Acute Care and Geriatric Assessment

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Key Points

- Acutely unwell older persons frequently present with falls, delirium, and social withdrawal, rather than with symptoms pertaining to the newly diseased organ system.
- Comprehensive geriatric assessment has been shown to result in sustained improvements in physical and cognitive function and to reduce inpatient mortality.
- Geriatric syndromes are usually due to multiple coexisting etiologies, and attempting to find *the* cause is often misdirected and expensive.
- Substantial overall improvement may result from concurrent interventions directed at multiple abnormalities in older persons, even if some may be only partially reversible.
- A significant proportion of older persons who are initially labeled by hospitalists as having "acopia" or "social problems" have an alternative medical diagnosis at the time of discharge.

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Case Study

Mrs. Joan Smith is an 84-year-old lady who lives with her frail 86-year-old husband. She is brought to the emergency department (ED) after an unwitnessed fall and low back pain. She has history of hypertension, atrial fibrillation, postherpetic neuralgia, knee osteoarthritis, and hyperlipidemia. Her medications include ramipril, indapamide, digoxin, warfarin, amitriptyline, meloxicam, atorvastatin, and occasionally paracetamol up to four times daily. She is confused, temperature 37.8 °C, heart rate 84/min irregularly irregular, blood pressure 180/95, heart sounds are dual with no murmur, respiratory rate 20/min, chest clear to auscultation, abdomen soft and non-tender, and no focal neurological signs are present. She has spinal tenderness over the fourth lumbar vertebrae.

10.1 Introduction

Older persons account for a significant proportion of acute hospitalizations and emergency department visits. In 2010, adults aged 65 years and over accounted for 34% of hospitalizations in the United States, and those aged 65–84 years had the highest average cost per stay (around USD 12,300) [1]. In 2009–2010, patients aged 65 years and older accounted for 15% of the emergency department visits, and the annual average visit rate increased with age [2]. Mean length of stay for older persons is 1.7 days longer, and in-hospital mortality is five times higher, than for younger patients [3]. Percentage of patients discharged to a long-term care facility from hospital also increases with age. In 2008, patients aged 85 years and older admitted to US hospitals were about 2.5 times more likely to be discharged to a long-term care facility than 65–74-year-olds [4].

Aging is associated with homeostenosis, a progressive constriction of physiological reserves available to meet challenges of homeostasis [5]. This leads to impaired capacity of the older person to successfully compensate for physiological stressors, resulting in increased vulnerability to seemingly minor perturbations [6]. Preexisting and often multiple comorbid conditions further impair the older person's compensatory reserve. Frail older persons can be therefore viewed as complex systems on the verge of failure [6]. When the system fails, the most vulnerable organ system fails first [7]. As the most vulnerable organ system may be different from one that is newly diseased, presentation can be atypical [7]. For example, the older person with urosepsis may present with acute confusion and fall, instead of symptoms related to the urinary tract. On the other hand, some findings that are abnormal in a younger patient, bacteriuria, for example, are common in the older person [8] and may not be responsible for the presenting illness and can lead to delayed diagnosis and misdirected treatment. Due to concurrent impairments across multiple organ systems, multiple comorbid diseases, and polypharmacy, geriatric syndromes such as falls, cognitive dysfunction, and urinary continence often have multifactorial etiologies [9]. Substantial improvement may result from

concurrent interventions directed at causes identified, even if some may not be amenable to treatment or partially reversible [7].

A significant proportion of problems experienced by older persons can be traced back to Bernard Isaacs' geriatric giants: immobility, instability, intellectual impairment, and incontinence [10]. For example, about 30% of community-dwelling older persons over 65 years old report a fall every year [11]. In a recent Australian study, 10% of the older adults aged over 70 years had delirium at the time of admission to hospital and a further 8% developed delirium during their hospital stay [12]. Urinary incontinence affects 24% of community-dwelling older people and 30–60% in institutional care [13]. Geriatric giants are often multifactorial in etiology, are chronic, and are associated with loss or impairment of functional independence [9]. They can be the result of potentially reversible medical conditions, but unfortunately, these syndromes are under-recognized, and older patients are sometimes inappropriately labeled as having "social problems" and "acopia" [14].

