



BEST PRACTICES GUIDELINES

GERIATRIC TRAUMA MANAGEMENT

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BEST PRACTICES GUIDELINES
**GERIATRIC TRAUMA
MANAGEMENT**



INTRODUCTION



INTRODUCTION

KEY POINTS

- Trauma in older adults is increasing, both in number of cases and as a proportion of the total trauma center volume.
- Unintentional injury is the seventh leading cause of death for older adults.
- The outcomes for older adult trauma patients are worse than for younger trauma patients; older age is an independent risk factor for mortality.

Adults 65 years and older are the fastest-growing segment of the United States (US) population. In 2019, 54.1 million adults aged 65 years and older lived in the US and accounted for 16% of the population. Older adults are expected to account for 21.6% of the US population, or 80.8 million people, by 2040.¹ An increasing volume of trauma cases is accompanying the growth of the older adult population.² Trauma in older adults is increasing, both in number of cases and as a proportion of total trauma center volume. Unintentional injury is now the seventh leading cause of death for older adults.³

Trauma outcomes for geriatric patients are worse than for younger patients.⁴⁻⁶ Irrespective of mechanism, older age is an independent risk factor for mortality.^{7,8} Frailty is also a strong predictor of poor outcome.⁹ Neither age nor mechanism of injury appears to be correlated with injury severity in older adults, as less severe mechanisms can result in substantial injury.⁸ This highlights the need for guidelines focusing on practices specifically related to the care of injured older adults. In this document, adults aged 65 years and older are referred to either as *older adults* or *geriatric patients*.

IMPORTANT NOTE

The intent of the American College of Surgeons (ACS) Trauma Quality Programs (TQP) Best Practices Guidelines is to provide healthcare professionals with evidence-based recommendations regarding care of the trauma patient. The Best Practices Guidelines do not include all potential options for prevention, diagnosis, and treatment, and they are not intended as a substitute for the provider's clinical judgment and experience. The responsible providers must make all treatment decisions based upon their independent judgment and the patient's individual clinical presentation. Although these Best Practices Guidelines have been reviewed with significant care, they are provided as is and without liability. The ACS and any entities endorsing the Guidelines shall not be liable for any direct, indirect, special, incidental, or consequential damages related to the use or misuse of the information contained herein. The ACS may modify the TQP Best Practices Guidelines at any time without notice.

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MECHANISMS OF INJURY IN OLDER ADULTS

KEY POINTS

- Falls are the most common cause of injury in older adults and the leading cause of fatal injury.
- Suicide rates are highest among older adults when compared with other age groups.

MECHANISMS OF INJURY

Falls: Falls are the most common cause of trauma injury and the leading cause of fatal injury in older adults. Each year, 3 million older adults are treated in the emergency department (ED) and more than 800,000 patients are hospitalized for fall-related injuries.¹ Fall death rates among adults aged 65 years and older increased more than 30% between 2007 and 2016.² Low-velocity falls (LVF) are a frequent cause of admission for trauma in the elderly. While a seemingly innocuous mechanism, LVFs can result in disproportionately severe injury and even death.³ A high index of suspicion for potential serious injury, even after simple, same-level falls, is necessary to diagnose and treat older adult patients in a timely fashion. Falls produce injury patterns that include intracranial hemorrhage (ICH), fractures, and injuries to the chest and abdomen.⁴ Risk factors for falls include a history of a previous fall, living alone, use of ambulation aids, depression, cognitive deficits, and use of more than six medications.⁵ Falling once doubles the chances of a second fall.³ Other described nonmodifiable risk factors include age greater than 85 years, male sex, and White ethnicity.⁶ Overall health appears to be more important than age in preventing falls and injury.

