Rehabilitation Concerns in the Geriatric Critically Ill and Injured - Part 1

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KEYWORDS

- Geriatric palliative care • Frailty • Delirium • Dementia • Pain • Constipation
- Rehabilitation • Prognostication

KEY POINTS

- Frailty is an independent risk factor for progressive physical dependence and mortality.
- Delirium is associated with poor long-term outcomes, including increased institutionalization, cognitive impairment, falls, and pneumonia.
- Hospitalized patients with dementia have increased short-term morbidity and mortality and do not return to previous baseline functional status after acute decompensation resolves.
- Prognostication tools and performance scales such as the Palliative Performance Scale should be used to help determine rehabilitation expectations.
- Goals of care should be determined before entering into a rehabilitation service.

INTRODUCTION

Geriatric patients who are critically ill have unique challenges that must be considered when attempting to prognosticate survival and determine expectations for rehabilitation and meaningful recovery. Furthermore, elderly patients with frailty present distinct rehabilitation and clinical challenges when suffering from critical illness. There are multiple symptoms and syndromes that negatively affect morbidity and mortality of elderly patients who require intensive care unit (ICU) management, including frailty, delirium, dementia, pain and constipation. Although long-term prognosis for elderly patients in the ICU may be poor, there are scenarios in which prognostic awareness is challenging. It is also important to consider options for physical rehabilitation after discharge based on the patient's functional status, care needs, and goals of care.

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DISCUSSION

Physiology of Aging

There are several natural changes that occur with aging that should be considered when medically managing elderly patients and creating long-term treatment plans after critical illness. An understanding of these age-related changes can help guide discussions with patients and families concerning long-term goals, practical expectation of recovery, and long-term survival.

There are several physiologic theories of aging ranging from destabilization of DNA integrity to reduction in physical reserves and energy metabolism.¹ What these theories have in common are progressive, irreversible, physiologic changes that lead to decline in both organ and physical function. These changes result in patients having less physiologic reserve to recover from an acute illness. The changes that occur in organs are at the molecular and cellular level and are specific to organ type and function.^{2,3} Declines in plasma proteins, as well as renal and liver function, affect clearance of medications in the elderly. This results in narrowing of therapeutic windows for drugs used to treat and palliate critical illness, which can present challenges to meaningful recovery and rehabilitation.⁴

Nervous system

Changes in the nervous system lead to decreased fine motor control with aging and present challenges for elderly patients who develop muscle weakness from an acute illness, as they may not be able to recover fine motor skills that are required for certain activities of daily living such as dressing (ie, buttoning and zipping) even with adequate rehabilitation. Special attention may be required, with the addition of assist devices introduced early to assist patients with adaptation. For these patients, early planning for ongoing assistance may need to be considered.⁵

Musculoskeletal/Skin

Lean muscle mass decreases with aging. The rate of muscle mass decline is about 15% per decade up to age 50 years and then accelerates to about 30% per decade after age 60 years. The rate of replacing muscle tissue declines with advancing age. There is an increase in fat deposits and lipofuscin, which leads to loss of strength, tone, and contractility over time, which can result in an overall loss of strength and endurance.^{2,3} This makes elderly patients more susceptible to sarcopenia, which is a syndrome characterized by loss of skeletal muscle mass correlating with physical debility, decline in quality of life, and death.⁶ Elderly patients who are critically ill are usually confined to bed for extensive periods of time and have poor nutritional status, both risk factors for sarcopenia. With the addition of normal muscle aging, this can adversely affect an elderly patient's ability to rehabilitate back to baseline after a critical illness. Development of sarcopenia increases 1-year mortality.^{3,6} The aging skeletal system can develop increased joint stiffness and reduced flexibility, which can result in restricted movements and the development of chronic pain; this can limit an elder's functional recovery. The loss of skin elasticity and thickness increases the risk of pressure wounds.^{3,5}

Cardiovascular

Age-related changes in the cardiovascular system, including increased myocardial stiffness, fat deposition, and reduction in response to cardiovascular agents, can lead to difficulties in compensation to cardiac stressors, and this can manifest as increased risk of arrhythmias and diastolic heart failure. Pacemaker cells decline at a rate of 10% per decade. Fibrosis, lipofuscin, and calcium deposition in the myocardium, secondary to aging, can manifest as prolonged QTc and PR intervals,

contributing to arrhythmias under stress. Arteries become dilated and rigid, affecting responses to cardiovascular agents.⁷⁻⁹

