers criteria for potentially inappropriate medication use in older adults: results of a US consensus panel of experts. *Arch Intern Med* 2003; 163:2716–2724.
7. **Milne AC, Potter J, Avenell A.** Protein and energy supplementation in elderly people at risk from malnutrition. *Cochran Database Syst Rev* 2005 Apr 18; (2):CD003288.
8. **Fried LP, Tangen CM, Walston J, et al.** Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci* 2001; 56:M146–M156.
9. **Naylor MD, Brooten D, Campbell R, et al.** Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial. *JAMA* 1999; 281:613–620.