Motor vehicle crashes (MVCs): MVCs are the second-most common mechanism of injury in the older adult population. MVCs are more likely than falls to result in mortality.^{7,8} Across all older adult age groups in 2021, females had higher death rates from MVCs than males.⁹ Age-related decline in vision and cognitive functioning, as well as physical changes, affect the driving abilities of some older adults.¹¹ Pedestrian-struck injuries account for a larger percentage of MVC-related injuries in the older adult pedestrian because of the increased time needed for ambulation and crossing.¹⁰

Burns: Older adults account for 20% of burn trauma admissions, and burns are the eighth leading cause of death for those over 65 years of age.¹¹ Contributing factors to burn injuries include smoking, limited mobility, slower reaction times, sensory impairment, cognitive decline, and medication side effects. Refer patients over the age of 50 with greater than 10% total body surface area burns to a burn center.¹²

Assaults: Assaults and penetrating injuries are less frequent in older adults, but these injury mechanisms are associated with a high mortality and increased hospital length of stay (LOS). Penetrating injuries account for 22% of assault-related injuries in the older adult population.^{13,14}

Suicide: Suicide rates are highest among older adult men and women, compared with a higher rate of *suicide attempts* in adolescents and young adults.¹⁵ In older adults, risk factors for suicide include psychiatric disorders such as depression, chronic pain or illness, social isolation, and being White and male.^{15,16} Suicidal behavior is more commonly associated with physical conditions and bereavement in older adults, whereas in younger persons it is more commonly associated with psychiatric problems, previous suicidal and self-harm behavior, legal and financial stressors, and relationship problems.¹⁶ The most common method in older adults involves use of a firearm.¹⁷ The majority of older adults who attempt suicide visited their primary care provider in the preceding year, offering an opportunity for intervention and prevention.¹⁵

Elder Abuse: An estimated 5 million older adults (1 in 10 age 60 years or older) experience elder abuse annually, but only one case in 24 is reported.¹⁸ Abuse includes physical, sexual, and emotional abuse, as well as neglect, isolation, and financial exploitation.¹⁸ Family members are responsible for more than 60% of abuse events.¹⁸ Older adults who experience abuse are at a 300% higher risk of death compared with those not abused.¹⁹ Please refer to the ACS TQP Best Practices Guidelines for Trauma Center Recognition of Child Abuse, Elder Abuse, and Intimate Partner Violence for additional information on elder abuse.¹⁹

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BEST PRACTICES GUIDELINES
**GERIATRIC TRAUMA
MANAGEMENT**



**ACUTE CARE
MANAGEMENT**

TRAUMA TEAM ACTIVATION

KEY POINTS

- Injury mechanisms and vital signs do not reliably triage older adult patients.
- Implement solutions for undertriage and lack of best practices.
- A best practice for trauma centers is to have defined geriatric trauma activation criteria that are monitored for compliance.

It is now clear in the US and other countries that trauma activation protocols must have specific criteria for older adults.¹ Using standard adult trauma activation criteria can lead to undertriage and delays in the recognition of injury severity in older adults.² The National Trauma Triage Protocol suggests a systolic blood pressure (SBP) of 110 mm Hg as a criterion for older adults for transport to a trauma center, to decrease the incidence of undertriage.³ Changing the heart rate criterion from 120 beats per minute to 90 is also recommended for the older adult trauma patient.³ The shock index (SI, equal to heart rate divided by SBP) can also be integrated into the trauma activation criteria. An SI greater than 1 reliably predicts mortality.⁴ At this time, no protocol is recommended for ground-level fall (GLF) activation for hip fracture, but many trauma centers have some form of protocol in place. A recent systematic review contends that uncertainty remains over the optimal geriatric-specific prehospital trauma triage criteria.⁵ Current recommended geriatric trauma activation criteria are listed in Box 1.

Box 1. Geriatric Trauma Activation Criteria

- GLF for patients on antithrombotic agents
- SBP less than 110
- Heart rate above 90
- SI greater than 1
- GLF patients not on anticoagulants with GCS < 14 and signs of head trauma

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THE EMERGENCY DEPARTMENT EVALUATION IN GERIATRIC TRAUMA

KEY POINTS

- Recognize atypical and occult presentations in the geriatric patient.
- Provide prompt, aggressive resuscitation in the unstable older adult trauma patient, and provide expedient, directed evaluation of the apparently stable older adult patient.
- Interdisciplinary trauma care beginning in the ED is a best practice for geriatric patients.
- Use a slow, gentle approach to care when possible. Removal of visual and auditory aids adds confusion and difficulty for older adult patients when responding to questions.