Pulmonary

The changes in pulmonary tissue with aging result in decreased exercise tolerance and pulmonary reserve, which can present a challenge for elders recovering from an acute pulmonary insult. These patients may require longer, less intensive rehabilitation, which can optimize recovery of function and return to independence. By 80 years of age, the average person develops reductions in vital capacity, surface area of the lung, and forced vital capacity/forced expiratory capacity ratio by about 30%. Subsequently, elders develop increased residual volumes, decreased skeletal muscle mass and strength, reduction in lung elastic recoil, and decreased efforts in dependent and independent respiration, which can result in challenges to weaning and managing respiratory assist devices. There is a higher risk of both hypoxia and hypercapnia. Age-related changes of kyphosis can lead to narrowing of the intercostal spaces, which can contribute a restrictive physiology.^{1,3,10}

Immune responses

Changes that occur in immunity with normal aging result in atrophy of the thymus, which contributes to decreases in T lymphocytes, natural killer cells, cytokines, and B-cell function. There is a decline in immune function with aging, which can blunt primary and secondary responses to new pathogens. As aging occurs, more time and stimulus are required to mount immune responses. This can make elderly patients more vulnerable to infections and their sequela.^{1,9,11}

Cognitive decline

There are normal cognitive changes associated with aging that can include diminished spatial orientation, decline in perceptual speed, numeric ability, verbal memory, and slower problem solving. When patients are suffering from critical illness, these declines increase the risk for delirium and require consideration in developing rehabilitation plans. Patients may require more assistance during the recovery period with activities of independent living as they attempt to cognitively recover. Cognitive recovery can be prolonged. If an elder has an acute neurologic injury, the ceiling of recovery may be lower than that of a younger patient secondary to a decline in cognitive reserves.^{3,12,13}

Sensory/Endocrine function

The natural decline of vision, hearing, and taste functions can have profound effects on recovering from an acute illness. Patients with sensory impairment are at higher risk for delirium when suffering from acute illness or injury. Also, sensory disturbances can present challenges to participation in rehabilitation leading to functional recovery.^{3,14} There are also age-related changes in the endocrine system that can lead to alterations in stress responses and declines in functional capacity.^{2,3,15} These changes likely contribute to the development of sarcopenia and frailty. See **Table 1** for further details regarding hormonal changes in aging.

When faced with physiologic stressors, the elderly may have more difficulty maintaining homeostasis secondary to homeostenosis, a narrowing of reserve capacity. Older patients with excellent premorbid status may struggle to recover and rehabilitate back to baseline or have increased mortality secondary to the decline in reserve capacity.² This difficulty stresses the importance of starting early, acute care interventions focused on preserving function, decreasing physiologic and emotional stress when managing frail elders in the acute care setting extending into rehabilitation.¹⁶

Table 1 Effects of aging on the endocrine system	
Hormone Reductions	Hormone Increases
<ul style="list-style-type: none">• Melatonin• Growth hormone• Testosterone• Estrogen• Leptin• Cortisol• Aldosterone• Prolactin• DHEA	<ul style="list-style-type: none">• Atrial natriuretic peptide• Parathyroid hormone• Norepinephrine• Erythropoietin

Frailty

Frailty is a syndrome that is characterized by dysregulation and reduction of physiologic, physical, and cognitive reserve, which culminates in decline across several physiologic systems. Alterations in cellular processes affect the body’s energy regulation and production, resulting in decreased reserve and resistance to stress causing a patient to be at risk for adverse outcomes.^{17,18} The frailty phenotype identified by Fried and Walston is composed of weakness, slowness, exhaustion, low activity, and weight loss.¹⁹ A consensus statement in 2013 characterized frailty as “*diminished strength, endurance, and reduced physiologic function that increases an individual’s vulnerability for developing increased dependency and death.*”¹⁸

Primary frailty is characterized by sarcopenia as its major manifestation and is independent of a comorbidity. Secondary frailty occurs when a patient has serious illness such as heart failure or chronic obstructive pulmonary disease and subsequently develops the frailty phenotype.^{18,20,21}

