Hospitalization-Associated Disability

“She Was Probably Able to Ambulate, but I’m Not Sure”

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THE PATIENT’S STORY

Ms N is a 70-year-old woman admitted to the medical service of an urban public hospital. She reported experiencing left labial pain and hematuria for 3 days. In the emergency department, she was in acute renal failure (serum creatinine, 10.8 mg/dL; potassium, 8.3 mEq/L).

She had a long history of type 2 diabetes mellitus, hypertension, chronic kidney disease (baseline creatinine, 3.5 mg/dL), coronary artery disease, peripheral vascular disease, and diabetic neuropathy.

Ms N emigrated from the Philippines in 1997 to join her husband, from whom she had since separated. Although her primary language was Tagalog, all communication with her during the hospitalization was in English. Her monthly income was $300 per month from the US Social Security Administration. One of her 6 children lives locally. Prior to admission, Ms N reported that she lived independently as a guest in a friend’s home and was able to care for herself until 3 days before admission.

On admission, Ms N appeared frail, shivering with a temperature of 98.2° F (36.8° C), systolic and diastolic blood pressure of 155/42 mm Hg, pulse rate of 55 beats per minute, and a respiratory rate of 22 breaths per minute. There was a 3-cm mass in the left labium majus that was tender and indurated. She was alert and oriented to person, place, and date and walked with a normal gait. In addition to renal failure, laboratory studies were notable for hematocrit at 19.9% and her albumin level was 3.2 g/dL.

On hospital day 1, hemodialysis was started and she received empirical treatment for a urinary tract infection. On day 3, a gynecology consultant noted a fluctuant, spontaneously draining 3-cm labial lesion that was incised and drained.

In older patients, acute medical illness that requires hospitalization is a sentinel event that often precipitates disability. This results in the subsequent inability to live independently and complete basic activities of daily living (ADLs). This hospitalization-associated disability occurs in approximately one-third of patients older than 70 years of age and may be triggered even when the illness that necessitated the hospitalization is successfully treated. In this article, we describe risk factors and risk stratification tools that identify older adults at highest risk of hospitalization-associated disability. We describe hospital processes that may promote hospitalization-associated disability and models of care that have been developed to prevent it. Since recognition of functional status problems is an essential prerequisite to preventing and managing disability, we also describe a pragmatic approach toward functional status assessment in the hospital focused on evaluation of ADLs, mobility, and cognition. Based on studies of acute geriatric units, we describe interventions hospitals and clinicians can consider to prevent hospitalization-associated disability in patients. Finally, we describe approaches clinicians can implement to improve the quality of life of older adults who develop hospitalization-associated disability and that of their caregivers.

See also p 1800.

CME available online at www.jamaarchivescme.com and questions on p 1809.
drained. Later that day, Ms N was transferred to the hospital’s acute care for elders (ACE) unit. There, during the daily interdisciplinary rounds, her nurse noted Ms N had difficulty transferring from bed to commode due in part to shaking and jerking of her extremities. On the Mini-Cog test, she recalled 2 of 3 objects and drew a normal clock.

The ACE team felt her myoclonus was multifactorial and recommended discontinuation of gabapentin, which was started after admission for diabetic neuropathy. Five days later, her myoclonus had resolved and she was again independent in activities of daily living (ADLs) and walking independently using a walker. She continued receiving hemodialysis 3 times weekly. She was transferred from the ACE unit to a regular medical ward while awaiting an outpatient hemodialysis slot.

Over the next 2 weeks, she developed progressive difficulty with ambulation and experienced a slow and unsteady gait even with use of a walker. She also began to need help bathing and using the toilet. The unit social worker noted her cognitive status as “foggy” and it was felt she could not safely manage her medications or finances. She was discharged on hospital day 30 to a skilled nursing facility.

Ms N, the ACE geriatrician (Dr Z), and the inpatient social worker (Ms R) were interviewed separately by a Care of the Aging Patient editor between April and October 2010, while Ms N was in her postdischarge skilled nursing facility.

**PERSPECTIVES**

Ms N: They did all the services that I needed. They took care of my medicine, my bedding, and my wardrobe... The social worker was very helpful in finding me a place to go when I left the hospital.

Dr Z (on Ms N’s admission status): She was able to walk independently. She was able to take care of all of her ADLs and IADLs [instrumental activities of daily living] before she came to the hospital. She was a pretty independent person.

Ms R (on Ms N’s status shortly after admission): She wasn’t ambulating very much; she had some neuropathy in her legs. I think that dialysis was knocking her out a lot.

**Hospitalization-Associated Disability**

Ms N illustrates an unfortunately common scenario: an older adult living independently at home and independently managing all basic ADLs develops an acute illness requiring hospitalization. During hospitalization, the acute medical issues are treated. However, the patient is discharged with a major new disability that was not present before the onset of acute illness. The patient is no longer able to complete basic self-care activities, eg, bathing independently, and has difficulty ambulating, even with a walker.

In this article, we address hospitalization-associated disability, which includes patients (like Ms N) who develop disability for the first time when hospitalized, as well as those who were disabled before hospitalization and develop further disability when hospitalized. We review the literature on risk factors for hospitalization-associated disability, discuss interventions that may prevent it, and recommend management practices that clinicians can implement.