The ED evaluation is critical to the identification and management of trauma. The ED evaluation of the older adult patient is complicated by unimpressive causal mechanisms, unreliable vital sign measures, and alterations of key physical findings. These typical indicators are all untrustworthy for the early detection of injury in geriatric patients. The identification and management of comorbid illnesses, mental status impairments, frailty, and polypharmacy are equally important. Actions taken in the ED significantly alter patient treatment, can promote optimal management, and can reduce LOS, morbidity, mortality, and hospital costs. Interdisciplinary trauma care beginning in the ED is a best practice for geriatric patients.

Older adults experience atypical and occult presentations. The trauma evaluation must maintain a high index of suspicion for significant injury in the geriatric trauma patient. Conduct a careful assessment to identify the subset of the geriatric trauma population at high risk for poor outcomes. Implement close monitoring, and anticipate and correct for atypical findings to improve outcomes. Because geriatric patient survival is dependent on advanced care, older adults deserve a more aggressive approach during initial trauma management than younger patients with similar injury mechanisms. Advanced patient age needs to elevate a provider's concern and prompt initiation of more aggressive care. However, the use of age alone for clinical decision—and as a triage tool—may also be misleading in geriatric trauma patients.

Primary Survey – The Geriatric Trauma ABCDEFs:

Perform a primary survey for the initial evaluation of each trauma patient, but be aware of important additional considerations and potential pitfalls when evaluating the older adult.

A – AIRWAY

Anticipate that securing the geriatric airway will be potentially difficult due to tissue redundancy, loss of muscular pharyngeal support, and limited mandibular protrusion.^{1,2} Be prepared with airway adjuncts and rescue airway devices such as gum-elastic bougies and laryngeal mask airways.^{3,4} Development of a difficult airway team and the use of fiber optic scopes can improve success rates.⁵ Second-generation supraglottic devices offer greater aspiration protection than earlier devices, and they can be safely applied in older patients.²⁻⁴ Potential challenges in obtaining a geriatric airway include:

Arthritis: Cervical spine arthritis may cause difficulty in cord visualization and intubation.^{2,6} Prediction of a difficult airway is key to optimizing intubation success rates.³⁻⁵ Bougie insertion, as compared with endotracheal tube with stylet, resulted in significantly higher first-attempt intubation success among patients undergoing emergency endotracheal intubation.⁷

Temporomandibular Joint Disease: The presence of temporomandibular joint disease may necessitate a cricothyroidotomy. Advanced airway techniques may preclude the need for a surgical airway by allowing successful intubation.⁶

Dentition: To maintain a patent airway in edentulous patients, leave dentures in place for mask bagging, but remove dentures for intubation.⁸

Airway Collapse/Friable and Dry Mucosal Tissues: The older adult has a tendency for airway collapse and obstruction.^{2,9} Take care to lubricate nasal and oral airways, as well as nasogastric tubes. Use topical tranexamic acid (TXA) for control of hemorrhage from traumatic insertions.

Intubation Dose Adjustments: Several dose adjustments are required for rapid sequence induction (RSI) in older adult patients (see Table 1).