10.2 The Sick Older Person in the Emergency Department

Older persons aged 65 years and above account for about 20% emergency department (ED) presentations [15]. Compared to younger patients, they have multiple comorbidities, present with a higher level of medical urgency, have longer length of stay in the ED, are more likely to be admitted, and experience higher rates of adverse health outcomes following discharge [16]. Delirium and immobility is common among older persons presenting to the ED, which increase the risk of falls and pressure injury [17]. Several scales have been developed to screen high-risk older persons in the ED; however, the need for reliable risk stratification tools to accurately identify vulnerable older persons who are at risk of adverse outcomes has been recently highlighted [18]. Risk minimization protocols should be in place in EDs to prevent early complications such as pressure injuries due to delays on trolleys in the emergency department. Adjustments to the layout of the department, including the type of furniture, lighting, noise reduction, and access to utilities, may be necessary to address the needs of frail older adults, who are usually managed in the same environment as the younger patients. Increased boarding time in the emergency department is associated with increased hospital length of stay and mortality [19]. On the other hand, reduction of emergency department overcrowding by expediting discharge or admission process is associated with reduced overall mortality [20]. Comprehensive geriatric assessment in the emergency department by physicians with expertise in geriatric medicine can lead to expedited discharge and lower readmission rates [21]. Hospital avoidance programs such as "hospital at home" have been shown to lower mortality and reduce functional decline in older persons and should be considered as alternatives to hospitalization [22, 23].

10.3 Comprehensive Geriatric Assessment

Providing quality acute geriatric care is complex [24]. Older persons presenting with acute illness have complex needs and require multidimensional assessment and coordinated multidisciplinary approach to care. There is good evidence that comprehensive geriatric assessment (CGA) reduces mortality and admission to residential aged care facilities following emergency hospital admission [25]. CGA can result in improvements in physical and cognitive function, sustained at 12 months of follow-up [26]. CGA is defined as a multidimensional interdisciplinary diagnostic process focused on determining the older person's medical, psychological, and functional capability that leads to the development of coordinated and integrated care plan for treatment, including appropriate rehabilitation and long-term follow-up [27]. Therefore, CGA can be viewed as both a diagnostic and a therapeutic process. The principal components of a CGA are outlined in Table 10.1 [28], and the assessment should be adapted to the context. The CGA should be carried out using standardized tools with good intra- and inter-observer agreement so that they are reproducible and can be used to reliably measure change over time [28]. For example, cognitive function may be assessed using a validated tool such as the mini-mental state examination (MMSE) [29] and mobility with a 6-min walk test [30]. The CGA should target patients who benefit most. This is usually those who are frail and have functional impairments and complex multiple comorbid conditions, rather than relatively healthy and functionally older persons or those are too sick with terminal illness or advanced dementia [26]. Broadly, two different models of inpatient CGA have been described [25]. In the first model, patients are admitted to a discrete ward [e.g., Geriatric Evaluation and Management Unit (GEMU), Acute Care for the Elderly (ACE) Unit, Acute Medical Unit (AMU)] where they are assessed by a multidisciplinary team with expertise in geriatric medicine. In the second model, patients are admitted to general medical wards, and eligible patients

Table 10.1 Components of in-hospital Comprehensive Geriatric Assessment

Medical domain	Principal diagnoses Significant comorbidities Medication review Nutritional status
Psychological domain	Cognition Affect
Functional assessment	Basic and instrumental activities of daily living Gait and balance Physical activity/Exercise
Social domain	Informal supports e.g. family and friends Financial assessment and eligibility for care resources
Environment	Home set up and safety Transportation and accessibility to local resources Telehealth

are assessed by an interdisciplinary geriatric medicine consultation service. The consultation service makes recommendations to the physician who is responsible for the overall care of the patients.

