

ORIGINAL RESEARCH & CONTRIBUTIONS

Special Report

Making Hospitals Safer for Older Adults: Updating Quality Metrics by Understanding Hospital-Acquired Delirium and Its Link to Falls

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<http://dx.doi.org/10.7812/TPP/13-065>**Abstract**

The medical care of hospitalized geriatric patients must differ from the care of younger adults. Because of reduced “reserve capacity,” hospitalized older adults are at high risk of development of geriatric syndromes such as delirium and falls. Geriatric syndromes often lead to functional decline and dependence. Patients who experience geriatric syndromes in the hospital are more likely to have a longer length of stay, higher risk of readmissions, and worse medical outcomes. Incident delirium in hospitalized geriatric patients has been shown to be preventable by intervening in established risk factors. Prevention of hospital-related falls has not been consistently demonstrated. Analysis from Kaiser Permanente data demonstrated a correlation with delirium and hospital-related falls. We propose that age-specific quality metrics should be made to reduce the risk of the development of geriatric syndromes in hospitalized older adults. By preventing delirium, we believe that health care practitioners can reduce hospital-related falls in geriatric patients and improve the quality of care delivered to hospitalized older adults. An illustrative fictional case study is presented.

Case Study

A man, age 75 years, was admitted to the hospital after a 1-week history of increasing dyspnea. Before admission, the patient was receiving no medications and had no clinically significant medical history. He did not drink alcohol or have a history of tobacco use. He was still employed and walked up to 3.2 km (2 mi) daily without difficulty. In the Emergency Department (ED), the patient received a diagnosis of congestive heart failure. After an indwelling urinary catheter was placed, diuresis was initiated in the ED.

At hospital admission, furosemide therapy was continued for diuresis. Lisinopril treatment was started because of systolic dysfunction, omeprazole was added for routine stress ulcer prophylaxis, and temazepam was ordered as needed for relief of insomnia. For patient comfort and convenience, the patient rested in bed during the first 48 hours, and the indwelling urinary catheter was left in place. On hospital Day 3, his anticipated day of discharge, the patient experienced sudden confusion.

In his agitated state, the patient got out of bed and fell. His radiographs showed no evidence of fracture. A workup for delirium revealed pyuria, and a ceftriaxone regimen was begun. Cultures later showed growth of *Escherichia coli* in the blood and urine.

On Day 6 of hospitalization, *Clostridium difficile* diarrhea developed and the patient was treated with metronidazole. The patient was sent to a skilled nursing facility on Day 9, where he remained for 60 days. He was forced to retire from work because of continued impaired cognition and reduced physical stamina.

Alternative with Updated Quality Metrics

If quality metrics had been updated to meet age-specific concerns, this case scenario would have had different treatments and outcomes. The indwelling urinary catheter would not have been inserted for comfort and convenience, the patient would have been mobilized at admission to the ED and hospital, and omeprazole

and temazepam would not have been prescribed. Subsequently, bacteremia and *C difficile* colitis would likely have been avoided, and the patient would probably have been able to continue working.

The Aging Population and the Aging Medical Paradigm

The first cohort of baby boomers officially became “seniors” in 2011. The fastest growing segment of our patient population is people over the age of 85 years. Geriatric patients are more likely to have substantial renal and hepatic insufficiency, reduced cardiac output, increased body fat, and reduced lean body mass compared with those younger than age 65 years. Because of these physiologic changes, hospitalized older adults adapt to environmental and internal insults differently from their younger counterparts. The manifestation of reduced reserve capacity in older adults is a geriatric syndrome, which often portends increased health care utilization and functional dependency on others. Hospitalized older adults are most vulnerable to the development of geriatric syndromes.