There are several validated tools to identify frailty in the geriatric population. Frailty in older adults is associated with poor health outcomes, disability, worsening mobility, falls, emergency room visits, and hospitalizations. Frailty is an independent risk factor for progressive physical dependency and mortality. The prevalence of frailty has been noted to be about 7% to 10% in community-dwelling elders.^{18,22,23}

Screening for frailty helps to identify patients at risk for poor outcomes in the surgical, hospital, skilled nursing, home, and ICU settings. Patients who have been identified as frail with end-stage renal disease have been associated with increased rates of falls, hospitalizations, and mortality.²³ Frailty screening tools have been used in the evaluation for renal transplant. Frailty predicts all-cause and postoperative mortality and chemotherapy intolerance in patients with cancer. In cardiac surgery, frailty screening tools have been used in preoperative risk assessments, medical decision-making, and palliative care consultation. Patients admitted to the ICU who have been identified as frail have worse health outcomes. In a systematic review, frail patients admitted to the ICU were less likely to be discharged to home and have increased mortality compared with nonfrail patients.^{18,21} Refer to **Table 2** for details on validated frailty screening instruments.¹⁸

For patients who are critically ill and frail, it is appropriate to facilitate early discussions concerning goals of care with patients and their family. These discussions should identify surrogate decision makers, code status, and patient/family perception of an acceptable quality of life. Palliative Care and Geriatric consultations should be considered to assist with advanced care planning, prognostication, family meetings, and support. Prognostic information should be given in a compassionate and clear

Table 2 Validated frailty scales		
Frailty Tool	Scoring	Tool Characteristics
Frailty Index (FI)	Scoring: 0–0.7 0.2–0.45: Frail 0.45–0.7: Severely frail	Based on a comprehensive geriatric assessment scale
Frailty Phenotype (FP)	FP ≥3 signifies frailty Scoring: 5 phenotypic criteria—weakness, slowness, low level of physical activity, self-reported exhaustion, unintentional weight loss	Objective and self-reported criteria, excludes cognition
Clinical Frailty Scale (CFS)	Scoring: 1–9 1–4: Nonfrail 5–6: Mild-to-moderately frail 7–8: Severely frail 9: Terminally ill	Subjective assessment of functional status

manner, focusing not only on immediate physical recovery from the acute illness but also long-term outcomes including expectations of physical and cognitive recovery.^{20,21} The concept of frailty may be difficult for patients and families to understand and accept as reasons for poor clinical outcomes. This can especially be true if a patient is doing poorly secondary to primary frailty or if they developed the syndrome secondary to an acute illness but had excellent premorbid status.^{24,25} Early identification of a surrogate and engaging them in collaborative decision-making during the patients treatment course will be key to achieve appropriate outcomes and establish trust when trying to explain this difficult concept.^{18,20,26}

Delirium

Delirium is a neuropsychiatric syndrome that occurs in acutely ill individuals whose core features are inattention, acute onset, and fluctuating course that cannot be explained by a preexisting neurocognitive disorder.^{27,28} Delirium is a clinical diagnosis based on comprehensive history and evaluation of cognitive function. In the elderly and critical care population, it is considered an emergency.²⁹ **Table 3** shows details regarding the diagnostic criteria of delirium according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V).²⁷

Delirium is a widely underdiagnosed syndrome. It is among the most common complications in hospitalized patients aged 65 years and older.³⁰ Delirium affects 2.6 million elderly patients in the United States each year.^{28,31} In the intensive care setting, the incidence of delirium is estimated to reach 20% to 50% of the general ICU patient population and up to 80% of those on mechanical ventilation.^{28,32,33} Because of its insidious features, the hypoactive form of delirium is likely routinely unidentified in more than two-thirds of hospitalized patients.³⁴

Although it can be caused by one insult, delirium is often multifactorial, especially in elderly patients. Elderly patients are more vulnerable to factors that predispose for delirium. The risk of delirium is increased if multiple factors are present.²⁸ Patients with underlying dementia are at increased risk for developing delirium with odds ratios (OR) ranging from 6.3 (95% confidence interval [CI]: 2.9–13.8) to 11.5 (95% CI: 6.1–20.1).^{35,36} **Box 1** shows risk factors for ICU delirium.³¹