**METHODS**

We conducted a literature review to determine which risk factors help identify older adults most likely to develop hospitalization-associated disability. We searched PubMed, CINAHL, and EMBASE from 1990 to 2011 using the Medical Subject Headings terms aged, hospitalization or hospitals, activities of daily living or recovery of function, and prospective studies or cohort studies or longitudinal studies or odds ratio. We did not search middle aged. We retained studies that either used multivariate analysis to assess the impact of a single risk factor or that considered multiple risk factors to develop a risk stratification tool. We focused on articles that compared ADL function at or shortly before hospital admission (within 1 month) to function at or shortly after hospital discharge (within 1 month).

**Incidence of Hospitalization-Associated Disability**

Hospitalization-associated disability manifests as the loss of ability to complete 1 of the basic ADLs needed to live independently without assistance: bathing, dressing, rising from bed or chair, using the toilet, eating, or walking across a room. Individuals who develop hospitalization-associated disability cannot successfully live without assistance; they become reliant on the help of caregivers or require long-term care.1,2 Hospitalization-associated disability develops between the onset of the acute illness and discharge from the hospital. At least 30% of patients older than 70 years and hospitalized for a medical illness are discharged with an ADL disability they did not have before becoming acutely ill.3,4 Older adults who are frail, such as those with slow gait speed, have even higher rates of hospitalization-associated disability.5 The acute illness is often seemingly minor, such as an uncomplicated pneumonia or exacerbation of congestive heart failure that responds to usual medical management.6 Approximately 50% of disability among older adults occurs in the setting of medical hospitalization.7 Although Ms N’s hospitalization was unusually long, rates of hospitalization-associated disability are high even after brief hospitalizations.8 One year following discharge, fewer than half of older adults have recovered to their preillness levels of functioning and rates of nursing home placement and death are high.7,8

Although it is obvious how directly disabling illnesses such as hip fracture or stroke can lead to long-term disability, it is less obvious how Ms N’s illness led to disability. Most of the acute metabolic and infectious problems that led to hospitalization showed dramatic improvement by discharge and hemodialysis should have led to an improvement in uremic symptoms. Yet her functional trajectory followed a downward spiral. This discordance between the improving trajectory of the medical diagnoses and the failure to recover functional loss occurring shortly before admission, as well as new functional loss after admission, is a common sequela of hospitalization.9

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Acute Illness as a Precipitating Event

Although older age disability can develop suddenly (ie, from a stroke), its onset is usually insidious, meaning an individual gradually accumulates impairments that make it more difficult to independently perform an ADL. Acute illness and hospitalization then precipitate a transition to frank disability. Before hospitalization, a patient may note that getting dressed is taking greater effort but can be done without assistance. After a hospitalization, a patient might only be able to get dressed with the assistance of a caregiver.

Hospitalization-associated disability can be understood through the paradigm of geriatric syndromes as it shares many features with other geriatric syndromes such as falls, delirium, and incontinence. As is typical of geriatric syndromes, hospitalization-associated disability can rarely be explained by a single cause. Rather, it occurs in vulnerable older adults who accumulate impairments in multiple domains. These impairments encompass a range of vulnerabilities such as comorbid diseases, cognitive impairment, and psychosocial factors such as depression and limited social support. Precipitating events such as acute illness and hospitalization then trigger the full syndrome.

Processes of hospital care including iatrogenic risks, immobility, polypharmacy, and lack of adaptive accommodations can both inhibit the recovery of functional loss that occurred immediately before hospitalization and lead to additional functional loss during the hospitalization. The figure describes how these factors interact to increase the risk of hospitalization-associated disability and loss of independence. Because hospitalization-associated disability shares many characteristics with other geriatric syndromes, it may be considered the hospitalization disability syndrome.

Table 1 illustrates that the risk for hospitalization-associated disability is defined by a broad range of factors, as is typical for geriatric syndromes. Age is the most potent risk factor. More than 50% of adults older than 85 years will leave the hospital with a major new ADL disability. Depression and cognitive dysfunction are additional potent risk factors for hospitalization-associated disability. Studies by Mehta et al, Inouye et al, and Sager et al demonstrate that integrating information from brief multidimensional prognostic assessments identifies older adults most likely to develop hospitalization-associated disability.
early assessment of postdischarge needs and prevent the rushed planning that often occurs immediately before discharge, when it is discovered that patients are unable to adequately care for themselves.\textsuperscript{30} Ms N had many risk factors for being disabled at the time of discharge, including limitations in activities such as doing housework and use of transportation, poor social functioning, and mobility difficulties. The Mehta index would have been particularly useful for Ms N as it focuses on older adults independent in all ADLs before the onset of the acute illness and likely would have suggested at least moderate risk for hospitalization-associated disability.