10.4 Functional Assessment: A Cornerstone of Geriatric Evaluation

A key component of the CGA is a functional assessment. Functional assessment allows patient-centered goal setting and provides information for measuring progress and predicting prognosis. It also helps to understand the impact of disease and disability on the older person and the caregiver. The basic ADLs include self-care activities such as eating, toileting, bathing, dressing, transferring, and ambulation [31]. Instrumental ADLs are composed of those activities that foster independence in the community and encompass housekeeping, cooking, shopping, managing finances, using telephone, managing medications, and transportation [31]. In many cases, functional assessment relies on patients and/or family caregivers who are asked to report on ADLs. Where self-less reliable (e.g., in dementia patients), informant-based questionnaires, and direct observation by nurses and occupational therapists may be necessary. A number of validated tools are available for functional assessment of older persons, such as the Barthel Index [32], Functional Independence Measure (FIM) [33], Physical Self-Maintenance Scale [34], and Lawton Brody Instrumental Activities of Daily Living Scale [35]. As mobility is of central importance to accomplishing most functional activities, assessment of physical activity status, gait, and balance is also an important aspect of the functional assessment. The functional assessment is of diagnostic and therapeutic relevance in the management of hospitalized older person in several ways:

1. Functional decline is a sensitive but nonspecific sign of physical illness [7] and may prompt investigation for underlying specific disease processes.
2. Incapacity to perform ADLs may be due to cognitive impairment and/or depression, and further assessments may be indicated.
3. It establishes the nature and the amount of assistance, environmental adaptations, and equipment (e.g., mobility aids) needed to complete tasks.
4. It helps with setting goals for geriatric rehabilitation.
5. It provides information on the overall prognosis.

10.5 Falls and Fracture Risk

About 30% of the community-dwelling older persons fall each year [11]. Older persons are more likely to suffer serious injury than younger persons as a result of same-level falls [36]. More than 90% of hip fractures are associated with falls, and

most occur in persons above the age of 70 years [37]. Falls contribute to functional decline, social isolation, depression, and need for permanent residential care [38]. In the acute setting, 3–20% of inpatients fall at least once during their hospital stay [39]. Falls in older people are multifactorial. Intrinsic risk factors for falls include age, previous history of falls, gait and balance disorders, cognitive impairment, visual impairment, ADL disabilities, and medication use [40, 41]. Extrinsic risk factors include cluttered environment, poor lighting, uneven floors, and use of restraints such as indwelling catheters and chest drains [41]. Acute illness and medication side effects are common precipitants of falls. Older persons who present to the hospital with a fall, give a history of recurrent falls in the past year, or have abnormalities of gait and/or balance should be offered a multifactorial fall-risk assessment [42]. A number of fall-risk assessment tools have been developed; however, only a few tools have been tested in more than one setting [43], and most tools discriminate poorly between fallers and non-fallers [44]. The STRATIFY tool [45] and fall-risk assessment tool [46] have been reported to have good positive- and negative-predictive value in the acute care setting [43]. Patients identified as at risk of falling should be considered for multifactorial intervention by multidisciplinary teams targeting risk factors [42]. Risk factors for falls in older persons are multivariate, and there is limited evidence to support any single intervention. On the other hand, multicomponent interventions targeting risk factors have been shown to reduce falls in various settings [47, 48]. Exercise is often a key component in successful multifactorial falls intervention programs. Group or individual exercise, balance training, and tai chi have been shown to reduce both risk and rate of falls [47] in the community setting. Additional interventions supported by evidence in this setting include home safety assessment and hazard reduction, gradual withdrawal of psychotropic medications, correction of vitamin D insufficiency, cardiac pacing for cardioinhibitory carotid sinus hypersensitivity in patients with unexplained falls, first cataract surgery for the appropriate eye, and restricted bifocal spectacle use [47]. Supervised exercise and vinyl flooring (as opposed to carpeting) have been shown to reduce falls in the acute hospital setting [48].