Table 3 Diagnostic criteria of delirium based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition	
Criteria	Explanation
Disturbance in attention	Decreased ability to direct, focus, shift, or sustain attention; easily distracted; impaired orientation to self or environment
Acute onset	Develops over a short period of time (hours to days); waxing/waning fluctuation in course
At least one other domain affected	Disorganized thinking; altered level of consciousness; altered memory and learning; alteration in language; perceptual distortions (eg.: hallucinations, delusions)
<i>Supporting Features:</i> altered sleep-wake cycle; emotional disturbances (eg, anxiety, agitation, apathy)	

Data from Diagnostic and statistical manual of mental disorders: DSM-5. In. 5th ed. Washington, D.C.: American Psychiatric Association; 2013.

Given the incidence of delirium in hospitalized patients, especially those who are elderly and admitted to the ICU, it is important to proactively screen patients for this syndrome. Two of the most commonly used instruments for delirium screening in the ICU are the Confusion Assessment Method for the ICU (CAM-ICU)³⁷ and the Intensive Care Delirium Screening Checklist (ICDSC).³⁸ These instruments were specifically designed for patients with limited communication abilities. In 2012, a systematic review and meta-analysis showed the CAM-ICU had a pooled sensitivity of 80% and pooled specificity of 95.9%, whereas the ICDSC had a pooled sensitivity of 74% and pooled specificity of 81.9%.³⁹ These data suggest that although both instruments can be used as screening tools for delirium in the ICU setting, the CAM-ICU is the superior diagnostic instrument. However, not all studies show consistency in the diagnosis of delirium via these 2 tools. In 2017, a validation study compared these 2 instruments against the DSM-IV criteria for delirium. The CAM-ICU had moderate concurrent validity and sensitivity of 50% but high specificity of 95%. The ICDSC also had

Box 1 Risk factors for intensive care unit delirium
Comorbidity or severity of illness
Older age (≥75 years)
Sedative or hypnotic use
Increased serum urea
Metabolic acidosis
Infection
Neurosurgery
Trauma admission
Urgent admission
Coma
<i>Data from</i> Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. Lancet. 2014;383(9920):911-922.

moderate concurrent validity and sensitivity of 63% but high specificity of 95%. Between the 2 tools, the concurrent validity was moderate. The ICDSC yielded higher sensitivity and specificity of 78% and 83%, respectively.³²

Delirium screening should be performed at multiple points throughout hospitalization, given its waxing/waning course and potentially subtle features. Consistently using the same instrument to assess for this syndrome allows for comparison over time. Furthermore, these tools should be used in conjunction with patient history, as well as collateral history from family and friends.

Delirium causes significant harm to hospitalized patients, especially those requiring ICU care. In a 2010 meta-analysis, delirium was found to have an increased risk of death compared with controls over a two-year follow-up period.³⁰ Other studies have also found delirium to be associated with increased mortality anywhere from 6 months³⁴ to 5 years.^{28,29} Patients with delirium who are admitted to a postacute facility have a five-fold increased risk of six-month mortality.⁴⁰

Delirium often occurs in patients who have other serious preexisting conditions. Delirium is associated with poor long-term outcomes in both cognitive and functional domains. Patients are at increased risk of institutionalization.^{30,41} Patients with delirium have increased risk of dementia over a four-year follow-up period.³⁰ Patients with delirium have longer hospital length of stay, including post-ICU length of stay. These patients spend, on average, 10 more days in the hospital than those without delirium.⁴¹ Delirious patients also have fewer ventilator-free days and increased cognitive impairment at hospital discharge.³⁴ In hospitalized delirious patients discharged to a postacute facility, there were higher rates of rehospitalization, falls, and pneumonia. There were lower rates of eventual discharge to the community.⁴⁰ Delirium is associated with chronic functional impairment up to 18 months after the episode.^{28,30} These complications pose significant limitations to the potential rehabilitation of elderly patients.