Incident (hospital-acquired) delirium is common in older adults, occurring in nearly one-sixth of all older adults hospitalized for medical reasons.¹ Risk factors for incident delirium are shown in Table 1. Hospital-acquired delirium is associated with increased length of stay and risk of unplanned readmission.^{2,3} Four percent of all symptoms of delirium resolve at the time of hospital discharge.⁴ Only 18% of patients have all symptoms of delirium resolve 6 months after hospital discharge.⁴ Historically, delirium was once considered a self-limiting occurrence. However, there is more evidence that delirium is indeed

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more insidious. Dementia, with inexorable cognitive decline, may be a sequela of delirium.⁵ Eventual return to the patient's pre-delirium cognitive status should no longer be assumed.

Falls in the community also occur frequently in older adults. Thirty percent of community-dwelling adults over age 65 years of age fall, and 50% of community-dwelling adults over age 80 years fall, many repeatedly.⁶ Of all falls that occur in the community, 10% lead to a major injury, including fractures, soft-tissue injury, and subdural hematomas.⁷ The psychological consequences of falls are dramatic; there is a 20% to 55% prevalence rate of fear of falls in community-dwelling older adults, and the prevalence is higher in those who have already experienced a fall.⁸ Not surprisingly, the attributable risk of a fall leading to nursing home placement is 10%.⁹

The Centers for Medicare & Medicaid Services designated that falls occurring during hospitalization are a "never event."¹⁰ However, in contrast to falls in the community, the epidemiology and risk factors for this never event are incompletely characterized in the literature. To comply with the Centers for Medicare & Medicaid mandate to prevent falls during hospitalization of an older adult, the risk factors must be clearly defined. One reasoned approach to preventing falls in the hospital is to apply our knowledge of preventing falls in the community (risk factors shown in Table 1).

Geriatric syndromes should not be considered inevitable events. Inouye et al¹ demonstrated that incident delirium in older adults hospitalized for medical reasons could be decreased by 50% through a multiple risk factor reduction approach. Tinetti and colleagues⁶ demonstrated that 30% of falls in older adults living in the community also could be lowered by reducing multiple risk factors.

At our institution, 40% of all hospitalized patients are older than 65 years. Complications caused by geriatric syndromes lead to increased length of stay and number of readmissions.³ The medical paradigm—treating the disease leading to hospitalization in isolation—must be retired. Hospital care of the geriatric patient must be viewed comprehensively, combining our medical paradigm with the additional focus on preventing iatrogenically acquired geriatric syndromes.

This idea has been proposed since 1995, when Landefeld et al¹¹ published their landmark findings of the Acute Care for Elders Unit. Older patients hospitalized in this special unit were, compared with controls, more likely to have improved function, less likely to have worse function, and less likely to be sent to a nursing home after hospital discharge. To our knowledge, there are only two comprehensive approaches to maintain or to improve the functional status of hospitalized older adults, including the Acute Care for Elders Unit and delirium prevention. Given similarities in both interventions, the Acute Care for Elders Unit and delirium prevention have been combined in at least one community health care system.¹²

Preventing delirium can improve function and thereby make hospitals safer for older adults through improved age-specific care. This is a seemingly simple task since delirium and falls share many of the same risk factors (Table 1). In 1995, Tinetti et al¹³ demonstrated that two common ambulatory geriatric syndromes (falls and incontinence) shared similar risk factors and proposed that we should unify our approach to geriatric syndromes. If we intervened on risk factors for one geriatric syndrome, we could prevent the occurrence of another geriatric syndrome. Indeed, delirium prevention has been shown to prevent falls in the hospital.¹⁴

Applicability of The Joint Commission Quality Metrics in the Hospitalized Older Adult

The Joint Commission Accountability Measures of 2011 are based on the classic medical paradigm for patients of all ages hospitalized for medical reasons. Of these possible 25 metrics (in the areas of heart attack care, heart failure care, pneumonia care, venous thromboembolism prophylaxis, and stroke care), only 1 metric addresses the prevention of functional decline (stroke care—assessed for rehabilitation).¹⁵ The emphasis on β -blocker use (myocardial infarction care) is certainly an important metric of quality. However, what impact will an angiotensin-converting enzyme inhibitor/angiotensin receptor blocker have in a 95 year old with new-onset heart failure due to systolic dysfunction and with no hypertension?