**Preventing Hospitalization-Associated Disability**

Dr Z: *The most important thing is assessing what the level of function was before the illness. Was the patient independent with taking medicines and remembering when to take them? Does the patient remember appointments? Know what the level of independence is at baseline and if there is any change in function either cognitively or physically. Try to determine if the change is part of the acute illness.*

Ms R (referring to postadmission functioning): *She was alert . . . but having a lot of brain fog . . . . She was probably able to ambulate but I'm not sure . . . I think she was just hanging out in bed.*

Although hospitalization-associated disability results, in part, from the illness necessitating hospitalization, hospital processes may play a role both in inhibiting recovery of functional loss that occurred shortly before admission and in accelerating additional functional decline during hospitalization.\textsuperscript{15} For example, most hospitalized older adults spend the majority of time in bed; even short periods of bedrest accelerate muscle wasting.\textsuperscript{15,31,32} Hospitalization provides opportunities for iatrogenic complications, including medication adverse effects and infections, especially in patients with indwelling devices such as urinary catheters.\textsuperscript{31,32} Nutritional status often deteriorates during hospitalization.\textsuperscript{34} This may be partially related to excessive use of nothing by mouth orders and restrictive unpalatable diets. Many of these processes also precipitate delirium, a potent risk factor for hospitalization-associated disability.\textsuperscript{35}

A number of interventions have been implemented to reduce the incidence of hospitalization-associated disability. They include geriatric inpatient units (acute care of elders or ACE units), geriatric inpatient rehabilitation (also known

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**Table 1. Studies Examining Individual Risk Factors of Hospitalization-Associated Disability**

<table>
<thead>
<tr>
<th>Source</th>
<th>No. of Participants</th>
<th>Risk Factor</th>
<th>Measures of Risk Factor</th>
<th>Age of Participants, y\textsuperscript{a}</th>
<th>Loss of independence</th>
<th>Outcome</th>
<th>Effect Size AOR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covinsky\textsuperscript{19} et al,\textsuperscript{20} 2003</td>
<td>2293</td>
<td>Age</td>
<td>NA</td>
<td>80 (65%), 70-79; 35%, 80-89; 9%, 90</td>
<td>in \textgeq 1 ADL before admission and discharge</td>
<td>Age, y</td>
<td>70-74</td>
</tr>
<tr>
<td>Covinsky\textsuperscript{21} et al,\textsuperscript{22} 1999</td>
<td>572</td>
<td>Depression</td>
<td>Short Geriatric Depression Scale\textsuperscript{23}</td>
<td>79.9 (6.4)</td>
<td>in \textgeq 1 ADL at hospital discharge</td>
<td>Depressive symptoms</td>
<td>Low</td>
</tr>
<tr>
<td>Lindenberger\textsuperscript{24} et al,\textsuperscript{25} 2003</td>
<td>1557</td>
<td>Mobility</td>
<td>Self-report\textsuperscript{26}</td>
<td>78.3 (6.0)</td>
<td>in \textgeq 1 ADL at hospital discharge</td>
<td>Steadiness</td>
<td>Very steady</td>
</tr>
<tr>
<td>Mahoney\textsuperscript{27} et al,\textsuperscript{28} 1999</td>
<td>1212</td>
<td>Mobility</td>
<td>Use of a walker</td>
<td>79.1 (6.2)</td>
<td>in \textgeq 1 ADL at hospital discharge</td>
<td>Worsening ADL function during hospitalization</td>
<td>No</td>
</tr>
<tr>
<td>Sands et al,\textsuperscript{29} 2003</td>
<td>892</td>
<td>Cognitive impairment</td>
<td>Short Portable Mental Status Questionnaire\textsuperscript{30}</td>
<td>79.7 (6.6)</td>
<td>Cognitive impairment</td>
<td>Development of new ADL disability</td>
<td>Abnormal (No. of errors)</td>
</tr>
<tr>
<td>Inouye\textsuperscript{31} et al,\textsuperscript{32} 1998</td>
<td>458</td>
<td>Delirium on admission</td>
<td>Confusion Assessment Method\textsuperscript{33}</td>
<td>78.9 (6.9)</td>
<td>Cognitive impairment</td>
<td>New ADL disability at discharge compared with prehospital baseline</td>
<td>Presence of delirium</td>
</tr>
</tbody>
</table>

\textsuperscript{a}All participants were older than 70 years of age; age data for Covinsky et al\textsuperscript{19} are reported as mean; data for other studies are reported as mean (SD).

\textsuperscript{b}Unsteadiness was assessed as a self-reported single item, “On the day you were admitted to the hospital, did you feel very steady, slightly steady, very unsteady, or very unsteady?”

\textsuperscript{c}Binary frequencies are presented because multivariate model in Sands et al\textsuperscript{29} examined adjusted trajectories over time. The models in the study confirmed cognitive impairment was associated with hospital-acquired disability after adjustment.
as geriatric evaluation and management [GEM] units), geriatric inpatient consultation, Hospital at Home (HAH), and the Hospital Elder Life Program (HELP). Table 3 describes some of the outcomes associated with these models in clinical trials and meta-analyses.

The strongest evidence that redesigned care systems improve outcomes stems from ACE units.36,41,42 ACE provides interdisciplinary care on geriatric-focused units with protocols for prevention and rehabilitation of disability.18 A meta-analysis suggested that ACE units reduce the incidence of functional decline at discharge and increase the likelihood of discharge to home.36 ACE units can reduce hospital length of stay and the resulting cost savings may be greater than the added costs of the unit.19 One study showed increased satisfaction among patients, nurses, and physicians.41 Many of the processes adopted by ACE units are also facilitated by Nurses Improving Care for Healthsystem Elders (NICHE), a program that provides resources to nurses to improve care of hospitalized older adults.44 Ms N regained independence in ADL function during her brief stay on the ACE unit, but her independence subsequently declined after she was transferred to a regular medical floor despite the continued stabilization of her acute medical problems.