Osteoporosis treatment is an important component of the management of future fracture risk. Assessment should include a focused history to identify risk factors for low bone mineral density (BMD), falls, and resultant fracture [49]. Diagnosis of osteoporosis is by hip and lumbar vertebral BMD measurement using dual-energy X-ray absorptiometry. Non-pharmacologic management of osteoporosis includes lifestyle counseling with regard to smoking cessation, limiting alcohol intake, regular weight-bearing and muscle-strengthening exercise, and taking adequate calcium and vitamin D intake [50]. Vitamin D deficiency and hypocalcemia should be corrected before commencing antiresorptive treatment [51]. Oral or intravenous bisphosphonates and the human monoclonal antibody denosumab are approved for primary and secondary prevention of vertebral, non-vertebral, and hip fractures in men and postmenopausal women. Raloxifene is approved for secondary prevention of vertebral fracture in postmenopausal women. We reserve teriparatide for patients who do not respond or tolerate first-line treatments. BMD measurement should be repeated

in 1-3 years after initiating treatment and thereafter at longer intervals if BMD is stable. The optimal duration of treatment is debatable, but in patients with moderate 10-year fracture risk, bisphosphonate treatment may be continued after 5 years [51]. Patients at high risk of fracture may be treated with bisphosphonates for up to 10 years before giving a drug holiday; alternatively they can be switched to bone formation therapy after 5–10 years [51].

10.6 Cognition and Affect

Delirium is common in hospitalized patients, with reported prevalence of 10–31% among medical inpatients [52]. Incident delirium is particularly common in the postoperative period [53]. Delirium is associated with increased hospital-acquired complications, length of stay, mortality, and discharge to long-term residential care [52]. Recent evidence also suggests delirium may lead to permanent cognitive decline and dementia in some patients [54]. Vulnerability to delirium can be viewed as a marker of diminished cognitive reserve. Factors predisposing to delirium include dementia, previous episode of delirium, cerebrovascular disease, multiple comorbidities, functional impairment, sensory impairments, polypharmacy, depression, and alcohol abuse [55]. There are a number of tools available to screen hospitalized older persons for delirium. The Confusion Assessment Method (CAM) [56] diagnostic algorithm acute onset and fluctuating cognitive dysfunction, inattention, disorganized thinking, and altered sensorium. It can be completed at the bedside within minutes and can be used to both rule in and rule out delirium (positive likelihood ratio 9.6 and negative likelihood ratio −0.16) [57]. Multicomponent interventions that target risk factors implemented by skilled interdisciplinary teams are known to prevent delirium [58]. Such interventions include orientation, ensuring adequate hydration and nutrition, sleep hygiene, pain management, optimizing hearing and vision, reduced use of psychoactive medications, reducing restraints such as intravenous lines and indwelling urinary catheters, and early mobilization [59]. There is insufficient evidence at present for the use of pharmacological interventions such as antipsychotics or choline esterase inhibitors in primary prevention of delirium [59]. Management of delirium involves removal of precipitating factors, symptom management, preventing complications such as pressure injuries and falls, and providing education and support to the carers. Antipsychotics and sedatives do not improve prognosis and can paradoxically prolong delirium and worsen cognitive dysfunction. Therefore, these agents should be reserved for patients with severe agitation or having distressing psychotic symptoms.

Around 40% of the hospitalized older persons above the age of 65 years have dementia, although only about half of them have been previously diagnosed [60]. Hospitalized patients with dementia have higher mortality than others [60]. Identifying those with dementia is important to formulate an appropriate inpatient and discharge care plan, including follow-up. However, the diagnosis of dementia in hospital setting is complicated by the potential concurrence of delirium, and cognitive assessments undertaken in hospital may not accurately reflect premorbid

cognitive functioning. There may be reasons other than dementia and delirium for hospitalized patients to perform poorly on cognitive screening, such as acute illness, poorly controlled pain, psychoactive medication, anxiety and depression, and poor engagement [61]. Therefore, results of single cognitive tests should be interpreted with caution, and progress should be assessed with further tests as indicated. A number of validated tools are available for cognitive assessment such as MMSE and MOCA; however, a recent systematic review showed lack of evidence to help clinicians to select a validated tool in the hospital setting; the mostly researched instrument was the AMTS, with a score of <7 predictive of dementia with a sensitivity of 81% and specificity of 84% [62].