Similarly, the accountability metrics for pneumonia^{16,17} (antibiotic selection, blood culture attainment before antibiotic administration) are actively ordered and routinely performed by seasoned hospital-based physicians. However, they fail to redirect attention to ameliorate physical function that would improve outcomes in older adults, yet are often neglected by the physician. Are these quality metrics the most important considerations in older adults at high risk of functional dependence caused by hospitalization?

These quality metrics should be culled by accrediting commissions carefully. Putting focus on the medical paradigm without consideration of functional outcomes has substantial opportunity cost, with the vulnerable older adult population most at risk. Hospital physicians and leaders must assume that all older adults are at high risk of geriatric syndromes, and they should proactively focus on preventing them from occurring. By modifying quality metrics to address the needs of our aging population, we can make hospitals safer for older adults.

Proposed Age-Specific Quality Metrics for Older Adults

The authors propose better age-specific care by revising quality metrics that address functional outcomes of hospitalized medical patients. These quality metrics should be modeled to target risk factors for incident delirium and falls. In addition, these three additional quality metrics satisfy the four

Table 1. Risk factors for incident delirium during hospitalization and falls in the community

Risk factor	Delirium in hospital	Falls in community
Restraints (immobility)	X	
Urinary catheter	X	
Malnutrition	X	
Polypharmacy (> 3 medications added)	X	X
High-risk medications	X	X
Iatrogenic event	X	
Use of sedative-hypnotics	X	X
Cognitive impairment	X	X
Lower extremity weakness		X
Gait and balance disorders		X
Acute illness	X	X

accountability criteria for processes of care as cited by the custodians of The Joint Commission.¹⁶ We proposed quality metrics for older patients as shown in the Sidebar: Proposed age-specific quality metrics for older adults.

Preventing Deconditioning/ Improving Mobility

More than 80% of the time (nearly 20 hours per day) during hospitalization is spent in bed. Only 4% of the time (less than 1 hour per day) during hospitalization is spent standing or walking.¹⁸ Length of stay has been shown to improve with early and progressive mobilization.^{19,20} Poor mobilization during hospitalization is associated with poor functional outcomes in older adults. Im-mobility is an established risk factor for delirium, and lower extremity weakness is an established risk factor for falls in the community.⁶ Concerted efforts to mobilize older adult patients must be made even though they are fatigued because of an acute illness. Improved mobility must start from the time the patient arrives in the ED, at minimum by encouraging the use of a bedside commode or assisting the patient to the bathroom (rather than giving a bedpan or urinal). Nursing administration must recognize that mobilization of older patients is of equal importance to medication administration and grooming.

Preventing Catheter-Related Urinary Infections

The indwelling urinary catheter can be considered a one-point restraint and hinders free mobility.²¹ Up to 40% of the time, the presence of an indwelling urinary catheter goes unrecognized by the hospital physician.²² The rate of bacterial colonization is 5% per day in a patient with an indwelling urinary catheter, and 4% of all Foley catheter-related urinary tract infections can lead to bacteremia.²³ Up to 1.4% of all indwelling urinary catheters placed in the ED, operating room, or hospital wards may lead to a traumatic urethral injury.²⁴ Unlike other minor procedures that commonly lead to adverse outcomes, the insertion of an indwelling urinary catheter does not require informed consent. Consequently, its indications are often not known by ED or hospital physicians. The indications for an indwelling urinary catheter are as follows:²⁵

- Acute urinary retention or obstruction
- Incontinence in a patient at the end of life for comfort or with a perineal wound
- Critical monitoring of the fluid input and output in the care of the incontinent patient
- Perioperative setting.