Inpatient GEM units differ from ACE units in that they usually admit patients after their acute problems are stabilized.37 GEM units provide a greater focus on rehabilitation than on prevention of hospitalization-associated disability. They are also more selective in their choice of patients, with a focus on those most likely to benefit from rehabilitation. ACE and GEM units share an important similarity, which is the oversight of a multidisciplinary team and the use of comprehensive geriatric assessment. A meta-analysis suggested that GEM units increase the likelihood of functional improvement by the time of discharge and lower the need for nursing home care.37 Subgroup analyses suggest that GEM units are particularly promising following hip fracture.

In contrast to these models, consultative inpatient geriatric assessment has failed to demonstrate the same effect on outcomes as the interventions in which the multidiscipli-

<table>
<thead>
<tr>
<th>Prognostic Stratification Source</th>
<th>No. of Participants</th>
<th>Participant Age, Mean (SD), yr</th>
<th>Outcome</th>
<th>Risk Factors</th>
<th>Points</th>
<th>Total Points (Risk %, Validation Sample)</th>
<th>ROC Area (Validation Sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mehta et al, 2011</td>
<td>1638</td>
<td>79 (7)</td>
<td>Need for assistance in ≥1 ADL at discharge</td>
<td>Age, yr</td>
<td>0-1 (9)</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>s</td>
<td></td>
<td>80-89</td>
<td>1</td>
<td>2-3 (31)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥90</td>
<td></td>
<td>≥90</td>
<td>2</td>
<td>4-5 (44)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Needed assistance in ≥3 IADLs 2 wk</td>
<td></td>
<td>before admission</td>
<td>2</td>
<td>≥6 (75)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mobility 2 wk before admission</td>
<td></td>
<td>Unable to run a short distance (but able to walk up stairs or uphill)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unable to walk uphill or up stairs</td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>No. of ADLs for which assistance was needed at admission:</td>
<td></td>
<td>2-3</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>4-5</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Metastatic cancer or stroke</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Severe cognitive impairment</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Albumin &lt;3.0 g/dL</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inouye et al, 1993</td>
<td>330</td>
<td>78.1 (6.0)</td>
<td>New need for assistance in ≥1 ADL between admission and discharge</td>
<td>Pressure ulcer</td>
<td>1</td>
<td>0 (6)</td>
<td>0.771</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Poor cognitive function on admission</td>
<td>1</td>
<td>1-2 (29)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Needed assistance with ≥1 ADL 2 wk before admission</td>
<td>1</td>
<td>3-4 (83)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Low social activity before admission</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sager et al, 1996</td>
<td>827</td>
<td>80 (6.1)</td>
<td>New need for assistance in ≥1 ADL between 2 wk before admission and discharge</td>
<td>Age, yr</td>
<td>0-1 (19)</td>
<td>0.65</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>s</td>
<td></td>
<td>75-84</td>
<td>1</td>
<td>2-3 (31)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥85</td>
<td></td>
<td>≥85</td>
<td>2</td>
<td>4-5 (55)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Needed assistance in ≥3 IADLs 2 wk</td>
<td></td>
<td>before admission</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: ADL, activities of daily living; IADL, instrumental activities of daily living; ROC, receiver operating characteristic.

a All participants were older than 70 years of age.
b Patients in this study needed no assistance in any ADL 2 weeks prior to admission.
c IADLs included using the telephone, accessing transportation, shopping, preparing meals, doing housework, taking medicines, and handling money.
d Severe cognitive impairment was defined as a diagnosis of dementia or 5 or more errors or inability to perform on the Short Portable Mental Status Questionnaire.24
e Poor cognitive function was defined as a score of less than 20 on the Mini-Mental State Examination.
f Calculated from data in Inouye et al.28
g Poor cognitive function: score <15 on abbreviated 21-item Mini-Mental State Examination that excluded naming, repetition, 3-stage command, reading, writing, and copying.
plinary team takes a primary role in patient care. The lessons from ACE and GEM units suggest that the usual scenario, in which physical therapy, occupational therapy, and geriatrics are provided as isolated consultation services, is less effective than integrating all of the disciplines into the multidisciplinary team.

Some of the best evidence that hospital processes contribute to poor outcomes derives from randomized studies that reengineer these processes. A study of the HELP, which targets delirium prevention by instituting protocols to promote sleep, provides aids for sensory impairment and reorientation, promotes hydration, and promotes daytime activity, showed that delirium incidence could be reduced by one-third. Some studies have proposed moving as much hospital care as possible to the home setting. Although evidence is limited, a nonrandomized comparison suggested that this approach is safe and may lead to modest reductions in disability.

The Physician’s Role in Preventing Hospitalization-Associated Disability

Assessing and Documenting Disability, Mobility, and Cognition. By the end of her hospitalization, Ms N lost her ability to function independently and required care in a nursing home. Her nursing home care, paid for by Medicaid, resulted in substantial public expense.