Delirium severity and duration are independently associated with increased morbidity and mortality among older medical inpatients.^{42,43} **Box 2** shows predictors of poor outcomes in the setting of delirium based on a 2015 systematic review.⁴⁴

It is well established that patients treated in the ICU, for any reason, have significant incidences of posttraumatic stress disorder (PTSD) ranging from 14% to 44%. There are now case reports of hallucinations and delusions during episodes of delirium being linked by patients to PTSD.⁴⁵ In fact, a small study has suggested that one-third of all patients who suffer from delirium eventually develop PTSD.⁴⁶ Patients have higher risk of depression after an episode of delirium, although there is no apparent increased risk of anxiety.⁴⁷ Further research is warranted in these domains, especially regarding the onset of PTSD in ICU patients with delirium.

Box 2
Predictors of poor outcomes in delirium

Duration of delirium episode

Hypoactive subtype

Delirium severity

Preexisting neuropsychiatric morbidity with depression or dementia

Data from Jackson TA, Wilson D, Richardson S, Lord JM. Predicting outcome in older hospital patients with delirium: a systematic literature review. *Int J Geriatr Psychiatry*. 2016;31(4):392-399.

Efforts should be taken to aid in delirium prevention in hospitalized patients, given the known negative impacts of delirium on morbidity and mortality. The Hospital Elder Life Program (HELP) is an intervention strategy for delirium prevention. These interventions include several behavioral and environmental modifications such as reality orientation, minimization of psychoactive medications, use of a non-pharmacologic sleep protocol, early mobilization, and attention to feeding and nutrition.⁴⁸ A recent meta-analysis assessing delirium prevention models based on HELP showed significant reductions in delirium incidence with an OR of 0.47 (95% CI: 0.38–0.58).⁴⁹

Dementia

Dementia includes a constellation of cognitive and behavioral impairments in multiple domains: memory; executive function (reasoning, planning, judgment); visuospatial ability; language; and personality/behavior. A diagnosis of dementia is made when sustained impairments are witnessed in at least 2 of these domains.⁵⁰ Given the progressive decline in patients with dementia, prognostication is often challenging. Further, the chronicity of this disease makes it difficult to conceptualize as a terminal condition. However, experts encourage that dementia be viewed similarly to cancer or other chronic organ failure. Patients with dementia experience functional decline, frailty, and cachexia with a median survival of 5 years from diagnosis.⁵¹

A 2013 systematic review attempted to identify accurate prognostic indicators of mortality in patients with advanced dementia.⁵² Unfortunately, reliable predictors were not found in the literature. However, the most common prognostic variables encountered related to nutrition and nourishment including decreased appetite, anorexia, eating less than 25% of meals, and cachexia. The National Hospice and Palliative Care Organization recommends the use of the Functional Assessment Staging scale for use in prognostication for hospice eligibility in patients with dementia.^{53,54} At stage 7, patients are believed to have a prognosis of 6 months or less if they also have a listed medical complication. At this stage, patients depend on all activities of daily living, are incontinent of bowel and bladder, and speech vocabulary is limited to no more than 6 words. Medical complications include aspiration pneumonia, upper urinary tract infection, stage III or IV pressure wound, greater than 10% weight loss over the span of 6 months or albumin less than 2.5 g/dL.^{51,55}

Patients with dementia often have recurrent acute decompensations such as urosepsis, aspiration pneumonia, dehydration, falls, and delirium.⁵¹ Hospitalization is a warning sign for short-term morbidity and mortality.^{56,57} In fact, when patients with dementia recover from acute illness, the progression of their underlying dementia continues without returning to their previous baseline functionality. Identifying the type of dementia present is important. For example, patients with Alzheimer dementia have significantly decreased mobility at advanced stages; patients with Lewy body dementia exhibit parkinsonism.⁵⁸ These considerations have significant implications on the physical rehabilitation potential of critically ill elderly patients with dementia. Therefore, there has been renewed interest in patient and family education regarding the clinical course of dementia. Greater efforts are being made with patients regarding advance care planning and identifying a surrogate decision maker or health care agent to help make care choices based on the patient's values when acute and critical illness occurs. This caregiver education and preparation is a foundation of managing dementia.⁵¹ These discussions are most valuable when performed in the early stages of dementia so that patients can participate and speak to their preferences. Patients with dementia who have surrogate decision makers who have awareness of prognostic information and clinical course are likely to receive less aggressive care at the end of life.⁵⁹