If an indwelling urinary catheter is placed, an attempt to remove it should be made as soon as possible because of the patient's risk of reduced mobility and increased risk of catheter-related urinary infections.

Preventing Adverse Drug Events by Minimizing Polypharmacy

The indications for all medications should be scrutinized during hospitalization. When a clinician prescribes a new medication during the hospitalization of an older adult, the safest option should always be chosen and the number of new medications initiated should be minimized because the substrate of the hospitalized older adult is different.²⁶ Hospital-based physicians should feel comfortable stopping outpatient medication regimens. Indeed, the chance of an adverse drug event during the hospitalization of an older adult taking 8 or more medications is greater than 85%.²⁷ Medications can be safely stopped in older adults, with improved functional outcomes in the outpatient setting.²⁸ Reduction in polypharmacy should target three classes of medications: anticholinergics, proton pump inhibitors (PPIs), and benzodiazepine and nonbenzodiazepine hypnotics.

Anticholinergic Agents

The use of anticholinergic agents is a known risk factor for delirium and falls in the community. Reports have been published that up to 27% of all community-dwelling older adults use medications with some anticholinergic activity.²⁹ Alzheimer disease is thought to be partially caused by a cholinergic deficiency and hence the use of anticholinergic agents can deteriorate cognitive function in patients with dementia. The use of anticholinergics is an established risk factor for delirium.³⁰ In addition, because anticholinergics may lead to symptomatic orthostatic hypotension, they are a risk factor for falls in the hospital. The use of medications with some anticholinergic activity may be unavoidable (ie, furosemide, atenolol, nifedipine). However, many commonly used anticholinergics have minimal to no demonstrable efficacy (skeletal muscle relaxants such as cyclobenzaprine and antispasmodic gastrointestinal agents such as dicyclomine), whereas others have safer alternatives (H₁ blockers such as diphenhydramine and hydroxyzine). Finally, tertiary tricyclic agents are often used for off-label purposes (tertiary tricyclic antidepressants such as amitriptyline and imipramine) to treat neuropathy and insomnia and should be discontinued during hospitalization.

Proposed Age-Specific Quality Metrics for Older Adults

1. Prevent deconditioning/improve mobility in previously ambulating patients

- a. Establish patient's functional status
 - i. one month before admission
 - ii. at hospital admission
 - iii. at discharge
- b. Define processes to improve physical function
 - i. percentage of time patient is out of bed for meals and while awake
 - ii. percentage of time patient has a physical therapy evaluation and continued physical therapy care
 - iii. percentage of time patient demonstrates increase in ambulation (time and distance) within 48, 72, and 96 hours of admission

2. Prevent catheter-related urinary tract infections

- a. percentage of time patient has a urinary catheter with an approved indication
- b. percentage of time patient without an approved indication has urinary catheter removed within 36 hours of insertion

3. Prevent adverse drug events by minimizing polypharmacy

- a. percentage of time patients received an anticholinergic agent from the following classes:
 - i. antispasmodic gastrointestinal agents
 - ii. skeletal muscle relaxants (with the exception of carisoprodol [Soma] because of risk of withdrawal)
 - iii. H₁ antihistamine (unless used for prevention or treatment of an allergic reaction)
 - iv. tricyclic antidepressants (unless used for treatment of depression)
- b. percentage of time patient received a proton pump inhibitor without an approved indication
- c. percentage of time patient received a benzodiazepine or nonbenzodiazepine hypnotic

Proton Pump Inhibitors

Stress ulcer prophylaxis is overused in the hospital setting. The indications for stress ulcer prophylaxis are limited to critically ill patients only.³¹ Unfortunately, hospital-based physicians now prescribe PPIs in the noncritical hospitalized patient without indication. The number needed to harm is 111 for a hospital-acquired pneumonia.³² The number needed to harm is 533 for *C difficile* diarrhea.³³ The number needed to prevent a stress ulcer in a noncritical hospitalized patient is 730 for any acid suppression medication.³⁴ In older adults, the broad indications for PPIs may include the following:³⁵

- Patients on mechanical ventilation therapy
- Patients hospitalized in the intensive care unit with a coagulopathy
- Treatment of proven or suspected upper gastrointestinal bleeding
- Continuation of treatment of a recently diagnosed peptic or duodenal ulcer
- Treatment of a preexisting esophagitis or esophageal stricture
- Use of aspirin or other nonsteroidal anti-inflammatory drug during hospitalization.