Although Ms N’s functional status was an essential measure of her clinical well-being, the medical record suggests that it was sporadically assessed during her hospitalization. Failure to assess functional status in hospitalized patients is the norm, with 1 study showing that more than 50%...
of major functional limitations are not documented.\textsuperscript{47} The admission evaluation included little evaluation of functional status, and the functional course that led to Ms N’s inability to return home is unclear. However, several of her caregivers noted an inability to bathe independently at discharge, along with very limited mobility.

Functional status can change frequently between the onset of the acute illness, hospitalization, and discharge. These changes in functional status are powerful prognostic tools, predicting mortality and other health outcomes during and after hospitalization. Clinicians should view functional status over the course of hospitalization as a vital sign that can help guide care and serve as a guidepost of clinical well-being. We suggest that the key domains that should be documented include baseline ADL function, mobility, and cognition. Although other domains such as IADLs and screening for depression may be considered, our recommended assessment includes baseline ADL function, mobility, and cognition.

The assessment we recommend is not comprehensive, but is guided by pragmatism and the needs of the busy clinician. This screening has not been tested prospectively for effectiveness but the components yield a functional portrait that is prognostically useful\textsuperscript{48} and provide a much richer portrait of the clinical condition of the older patient.

First, at admission, learn from the patient (or caregiver) about the ability to perform ADLs. Typically, before the ability to independently perform an ADL is lost, the older adult may report difficulty completing the activity.\textsuperscript{49} Therefore, it is useful to inquire as to whether the patient has difficulty, and if so, to learn whether the activity can still be completed without assistance. To determine how the current illness has affected ADL functioning, we suggest asking about the patient’s ADL functioning on the day of admission and before the onset of the acute illness.

The frequent ADL changes that occur over the course of hospitalization may be best observed by nonphysician members of the health care team such as nurses and physical and occupational therapists. These individuals often observe functional status over the full day, while physicians may be primarily observing patients during morning rounds. Regular review of notes and good interdisciplinary collaboration could help physicians better monitor this functional status vital indicator. As hospitals develop electronic medical record systems, efforts to better collate and use functional information has the potential to improve care.\textsuperscript{50}

Second, we suggest a brief mobility assessment to assess whether the patient can sit up in bed without assistance, stand, and walk a few steps. This should be done on admission and on daily rounds, as impairments in mobility are strongly associated with an increased risk of hospitalization-associated disability.\textsuperscript{21} Our suggested assessment of mobility, a functional neurologic assessment, takes less time than the assessment of strength, sensory function, and reflexes and usually will be more useful.

### Table 4. Minimum Functional Assessment in Hospitalized Older Adults

<table>
<thead>
<tr>
<th>Functional Domain</th>
<th>Assessment on Admission</th>
<th>Daily Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADLs:</strong> taking a bath or shower; getting dressed; transferring (getting out of bed and out of a chair); using the toilet; eating; and walking across a room</td>
<td>For each ADL, the following elements should be assessed at admission and before onset of illness: Difficulty with ADL: “On the day of admission did you have any difficulty bathing or taking a shower? Did you have any difficulty bathing before the onset of the problem that led to your being hospitalized?” Ascertainment of equipment use for walking (cane or walker) or bathing (shower chair and rails) If patient reports difficulty, assess need for help: “On the day of admission, did you need the help of another person to bathe? How about before this illness?” If the patient needs help, assess adequacy of help: “What help do you need? Who helps you? Do you get enough help?”</td>
<td>Ask nurse or nursing assistant at bedside the extent of help they are providing for bathing, dressing, transferring, using the toilet, eating, and walking</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td>Observe by asking the patient the following: To sit up in bed without assistance To get out of bed and stand To walk a few steps, using a cane or walker as necessary</td>
<td>Repeat on daily rounds</td>
</tr>
<tr>
<td><strong>Cognitive function</strong></td>
<td>Administer the MiniCog Give the patient 3 items to remember (ie, bird, paper, watch) Ask the patient to draw a clock, setting hands to show 11:10 (patient should draw circle, place numbers, place hands) Ask patient to recall the 3 words Score 2 points for correct clock and 1 point for each correct word ≥3 Points indicates a passing score</td>
<td>Assess for delirium on daily interview with patient and consider: Orientation: “What day of the week is it?” Inattentiveness (does the patient have difficulty focusing, is patient easily distractible) Unclear thinking (does the patient seem to ramble; is the flow of speech unclear, tangential, or difficult to follow) Assess these parameters for fluctuation over time Review nursing notes looking for evidence of these features</td>
</tr>
</tbody>
</table>

Abbreviation: ADL, activities of daily living.

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We recommend that all older patients receive a brief assessment of cognitive function on admission. The Mini-Cog, which consists of the clock draw test in addition to the 3-item delayed recall, is a brief and useful screening test—as negative screens markedly reduce the likelihood of cognitive impairment. The screen is considered negative if the patient can remember all 3 items or if the patient can remember 1 to 3 items and has a normal clock draw result. This classification has a sensitivity of 99% and a specificity of 93% for a diagnosis of dementia. Identifying dementia can help clinicians identify patients at high risk for developing delirium, an acute change in mental status marked by features such as disorientation and inattentiveness. Since an abnormal Mini-Cog could also be due to delirium, it should be followed up with a tool such as the Confusion Assessment Method (CAM) to determine if the patient has delirium. The CAM has a sensitivity of 96% and specificity of 93% in diagnosing delirium.