Pain

Elderly populations tend to experience pain at higher rates than younger people, affecting up to two-thirds of patients. Further, pain prevalence increases in critical illness and at the end of life.^{60–62} Despite this, there are often misconceptions and lack of knowledge among clinicians on how to best manage pain in this patient population.⁶³

The most important step in the management of pain is an initial, thorough pain assessment. In elderly patients, it is essential to also assess for cognitive and sensory impairment. Pain is a common cause of suffering for patients with advanced dementia and even when identified, it is often undertreated.^{51,64} One of the most widely used pain assessment tools in nonverbal dementia patients is the Pain Assessment in Advanced Dementia Scale.^{65,66} This scale uses various observational metrics such as breathing, negative vocalization, facial expression, body language, and consolability in order to rate pain.

Uncontrolled pain may contribute to the development of frailty. It can also cause increased falls and functional impairment, potentially leading to increased trauma and ICU admissions, affecting future rehabilitation potential.⁶⁰ Although opioids can be safe and effective at low doses for moderate and severe pain, they should only be used as first-line therapy in cancer-related pain. When used, steps to mitigate side effects should be taken. In other pain syndromes, adjuvant medications are preferred first. For example, in elderly patients, up to 3 g of acetaminophen can be used daily. If there is concomitant liver injury, up to 2 g can be used daily.⁶⁷ Further, topical analgesics may be used for musculoskeletal pain. In patients with advanced dementia, it is recommended to provide analgesics on a scheduled basis, as these patients are unable to ask for as-needed medications.^{51,68} Inadequate pain control may impair rehabilitation. Therefore, it is important to start pain interventions early in the treatment course.

When adjuvant analgesics are inadequate in managing pain in elderly patients, the use of opioids is warranted. When opioids are ineffectively and inadvisably used, delirium may result in elderly patients. A similar situation is also true: uncontrolled pain can also cause and exacerbate delirium.⁶⁰ Cognitively intact patients with uncontrolled pain are 9 times more likely to develop delirium.⁶⁹

Constipation

The prevalence of constipation is higher in the elderly, affecting about 20% of the population, which increases to 50% in the nursing home patient population.⁷⁰ The pathophysiology of constipation in this population includes age-related cellular dysfunction that affects plasticity, compliance, macroscopic structural changes, altered control of the pelvic floor, and altered colonic motility due to age-related neuronal loss.⁷¹ It is especially important to manage constipation in the elderly ICU population. Constipation is a risk factor for delirium and can contribute to nausea and decreased oral intake.⁷² A recent observational study found that up to 75% of ICU patients suffer from constipation. In fact, as ICU length of stay increases and number of mechanical ventilation days increase, constipation becomes more common and severe. In the ICU setting, constipation is best managed with the use of osmotic laxatives such as polyethylene glycol or stimulant laxatives such as sennosides or bisacodyl. In the setting of fecal impaction, manual disimpaction, water enemas, and mineral oil enemas may be used.⁷⁰ Docusate, a stool softening agent, should not be used. It has not been shown to be effective for the management of constipation and often contributes to polypharmacy in the elderly population.⁷³

Prognostication Scales

Prognosticating how a geriatric patient will recover after critical illness can be difficult. In a study evaluating advanced age (>85 years) geriatric patients, unplanned surgical ICU admissions had higher mortality than general medical admissions. In patients who survived to ICU discharge, they had the potential to return to population-based norms by 1 year after discharge from the ICU. Patients reached premorbid physical status 25% of the time. The physical gains plateaued after 9 months. Baseline functional status of patients can be a determining factor in the ability to survive and/or to reach pre-acute illness baseline function.¹⁴ In a study evaluating ICU discharges for patients older than 75 years, short-term mortality correlated to the severity of the acute illness and long-term mortality to the preadmission cognitive status, functional status, and number of comorbidities. In the study, one-third of patients had moderate-to-severe disability requiring significant family support on discharge. Even in patients with high premorbid function, 40% were dependent at hospital discharge, with some improvement by 3 months, with plateauing, again, at 9 months.⁷⁴ In another study the survival rate of baseline healthy elderly medical patients 12 months postdischarge from the ICU was 49% with functional status and quality of life returning close to baseline in most of the survivors. However, they did experience a two-fold increase in the prevalence of geriatric syndromes.⁷⁵