Surgical Airways: Cricothyroidotomy landmarks may be harder to identify—and airway entry more difficult—due to decreased cervical mobility, looser skin on the neck, and a stiffer, smaller cricothyroid membrane. Cricothyroidotomy is the recommended rescue technique after failure of intubation and supraglottic techniques, if unable to provide and maintain bag-mask ventilation.³

Table 1. RSI Medication Dosage Adjustments

Medications	Dosage Adjustment
ANESTHETICS	
Ketamine: <i>May cause increased myocardial oxygen demand (important in patients with coronary artery disease). Catecholamine depletion can contribute to hypotension. Subdissociative doses help in pain management but may have adverse psycho-perceptual effects in older adults.</i> ¹⁰	Intubation dose: 1mg/kg in older adults ¹¹ Subdissociative dose: 0.3 mg/kg ¹⁰
Propofol: Generally well tolerated. <i>May induce hypotension and apnea in some older adults.</i>	Median induction dose: 1 – 1.5 mg/kg, with continuing infusion of 0.5 – 1.0 mg/kg/hr ^{12,13}
“Ketofol”: A combination of propofol and ketamine that has improved hemodynamic stability in the first 10 minutes after induction. The mixture was reported to have less respiratory adverse effects. ^{14,15}	Intubation dose: 0.5 mg/kg of both agents
Etomidate	0.1-0.2 mg/kg IV, decreased from 0.3 mg/kg IV
OPIOIDS	
All Opioids	Reduce all doses with “start low, go slow” as a guide
Fentanyl	Decrease dose by 20% to 40%
BENZODIAZEPINES	
Midazolam	Decrease dose by 20% to 40%
NEUROMUSCULAR BLOCKADE	
Depolarizing Neuromuscular Blocking Agents: Produce a similar degree of blockade in all ages, but <i>may have a 2-minute delay and a longer duration of action in geriatric patients.</i> ^{16,17} <ul style="list-style-type: none"> Succinylcholine 	Doses do <i>not</i> have to be altered, regardless of renal function. <ul style="list-style-type: none"> 1.5 mg/kg IV
Nondepolarizing Neuromuscular Blocking Agents: <i>Have longer duration of action in geriatric patients.</i> ¹⁷ <ul style="list-style-type: none"> Rocuronium Cisatracurium: Has smallest duration variability and greatest reliability in geriatric patients.¹⁸ 	<ul style="list-style-type: none"> 1.0 mg/kg, decreased from 1.2 mg/kg 55 micrograms/kg¹⁹

B - BREATHING

Older adults may have a normal respiratory rate up to 25 breaths per minute. A higher rate can be the first sign of lower respiratory tract compromise.²⁰

Hypoxia and Hypercarbia: Both abnormal findings are more common in geriatric patients because of weaker respiratory muscles and decreased elastic recoil, which reduces vital capacity. Hypoxia and hypercarbia are further exacerbated by increased dead space and decreased respiratory reserve in older patients. The older patient's response to hypoxia and hypercarbia declines by 50% and 40%, respectively, when compared with younger adults.²¹ Maintain oxygen saturation in the low 90's.

Ventilator Management: Data suggest that low volumes and lower-pressure ventilation are both associated with better outcomes in older patients.²² Consider ventilator settings of 6 mL/kg and plateau pressures of 30 cm H₂O or less. Hyperventilated trauma patients appear to have increased mortality when compared with non-hyperventilated patients.^{23,24} In patients with absolute or relative hypovolemia, high ventilation rates and positive-pressure ventilation may compromise venous return, worsening hypotension and even causing cardiovascular collapse.

C - CIRCULATION

Vital signs are commonly atypical in geriatric trauma patients.²⁵

Blunted Tachycardia: Older adult trauma patients may lack compensatory tachycardia with hypovolemia due to catecholamine insensitivity, atherosclerosis, myocyte fibrosis, conduction abnormalities, and common medications such as beta and calcium channel blockers.^{25,26}

Occult Hypoperfusion (OH): The finding of normal-range SBP in the volume-depleted older adult patient may indicate a false measurement. Baseline or historical SBP measures for comparison can help establish the drop in blood pressure with volume depletion. Patients with a usual SBP of 130–150 mm Hg have high rates of OH. Geriatric patients with congestive heart failure, coronary artery disease, and renal insufficiency commonly have OH. Each of these conditions result in baseline fluid overload, further complicating the clinical picture in acute volume depletion.