Although depression is common among hospitalized older persons, with weighted prevalence estimated around 17%, it is often unrecognized [63]. Symptoms of depression in acutely unwell older adults can be difficult to separate from those of the physical illness. Concurrent depression adversely affects the outcome of a number of medical conditions, compliance with treatment, engagement with rehabilitation process, and in-hospital mortality [64]. Depression is a risk factor for Alzheimer's disease and is a common psychological symptom of all disease stages of dementia [65]. Guidelines recommend that hospitalized older persons be screened for depression. The Geriatric Depression Scale (GDS) has been widely evaluated in the general hospital setting, and a cutoff of 5 or 6 out of 15 has a sensitivity of 79% and specificity of 77% for diagnosing depression [66]. The Cornell Scale for Depression in Dementia (CSDD) [67], which combines the patient interview, direct observation, and caregiver report, is more appropriate for screening dementia patients for depression.

10.7 Orthostatic Hypotension

Orthostatic hypotension (OH) is defined as a drop in systolic blood pressure by 20 mmHg or diastolic blood pressure by 10 mmHg, compared to supine blood pressure, within 3 min of standing [68]. The prevalence of OH is reported to be between 5% and 30% [69]. OH is a risk factor for syncope [70], falls [71], cognitive impairment [72], and hospitalization. OH is also an independent predictor of mortality in older persons [73]. OH is an important consideration in the treatment of hypertension in older persons, as cardiovascular drugs are a common cause of OH [74]. OH in older persons is often multifactorial; contributing causes may include volume depletion, anemia, prolonged bed rest, autonomic neuropathy (e.g., diabetes, amyloidosis), primary autonomic failure, Parkinson's disease, stroke, cardiac disease, and endocrinopathies such as hypoadrenalism and pheochromocytoma [75]. Evaluation should begin by identifying reversible causes and underlying associated medical conditions. Blood pressure should be measured supine and 3 min after standing. Head-up tilt table testing should be considered where there is a high pretest probability of OH despite negative bedside evaluation and in patients who are unable to stand for blood pressure measurement [76]. Non-pharmacologic management includes discontinuing potential medications contributing to OH, ensuring adequate hydration and sodium intake, avoiding alcohol, exercise program to improve conditioning, teaching physical

maneuvers (e.g., squatting, bending at waist), and abdominal and lower limb binders [75]. Patients with postprandial symptoms should be advised to avoid large carbohydrate meals [75]. In patients with persistent symptoms despite these measures, a trial of pharmacologic therapy is indicated. Fludrocortisone is often used as the first line. Other treatment options include midodrine and other alpha-adrenergic agents, desmopressin, octreotide, and erythropoietin [77].

10.8 Medication Rationalization

Polypharmacy, or the concurrent use of multiple medications, is a common problem in older persons that can lead to reduced medication compliance, lack of efficacy, adverse drug reactions, drug interactions, and iatrogenic illness [78]. The appropriate management of medications is one of the most important areas in geriatric medicine. Medication review should therefore be a key component in geriatric assessment. This should start by taking an accurate medication history. Discrepancies between what the patient has been prescribed and what they are actually taking are common. Asking the patient or the caregiver to bring all prescribed and checking patient's understanding about the indications, benefits, and potential adverse effects allow a more accurate picture of current medication use. Medication review should be viewed as an opportunity to identify any inappropriate medications (errors of commission) and potentially beneficial medications that may have been overlooked (errors of omission). Inappropriate prescribing can lead to increased healthcare utilization and adverse clinical outcomes [79]. On the other hand, in some patients, multiple medications are indicated for optimal management of comorbidities, and therefore undertreatment should be avoided [80]. There are published lists of potentially inappropriate medications for the older persons to guide treating physicians; examples include the Beers Criteria [81], Screening Tool of Older Persons' potentially inappropriate Prescriptions (STOPP), and Screening Tool to Alert doctors to the Right Treatment (START) [82]. In the hospital setting, clinical pharmacists can provide assistance with medication review, reconciliation, and discharge counseling, which has been shown to improved clinical outcomes [83]. Older persons with multiple comorbid conditions are often excluded or underrepresented in clinical trials [84], and care should be taken when extrapolating evidence to frail older persons, as unintended adverse effects may overweigh potentially modest benefits. Prescribing considerations should include patient's goals of care, remaining life expectancy, and age-associated physiological changes.