When determining expectations for rehabilitation in these patients, prognostication tools can be helpful. These tools can also serve as triggers for involving palliative care services and facilitating goal of care discussions with patients and families when prognosis is poor or goals cannot be met.¹⁴ The Palliative Performance Scale (PPS) was developed by Anderson and Downing in 1996. It is a modification of the Karnofsky Performance Scale (KPS) used to assess a patient's functional performance and to determine progression toward end of life.⁷⁶ The KPS and PPS can be used interchangeably.⁷⁷ In a study evaluating trauma patients with a mean age of 70 years, if the preinjury PPS was low (≤ 70), this correlated with hospital mortality and poor outcomes for survivors at 6 months. Low PPS predicted poor functional outcomes at 6 months, whereas age and the Injury Severity Score did not. Patients with lower scores who had functional improvement often continued to have persistent pain and anxiety/depression. Patients with low PPS scores plateaued in improvement compared with patients with higher scores.^{78,79} In another retrospective study of elderly trauma patients admitted to a surgical ICU, a PPS of 80 or less was an independent risk factor for mortality, discharge to skilled care, and poor functional outcomes.²⁶

Postintensive Care Unit Care and Rehabilitation

Healthy elderly patients with good baseline functional status have a possibility, with rehabilitation and management and prevention of geriatric syndromes, to functionally recover after acute illness. Patients start to develop muscle atrophy and skin pressure areas on the first day of hospitalization bedrest. By the eighth day, patients can start to develop bone degradation.⁸⁰ When a patient is showing clinical improvement, introducing physical and occupational therapy early in the acute care setting can improve patient outcomes. Also, taking measures to identify and avoid delirium and maximizing nutrition improve outcomes. After discharge from the ICU, frail elderly patients should transition to specialized care units for the elderly, if available. The Acute Care for Elders units have trained nurses and therapists in geriatric care and principles; these units improve outcomes for frail hospitalized elders. These units result in increased adherence to evidence-based geriatric care, improved

patient function at time of hospital discharge, and reductions in length of stay and costs compared with usual care.⁸¹

For patients who do not exhibit functional recovery, or if it is determined that goals of treatment are not going to provide the patient with an acceptable quality of life, a palliative care consultation should be requested. This may also be an appropriate time to introduce hospice as an option to provide the patient with comfort and preserve dignity. The concept of hospice as an acceptable option should be introduced early if there is a concern that the patient's prognosis will be poor. Even if the goal is to pursue aggressive interventions, allowing patients and their family to become familiar with hospice, as a reasonable option can help with transition if it were to be needed. Geriatric patients who survive the ICU have high symptom burdens and care needs after discharge. Fatigue and pain are primary symptoms that can trigger outpatient palliative care consultations for symptom management and ongoing goals of care discussions.²⁰

Patients are able to be discharged to a rehabilitation facility or home with rehabilitation services. There are 4 major types of interventions to improve health outcomes of frail elders: exercise, nutritional intervention, multicomponent interventions, and individually tailored geriatric care models.^{80,82} Exercise interventions should focus on balance, flexibility, resistance, and endurance. The exercise program should focus first on flexibility and balance training, followed by resistance and endurance training with a gradual increase of exercise intensity. Resistance training can start to rebuild the lean muscle mass that was lost during illness (sarcopenia). In one study, frail women with advanced age and those living in long-term care facilities tend to benefit the most from these interventions.⁸² These interventions can start before leaving the acute care setting. Multicomponent interventions include nutrition, attention to emotional/physiologic distress, and management of distressing symptoms (ie, pain, constipation, delirium, nausea, reducing polypharmacy).