Skin turgor testing and capillary refill are not reliable in the clinical exam of older patients in shock, with specificities of only about 10%.²⁷ An SI (heart rate divided by SBP) of greater than or equal to 0.7 has an 83% specificity for predicting transfusion need in trauma patients 65 years and older.²⁸

Assessment and Management of Shock

Causes of Shock State: The rapid ultrasound in shock evaluation of the inferior vena cava, heart, lungs, abdomen, and aorta can identify 80% of shock etiologies, enabling correct resuscitation while evaluation proceeds.²⁹ Bedside ultrasound evaluation with treatment protocols may guide early therapy and enable assessment of improvement throughout the course of resuscitation. Note that in addition to hemorrhage, preexisting conditions such as myocardial ischemia can also exacerbate hypotension.

Laboratory Markers May Be Useful: The use of lactate and base deficit (BD) assays in the ED may quickly identify OH and guide early aggressive resuscitation. An admission BD of 6 or less, or lactate of 2.4 mmol/L or greater, suggests OH in an apparently hemodynamically stable patient. If the initial lab values are normal, strongly consider a second determination of either serum lactate or BD, obtained 30 to 45 minutes after arrival, for all geriatric patients who remain in the ED. BD and lactate clearance provide guidance about the status of hemodynamic resuscitation.

Appropriate Transfusion and Fluid Resuscitation: Do not hesitate to transfuse geriatric patients with severe trauma. Mortality risk is higher if transfusion is not administered within 4 hours of admission. Massive transfusion resulted in survival to hospital discharge in 60% of patients over age 65 years, even when confounded by multiple mortality risk factors.³⁰ Early aggressive resuscitation of older adult trauma patients is justified and may further improve outcomes. Age alone is not a contraindication to high-volume transfusion.³¹ However, a transfusion "ceiling," or maximum, seems to exist, after which additional transfusion has limited survival benefit for patients, and this ceiling worsens (decreases) with each decade of life. Octogenarians who received 2 units of packed red blood cells (RBCs) had a 28% mortality rate, rising to nearly 80% at 10 units but not reaching 90% until after 21–30 units were administered.³⁰

Older adult trauma patients generally have lower admission hemoglobin levels and receive more early and total units of packed RBC transfusions. About 10% of geriatric trauma patients are anemic at baseline.^{32,33} Low baseline hemoglobin could be an independent mortality predictor. Older adult patients also leave the hospital with lower hemoglobin levels.³⁴ Restrictive transfusion protocols appear to be safe in geriatric trauma patients, and they may be associated with decreased complications and shortened LOS.³⁵

When shock is due to hemorrhage, limiting crystalloids after hospital arrival is advised. Fluid resuscitation may promote coagulopathy by diluting coagulation factors and may also cause hypothermia. Additionally, the excessive rise of mean arterial pressure may promote further hemorrhage. The optimal types of loading fluids, volume and velocity of fluid administration, resuscitative endpoints, and regulation of perfusion pressure remain controversial. Definitive standards for fluid administration and evaluation are undefined in critically ill patients.

For nonhemorrhagic shock states, be cautious regarding iatrogenic fluid overload. However, do not let this concern delay or prevent resuscitation. Combine the repeated administration of 250 mL to 500 mL boluses with frequent patient reassessment to minimize the risk of iatrogenic fluid overload.^{36,37}

Anticoagulation: Older adults often take anticoagulant medication, which increases risk of hemorrhage. See the Anticoagulation Assessment and Reversal section on page 27 for more information.

D - DISABILITY

Use a slow, gentle approach when possible. Older adults often use visual and auditory aids. The removal of these during an initial resuscitation adds confusion and makes it difficult for the older adult to respond to questions. Even when senses are intact, allow time for the patient to understand what is happening.

Glasgow Coma Scale (GCS): Glaucoma, cataract surgery, and systemic medications may alter GCS eye findings.

Dementia and Cognitive Deterioration: Alterations in mentation are frequently seen in the older adult population and may be independent risk factors for falls and traumatic brain injury (TBI). Both the primary and secondary survey assessments are more complicated, and diagnosis and treatment of acute and underlying conditions may be delayed.