Benzodiazepine and Nonbenzodiazepine Hypnotics

The use of sedative-hypnotics are a classic risk factor for falls in the community and hospital-acquired delirium. A nonpharmacologic sleep protocol consisting of relaxing music, a back rub, and a warm drink was shown to reduce the rate of sedative-hypnotic use from 54% to 31%.³⁶ Benzodiazepine use has been demonstrated to increase length of stay. Previously thought to be safe, Z class nonbenzodiazepines have been recently targeted as a high-risk medication as well,³⁷ with evidence that they increase risk of injurious falls and confusion. In hospitalized patients, zolpidem use has been shown to be a risk factor for falls in the hospital. The authors concluded that 55 inpatients administered zolpidem might lead to 1 additional fall.³⁸

Application of Approaches: Putting Medical Knowledge into Clinical Practice

On the basis of internal interregional data review that showed a clear association between hospital-related falls and delirium, Kaiser Permanente (KP) Southern

California (KPSC) Region's Falls Prevention Team targeted the prevention of delirium as an additional area of its focus. Delirium prevention principles were incorporated into education about falls and interventions used by a multidisciplinary team, which included nurses, nursing assistants, physical therapists, pharmacists, and physicians.

The Confusion Assessment Method tool³⁹ is being used to screen for delirium in KPSC intensive care units. Currently, hospital units from two medical centers are testing the effectiveness of early identification of delirium by using the Confusion Assessment Method tool in medical-surgical units. KPSC has made a concerted effort to reduce outpatient prescribing of anticholinergic agents in older adults for the past three years, reducing the number of high-risk medications prescribed on an ambulatory basis that might have been otherwise unnecessarily continued in the hospital setting. Through physician education, partnership with patient and family members on the dangers of sedative-hypnotics, and the use of hospital admission order sets that exclude their use in older adults, the attempt to systematically reduce the use of benzodiazepines and Z class nonbenzodiazepines has been made. For 2013, minimizing the prescriptions for sedative-hypnotic drugs in the ambulatory setting for older adults has been made into a major quality initiative throughout the Southern California Permanente Medical Group, likely reducing the chance that such medications are prescribed at hospital admission. In addition, the potentially inappropriate use of PPIs in the hospital setting is being scrutinized in different KPSC Medical Centers, with pharmacists contacting hospital-based physicians about potentially inappropriate use. In all Medical Centers, the multidisciplinary team has partnered with family members to individualize care that would optimize mobility for hospitalized older adults.

A pilot program using pedometers has begun at the KP Fontana Medical Center in Fontana, CA, to increase early and cumulative ambulation during hospitalization. These interventions, along with encouraging the use of patients' hearing aids and eyeglasses and bringing familiar objects and pictures from home, are the KPSC Region's attempts to make our hospitals safer for older patients.

Conclusion

Quality metrics are a powerful strategy to institute change and will allow hospitalists to learn and apply the principles of geriatrics. Proactively focusing on preventing geriatric syndromes by targeting the shared risk factors for delirium and falls can reduce length of stay, minimize unplanned readmissions, maximize functional independence, and keep our hospitals safer for older adult patients. ♦

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The author(s) have no conflicts of interest to disclose.

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and helped spur the creation of our Kaiser Permanente Southern California committee that focused on improving functional outcomes of hospitalized older adults.

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