Disposition

If a patient is able to tolerate 3 hours of nonconsecutive physical therapy, then transition to an acute rehabilitation facility, which provides intensive rehabilitation with medical supervision, should be considered. The average length of stay is 12 to 16 days. If a patient cannot tolerate 3 hours of nonconsecutive rehabilitation daily, then transfer to a skilled nursing facility (SNF) for subacute rehabilitation services should be considered. Subacute rehabilitation in SNFs is performed over a longer period of time and allows for lower intensity and a slower pace. The average length of stay is 21 to 28 days. Both are covered by Medicare and Medicare Advantage programs if a patient meets the qualifications based on hospital physical therapy recommendation, documentation, and clinical history.¹⁶ For patients requiring extended hospitalization, long-term acute care (LTAC) hospitals specialize in treating patients requiring extended hospitalization who may have more than one serious condition and who have hope of return to home and/or meaningful recovery. LTAC hospitals are appropriate for patients who may require long-term ventilator weaning, extensive wound care, and antibiotic care that cannot be provided on an outpatient basis, in addition to rehabilitation.⁸³ Patients may also elect to be discharged to home with home health to provide rehabilitation. In a cohort study of Medicare data, patients discharged to home with home health were associated with higher 30-day readmission rates than were discharges to SNF. However, there were no significant differences between functional outcomes or 30-day mortality rates between these dispositions.⁸⁴ Refer to **Table 4** for details on outpatient rehabilitation options.^{16,83,84}

Table 4 Outpatient rehabilitation options			
Outpatient Rehabilitation	Average Length of Stay	Requirements	Notes
Home health	41.5 d	Patient must be homebound Require skilled care on a part-time or intermittent basis to improve, maintain, prevent, or further slow your health condition Rehab services in home 1–3 d per wk based on need and availability	Medicare authorizes 60 d
Skilled nursing facility	21–28 d	Services cannot be provided at lower level One or more skilled therapies are needed Rehab can be tolerated 1 h/d, if needed	Medicare certification SNF within 30 d of leaving the hospital and receive care for the same condition treated for during your hospital stay
Acute rehabilitation facility	12–16 d	Patient must be able to tolerate 3 nonconsecutive hours of therapy daily over 5-d period or 15 h over 7 d	Requires 24-h physician availability with specialized rehabilitation training. Requires 24-h availability of nurses with specialized rehabilitation training

For patients who are not showing clinical improvement and experiencing recurrent hospitalizations, progressive decline, and/or persistent symptom burden, palliative care consultation should be considered to clarify goals of care and manage symptoms. Outpatient palliative care consultation may be available through the facility or provided by independent agencies.²⁰ For patients with a prognosis with 6 months or less, referral to hospice is appropriate. The eligibility under the Medicare hospice benefit is based on the prognosis of the individual and not on the diagnosis.⁸⁵

SUMMARY

Natural, physiologic changes occur with aging that make rehabilitation and return to baseline functional status more challenging and potentially prolonged in the setting of critical illness. These physiologic changes occur in multiple organ systems: nervous system, skin, musculoskeletal, cardiovascular, pulmonary, and immune system. Frailty culminates in decline across several systems causing risk for adverse outcomes including increased falls, emergency department visits, and hospitalizations. Delirium is a geriatric emergency and is widely underdiagnosed. Most of the mechanically ventilated ICU patients experience delirium. Dementia is characterized by

progressive cognitive and behavioral deficits. The prevalence of pain is increased in critical illness and at the end of life. Constipation occurs in most of the critical care patients. These symptoms and syndromes have negative impacts on morbidity and mortality. Prognostication is challenging with most critically ill elderly patients. Multiple options exist for physical rehabilitation based on the patient's clinical recovery, including long-term acute care, acute rehabilitation, subacute rehabilitation, and home therapy.

CLINICS CARE POINTS

- Frailty is an independent risk factor for progressive physical dependence and mortality.
- Screening for delirium should occur at multiple points during hospitalization, given its waxing/waning course and potentially subtle features. Prevention strategies should be enacted.
- Patients with delirium have increased mortality up to 5 years after the episode.
- Delirium is associated with poor long-term outcomes, including increased institutionalization, cognitive impairment, falls, and pneumonia.
- Hospitalized patients with dementia have increased short-term morbidity and mortality. These patients do not return to previous baseline functional status after the acute decompensation resolves.
- Uncontrolled pain can contribute to frailty and delirium.
- Constipation is associated with increased days on mechanical ventilation and increased ICU length of stay. Treat constipation with scheduled osmotic and stimulant laxatives.
- Prognostication tools and performance scales such as the PPS should be used to help determine rehabilitation expectations.
- If functional recovery is not achieved or if continued disease-directed therapy will not provide adequate quality of life for the patient, hospice enrollment should be considered.

DISCLOSURE

The authors have nothing to disclose.

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