Like 30% of hospitalized older adults, Ms N almost certainly had undiagnosed delirium, which was described as “brain fog.” It takes little clinical skill to recognize the hyperactive form of delirium in the agitated patient. However, the hypactive form is equally dangerous, at least as common, but much less likely to be recognized. It is important to be alert to the possibility of delirium in the very quiet patient. During rounds, the patient may seem confused, inattentive, lethargic, or give tangential answers to questions. Review of nursing notes may reveal that mental status and alertness may increase and decrease over the course of a day.

### Incorporating Prevention of Hospitalization-Associated Disability Into Practice

Ms R: Like what happens with a lot of older people, she probably did very well in the ACE unit because they’re specially trained to get her out of bed multiple times a day and have her up for meals, but then went to a unit where she was feeling crummy and was not encouraged to get up multiple times a day. . . . [it] was a really good unit, but they just don’t have the training.

To describe steps hospitals and clinicians can consider to prevent hospitalization-associated disability, we categorized the common characteristics of ACE units by reviewing the 5 randomized controlled studies included in a meta-analysis included in Table 5. Most inpatient geriatric units conduct daily reviews of nursing, social work, and physical therapy can mimic some elements of interdisciplinary care. Second, clinicians should walk patients, encourage exercise if the patient is able, and encourage patients to ambulate from bed to the chair as much as possible. This should include removing any unnecessary tethers such as oxygen, bladder catheters, and intravenous catheters, creating hospital norms that patients are expected to walk regularly if they are able, and requesting physical therapy consultation when assistance may be helpful. Third, make sure that patients are eating adequately. This should include attention to actual intake, assurance that food is available when the patients are on the ward, availability.

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### Table 5. Processes of Hospitalization That May Lead to Hospitalization-Associated Disability and Quality Improvement Interventions From Acute Geriatric Units

<table>
<thead>
<tr>
<th>Hospital Factors Leading to Hospitalization-Associated Disability</th>
<th>System Interventions to Help Reduce Hospitalization-Associated Disability</th>
<th>Physician Interventions to Help Reduce Hospitalization-Associated Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment that discourages mobility and exacerbates disorientation</td>
<td>Geographically defined unit that encourages mobility and limits disorientation</td>
<td>NA</td>
</tr>
<tr>
<td>Shiny floors that increase likelihood of falls, limit ambulation</td>
<td>Carpeted floors</td>
<td>NA</td>
</tr>
<tr>
<td>Meals served in hospital room, leading to social isolation and immobility</td>
<td>Common eating area</td>
<td>NA</td>
</tr>
<tr>
<td>Noisy environment disrupting sleep; day/night sleep reversal</td>
<td>Quiet environment (eg, soft phones, silent pagers, closed doors, acoustical ceilings, headphones, earplugs)</td>
<td>NA</td>
</tr>
<tr>
<td>Few orientation cues leading to disorientation and confusion</td>
<td>Frequent reorientation; large calendars and clocks</td>
<td>NA</td>
</tr>
<tr>
<td>Sensory and social deprivation</td>
<td>Easy access to low vision and assistive hearing devices; availability of glasses and hearing aids used at home</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Encouraging family members to stay with patient overnight</td>
<td></td>
</tr>
<tr>
<td><strong>Restricted mobility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedrest orders and limited access to bedside chairs</td>
<td>Nurses encourage mobility; easy access to bedside chair; standing orders for all able patients to be out of bed and in a chair</td>
<td>Avoid bed rest orders; include orders for patient to be out of bed and in a chair for all meals and to ambulate 3 to 4 times daily in the hallway</td>
</tr>
<tr>
<td></td>
<td>Availability of physical therapy services and assistive devices</td>
<td></td>
</tr>
<tr>
<td>High beds with rails that lead to immobilization</td>
<td>Low beds with rails down</td>
<td>NA</td>
</tr>
<tr>
<td>Use of restraints</td>
<td>Restraint reduction program</td>
<td>Limit orders approving restraints; review need for restraints throughout day</td>
</tr>
<tr>
<td>Use of functional restraints including intravenous poles, nasal cannula oxygen, and indwelling urinary catheter</td>
<td>Limit placement of bladder catheters in the emergency department</td>
<td>Daily review of need for intravenous connections, oxygen, and bladder catheters limit indications for bladder catheters to urinary retention and institute voiding trials early</td>
</tr>
<tr>
<td>Undernutrition and dehydration</td>
<td>Frequent and prolonged use of no food by mouth orders</td>
<td>Daily review of need for no food by mouth orders</td>
</tr>
<tr>
<td>Diet not consistent with patient preferences</td>
<td>Provide diets consistent with majority of patients and populations served</td>
<td>Minimize restricted diets</td>
</tr>
<tr>
<td>Lack of access to water and other fluids</td>
<td>Easy access to snacks; provide and encourage oral hydration throughout day</td>
<td>NA</td>
</tr>
<tr>
<td>Enforced dependence</td>
<td>Protocols for each ADL to encourage patient independence:</td>
<td>Set expectation with patient and family that the patient should independently perform own ADLs as much as possible</td>
</tr>
<tr>
<td>Patient performs few ADLs in hospital, nursing staff assists with ADLs regardless of patient’s ability</td>
<td>Bathing: nurse supervises, patient encouraged to do as much of activity as possible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dressing: patient is encouraged to wear street clothing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using the toilet: elevated toilet fixture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transferring: assistive devices provided (eg, grab bars) and accessible from bedside</td>
<td></td>
</tr>
<tr>
<td>Polypharmacy</td>
<td>Engage clinical pharmacists to round with primary teams to reduce polypharmacy and increase prescribing appropriateness</td>
<td>Daily review of medications</td>
</tr>
<tr>
<td>Use of psychoactive drugs for behavioral disturbance and sleep</td>
<td>Behavioral and nonpharmacologic sleep protocols to minimize use of psychoactive medications</td>
<td>Minimize drugs associated with delirium, particularly anticholinergics and sleep drugs such as diphenhydramine or lorazepam</td>
</tr>
<tr>
<td>Discharge planning</td>
<td>Focus on discharge planning</td>
<td>Meet early with patient, family, and social worker to begin planning needs for discharge to home</td>
</tr>
<tr>
<td>Often occurs late</td>
<td>Initiated on admission by multidisciplinary team</td>
<td>NA</td>
</tr>
<tr>
<td>Motivated by bed utilization team rather than patient-centered</td>
<td>Explicit focus on patient and family needs at home; organizing hospital care and discharge services to facilitate return to home</td>
<td>NA</td>
</tr>
</tbody>
</table>