Dementia may falsely decrease GCS, because preexisting alterations in mental status are considered new when a baseline mental status is unknown. Immediate pain reports are likely to be correct; however, reports of recent or historical pain or of changes during treatment course may not be reliable. Learn the use of alternative pain scales for older patients with cognitive impairment. Please see the Pain Control section on page 46 for more information.

Delirium: Delirium, an acute state of confusion, signals acute illness in older adults. It is frequently missed, especially in a rapid trauma evaluation. Identify delirium during the ED evaluation, and consider it a sign of critical illness until proven otherwise. See the Delirium section on page 20 for more information.

Spinal Stenosis: Older adults with cervical spondylosis (stenosis), a narrowing of the spinal canal, are at risk for cord injury without bony abnormality.³⁸ This can result in either a central cord or Brown-Séquard-like syndrome despite normal imaging.

E - EXPOSURE

Blunted hypothalamic function, poor nutrition, loss of lean muscle mass, and microvascular changes make older adults susceptible to hypothermia and skin breakdown during trauma evaluation.

Hypothermia: Hypothermia drastically increases mortality from hypovolemia, and it contributes to dysrhythmia and coagulopathy. Use a rectal thermometer to get an accurate temperature. Prevent hypothermia with a Bair Hugger™, warm blankets, or a hot room. Use warm fluid for resuscitation.

Skin Breakdown: Pressure from backboards, C-collars, stretchers, and immobility contribute to skin breakdown in as little as 2 hours.^{39,40} Severe ulcers can form in 6 hours. Medicare penalizes healthcare facilities by providing no payment for all care associated with pressure ulcers.

Prevent skin breakdown by placing pads on all skin areas at risk (especially the chin, occiput, sacrum, and heels) at the time of evaluation. Use egg foam mattress pads, especially for prolonged ED evaluation. Establish protocols for early computed tomography (CT) activation, CT reading, and device removal.

F - FRAILITY

In addition to the traditional ABCDE primary survey for trauma, frailty is an extremely important consideration during the initial evaluation in older adults. Identification of frailty in the ED can help guide decision-making about patient management and prognosis, as well as concentrate early resources to patients most at risk for iatrogenic harms, functional decline, progression of disease, and death. Please see the Frailty section on page 16 for more information.

Secondary Survey of the Geriatric Trauma Patient

While the primary survey follows a uniform approach for all patients, common chronic and acute issues can be significant contributing factors leading to acute trauma, especially GLFs. In addition, older adults may have diminished pain perception, which may hide from clinical view the presence of serious injuries, including chest, abdominal, and skeletal fractures. The secondary survey for the older adult requires attention to their comorbidities. Refer to the Comorbidities sections for more information.

Laboratory Assessment: Many older adults are prescribed multiple drugs and may have multiple preexisting comorbidities, so it is a best practice to perform a thorough lab assessment, especially for patients with multiple injuries or serious life-threatening injuries. The suggested panel of laboratory studies includes:

- Lactic acid and/or blood gas (arterial or venous), with special attention paid to BD
- Prothrombin time, partial thromboplastin time (PTT), international normalized ratio (INR)
- Comprehensive metabolic panel (provides a rapid assessment of electrolyte abnormalities and renal or liver dysfunction)
- Complete blood count
- Toxicology, including blood alcohol level and a urine drug screen

While prothrombin time/INR is adequate for patients prescribed warfarin, it provides almost no information for those patients on direct oral anticoagulants (DOACs). DOACs include direct thrombin inhibitors (e.g., dabigatran) and factor Xa inhibitors (e.g., rivaroxaban and apixaban). Consider thromboelastography (TEG) for patients taking a DOAC in the setting of TBI, intraabdominal solid organ injury, bony pelvic injury with retroperitoneal hematoma, any evidence of active bleeding, or need for emergent surgical intervention. No objective test is clinically useful for quantifying the effects of antiplatelet agents (e.g., aspirin, clopidogrel, ticagrelor, ticlopidine, and eptifibatide).