10.9 Preventing Pressure Ulcers

Pressure ulcers are the result of pressure and/or shear forces, usually over a bony prominence. These are associated with extended length of stay, increased incidence of hospital-acquired infections and other complications, and increased healthcare costs [85]. Risk factors include advanced age, low body mass index, hypoalbuminemia,

malnutrition, immobility, cognitive impairment, urinary or fecal incontinence, and diabetes [86]. Pressure ulcers are a potentially preventable adverse event. About one third of emergently admitted hospital patients may acquire pressure ulcers soon after their admission [87]. Therefore, risk assessment and preventive interventions should start early during the hospital stay. Studies have not shown significant differences between nurses' clinical judgment vs. various risk assessment tools such as the Waterlow, Braden, Cubbin and Jackson, and Norton scales in reducing pressure ulcer incidence [86]. Advanced static mattresses and overlays, and alternating-air mattresses or overlays have been shown to reduce the pressure ulcer incidence compared with standard hospital mattresses [86, 88]. It is not clear if powered surfaces are better than non-powered surfaces, and cost should be taken into consideration when deciding between them [88]. There is no clear evidence that nutritional supplementation, repositioning, heel supports and boots, wheel chair cushions, or various dressings prevent pressure ulcers [86]. Dry skin is a risk factor for pressure injury, and there is weak evidence that a skin cleanser other than soap, and a fatty acid containing cream, reduces risk of pressure ulcers [86].

10.10 Continence Management

Urinary incontinence is rarely the reason for hospitalization but can be a sign that the older person is experiencing other health problems. Around 35% of older adults are incontinent at some stage during acute hospital stay [89]. Incontinence in acute care setting is associated with urinary tract infection, immobility, and cognitive impairment [89]. A number of medications such as diuretics, hypnotics, narcotics, antipsychotics, and anticholinergics agents can affect the older person's ability to toilet successfully by direct or indirect mechanisms [90]. Several types of incontinence may coexist due to the presence of multifactorial etiologies. Assessment should comprise, at least, a focused history, physical examination including the genitourinary and nervous systems, a stress test, urinalysis, and measurement of post void residual volumes. Management depends on the type of urinary incontinence and underlying causes identified. General measures include treating any urinary tract infection, avoiding constipation, stopping offending medications, attention to orientation, providing regular toilet assistance, and use of appropriate continence aids [91].

10.11 Post-acute Care

Older persons take longer to functionally recover than to medically recover. Once patient is medically stable, every effort must be made to prevent further decline and to help return to functional independence. Discharge planning should begin early during the hospitalization, and carers should be engaged in the discharge planning process as key members of the older person's care team. Patients who are slow to progress and therefore need a coordinated multidisciplinary strategy of restorative

care should be identified early. Some of these patients may benefit from referral to an inpatient geriatric rehabilitation unit or a day hospital. Short- and long-term goals toward achieving maximal functional independence should be set, and future medical, physical, psychological, and accommodation needs of the older person should be identified. Referral to appropriate home and community support services may be needed to provide additional support at least in the early post-discharge stage. It is crucial that the hospitalist liaise with patient's family physician with regard to medication changes, services arranged, and post-discharge care plan prior to discharge.

10.12 Closing Remarks

Mrs. Smith was worked up for infection and turned out to have a lower urinary tract infection. The rest of the septic screen was negative. She had recurrent falls from the history given by her daughter. Her bone scan showed recent L4 fracture. She was found to have orthostatic hypotension. Medications were reviewed and indapamide was ceased; potential benefits vs. risks of warfarin and statins were discussed with her and the family. Her delirium resolved, and she was discharged home with social support to be followed up in geriatric outpatient clinic.

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