Abbreviations: ADL, activities of daily living; NA, not applicable.
of food from home, and minimization of no food by mouth and restrictive diet orders. Fourth, sedative hypnotics and antihistamines should be avoided, including at bedtime. Safer nonpharmacologic protocols to aid patients with difficulty sleeping should be considered.38

**The Effect of Disability After the Hospitalization**

Disability associated with hospitalization is a sentinel event that often has profound effects on the patient and family long after hospital discharge. Whether patients will be able to live at home will depend not only on their capacity but also on their social support, resources, and environment.39

Planning for a patient’s return to home should include assessing whether the patient can successfully accomplish ADLs alone or with available support and recognizing that many patients able to perform these activities before acute illness may be unable to perform them upon returning home. For a patient like Ms N, who needed help bathing, had very limited mobility, and whose cognitive limitations necessitated help taking her medications, it is important to specifically assess how these tasks will be completed and whether temporary home assistance or equipment could help the patient to return home. For example, could providing support bars and a shower chair restore independence in bathing? Does the patient need only supervision while bathing or is an aide needed to help the patient in and out of the shower? A matter as simple as the number of stairs the patient must scale may make going home unsafe. Although Ms N was able to walk short distances with a walker, this level of disability was made more serious by her need to reliably use transportation to attend dialysis. Patients dealing with new disabilities may benefit from a home equipment evaluation, completed by a physical or occupational therapist visiting the home, a service covered by the Medicare Skilled Home Care benefit.60

Ms N’s delirium was another important consideration in the assessment of her ability to function at home. It is increasingly recognized that delirium can be stubbornly persistent and often does not resolve by discharge.61 Although efforts to reconcile medications and instruct patients in their use at discharge are laudable, they may be futile in delirious patients. The patient’s ability to understand medication instructions should be assessed and caregivers may need to be included in discharge education. Assistance with medicines is a skilled nursing need that will justify Medicare payment of postdischarge home nursing support.60 Beyond medication concerns, cognitive concerns will also effect the ability to manage finances.62

Finally, for Ms N, poverty and her lack of social support was another precipitant of loss of independence.63 Others with Ms N’s level of disability, but greater financial resources, likely would have been able to pay for home health aide assistance that would have made staying at home possible.

The care of Ms N illustrates the importance of considering the ability of the patient’s caregivers.64 Family caregiving often comes at significant physical, financial, and emotional costs.65 Caregivers often give up employment to provide care and report very high rates of depression.66 This patient’s friend and daughter had apparently reached their respective limits. Considering Ms N’s capacity in the context of her support system and resources made returning home unsafe.

### Table 6. Walter Prognostic Index

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex</td>
<td>1</td>
</tr>
<tr>
<td>ADL dependencies at discharge</td>
<td>2</td>
</tr>
<tr>
<td>Comorbid conditions</td>
<td>5</td>
</tr>
<tr>
<td>Laboratory values on admission</td>
<td>1</td>
</tr>
<tr>
<td>Creatinine ≥3 mg/dL</td>
<td>2</td>
</tr>
<tr>
<td>Albumin 3.0-3.4 g/dL</td>
<td>1</td>
</tr>
<tr>
<td>Albumin &lt;3.0 g/dL</td>
<td>2</td>
</tr>
</tbody>
</table>

**Point Score**

<table>
<thead>
<tr>
<th>1-Year Mortality, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
</tr>
<tr>
<td>2-3</td>
</tr>
<tr>
<td>4-6</td>
</tr>
<tr>
<td>&gt;6</td>
</tr>
</tbody>
</table>

Abbreviation: ADL, activities of daily living.65

*6 The 5 ADLs considered were bathing, dressing, transferring, using the toilet, and eating.
64 Data adapted from Walter et al.61

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is a reversible manifestation of the acute illness and the de-conditioning effects of hospitalization, vs a manifestation of ongoing progressive disease that may be leading toward the end of life. In most cases, it will be difficult to fully answer this question until the posthospitalization course is revealed. There is little research to determine which patients with hospitalization-associated disability will benefit from rehabilitation. In patients in whom restoration of function is important, a trial of outpatient or inpatient physical therapy and rehabilitation seems reasonable.

The often poor prognosis for hospitalization-associated disability suggests that simultaneous pursuit of both rehabilitative care and palliative approaches be part of the care of patients who develop disability. For example, for Ms N, would equipment such as a motorized scooter have made life easier? Would home modifications have been helpful? What could have been done to assist her caregivers? Would community resources such as meals on wheels or paratransit services have been useful? Which of her symptoms needed treatment? Disabled older adults often have unrecognized and untreated pain, which goes unnoticed as the hospital discharge plan is formulated because it may be unrelated to the acute illness. For example, in the last 2 years of life, arthritis is a stronger determinant of pain than the diagnosis leading to death.79

Unfortunately, the palliative needs of patients are often not considered unless a patient is referred for hospice care, which in practice usually occurs in the final days of life.71 However, palliative care is appropriate for all patients with serious, incurable chronic illnesses.72 For example, Ms N would not meet traditional hospice criteria, and might benefit from both life-prolonging therapies such as dialysis as well as aggressive symptom management. It is a common mistake to believe that patients must choose between traditional medical care and palliative care.

CONCLUSIONS
Hospitalization-associated disability is an uncommonly common occurrence in hospitalized older adults with significant consequences for patients and caregivers. Clinicians should supplement the traditional disease-focused approach to hospital care with one that recognizes that changes in functional status are a clinical vital sign and the most important manifestation of illness in older adults across admitting diagnoses. Reengineered hospital care that focuses on function, including assessment on admission and throughout the hospital stay, promoting physical activity, avoiding hospital processes and complications that impair functional recovery, and planning for discharge home with the support needed to complement a patient’s functional capacity, may reduce the incidence of hospitalization-associated disability. Adoption of models of care that can reduce hospitalization-associated disability should be a high priority for hospitals and clinicians caring for older patients.

Follow-up
Ms N was unable to return home and 6 months following her hospitization was still living in a nursing home. However, she was adjusting well to her dialysis and her new home situation. At her most recent outpatient primary care clinic visit, Ms N reported only some dizziness following hemodialysis. Her arteriovenous fistula had matured and was ready for use. She reported good appetite and stable weight.

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of a program to provide hospital-level care at home for acutely ill older patients.  
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Online-Only Resources

MODELS OF HOSPITAL CARE FOR OLDER ADULTS

Nurses Improving Care for Healthsystem Elders (NICHE)
A national geriatric initiative funded by the John A. Hartford Foundation to improve the care of older hospitalized adults. The NICHE program comprises nearly 300 hospitals throughout North America. NICHE is a program of the Hartford Institute for Geriatric Nursing at New York University College of Nursing.
http://www.nicheprogram.org/
http://www.jhartfound.org/pdf%20files/NICHE.pdf

Description of Acute Care for Elders (ACE) Units
Includes evidence for effectiveness and required elements for successful implementation of ACE units.
http://www.jhartfound.org/pdf%20files/ACEunits.pdf

BUSINESS CASE FOR GERIATRICS PROGRAMS IN HOSPITALS
These publications make the case that programs focusing on older adults in the hospital can pay for themselves and improve outcomes.

DELIRIUM

The Hospital Elder Life Program (HELP)
Designed to reduce delirium in hospitalized older adults. This Website provides information about delirium and a description of HELP for institutions interested in adopting the program.
Review article summarizing 2 decades of research on delirium including prevalence, incidence, risk factors, precipitating factors, and prevention.

FALLS
Systematic review of interventions that can prevent falls in hospitals.

CARE TRANSITIONS
This Website provides information and tools on improving the quality and safety of transitions of care across care settings.
http://www.caretransitions.org/

Next Step in Care
This Website, sponsored by the United Hospital Fund of New York, provides helpful guides for family members and health care providers for patients who are transitioning between health care settings.
http://www.nextstepincare.org/

Society for Hospital Medicine
Website contains information about the BOOST(Better Outcomes for Older adults through Safe Transitions) care transitions program. Resources include materials to help hospitals optimize the discharge process.
http://www.hospitalmedicine.org/ResourceRoomRedesign/RR_CareTransitions/CT_Home.cfm

BLOGS FOCUSED ON OLDER PATIENTS WITH SERIOUS ILLNESS

GeriPal
This blog is a forum for discussion of research, news, policy, and commentary focused on care of older patients, patients with serious illness, and patients nearing the end of life.
http://www.geripal.org/

HealthAGenda
This blog, sponsored by the John A. Hartford Foundation, focuses on introducing aging and geriatrics into the broader conversation around health, health care, and policy.
http://www.jhartfound.org/blog/

Pallimed
This blog describes new research and policy developments in palliative and hospice medicine.
http://www.pallimed.org/

The New Old Age
This blog at the New York Times chronicles the challenges older individuals and their caregivers face as elders become dependent on caregivers for basic needs. Lead blogger Paula Span and others provide pragmatic advice and commentary.
http://newoldage.blogs.nytimes.com/

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