Imaging: Make liberal use of CT scanning for initial imaging. While this is potentially controversial because of concerns about radiation exposure, contrast administration, and cost, occult injuries are common in this population. This is especially true for the patient whose exam is unreliable due to altered mental status from TBI, chronic dementia, metabolic encephalopathy, or intoxication. Low-energy trauma, such as from GLFs, may produce significant injuries, especially in those older than 55 years, thus emphasizing the need for CT of the head, neck, chest, abdomen, and pelvis in assessment of this population.⁴¹ Do not withhold contrast administration due to concerns of potential acute or chronic kidney injury. For further information on specific imaging issues common in the older adult population, please refer to the *ACS TQIP Best Practices Guidelines in Imaging*.⁴²

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BEST PRACTICES GUIDELINES
**GERIATRIC TRAUMA
MANAGEMENT**



**FRAILTY AND
COMORBIDITIES**

FRAILITY

KEY POINTS

- Optimal trauma care of the older adult patient must factor in any comorbidities, geriatric-specific syndromes, and reduced physiologic reserve.
- Frailty syndrome involves decreased physiologic reserves across multiple organ systems, and it is associated with worse outcomes and increased mortality.
- In trauma patients, frailty is often more predictive of adverse outcomes than age.
- The Trauma-Specific Frailty Index (TSFI) is an effective, validated tool that can aid clinicians in identifying high-risk patients and planning their care.
- Early assessment and identification of patients with frailty is essential to optimize their care by involving interprofessional teams and implementing focused management plans.

More than 70% of Medicare participants, 65 years and older, were reported to have at least two chronic conditions.¹ Multimorbidity in this population increases the risk of complications and mortality. Additionally, their medical care requires nuanced evaluation and treatment that adequately weighs risks and benefits.

Frailty

It is well recognized that aging is associated with physiological decline, but this decline is not uniform across all individuals or even across one individual's organ systems. Frailty is a geriatric syndrome, clinically distinct from age, comorbidity, and functional disability, characterized by age-associated depletion of physiological reserves that leads to a state of augmented vulnerability to physical stressors and a diminished ability to recover from illnesses.² The prevalence of frailty in geriatric trauma patients is high.^{3,4} Characteristics of frailty include the following:⁵

- Diminished strength and endurance
- Suboptimal physiologic functioning
- An associated loss of independence and mortality

In trauma patients, frailty may be more predictive of adverse outcomes than age.⁶ Patients with frailty have a higher risk for complications, mortality, adverse discharge disposition, and loss of functional independence.⁷⁻⁹ In surgery, frailty receives considerable attention because proactive intervention has the potential to positively impact surgical outcomes.¹⁰

The TSFI is a validated assessment tool recommended for use (see Table 2).¹¹ The TSFI involves assessment of 15 variables that are practical when assessing geriatric trauma patients. It is simple to use, trauma-specific, and tied to delirium and other markers identified as important for patient care. Additionally, it does not require the assessment of variables that are cumbersome to assess in the geriatric trauma patient, such as gait speed and hand grip strength. The TSFI is derived from the Canadian Study of Health and Aging Frailty Index (CSHA-FI).^{12,13} Its components include five domains that account for comorbidities, daily activities, health attitude, functionality, and nutrition.

Other frailty screening tools for consideration include but are not limited to: Rockwood Clinical Frailty Scale (CFS),¹⁴ modified frailty index (mFI),^{15,16} International Association of Nutrition and Aging Frailty Scale (FRAIL),¹⁷ and Vulnerable Elders Survey (VES-13).¹⁸

Frailty and Inpatient Care Pathways

Using a frailty assessment tool helps identify those patients who would benefit from multiple interventions.¹⁰ Development of frailty pathways for trauma and acute care surgery patients helps reduce LOS and 30-day readmission rates.¹⁹⁻²² Frailty pathways are multimodal and multidisciplinary and successfully improve outcomes.²³ Programs such as Hospital Elder Life Program (HELP) and Nurses Improving Care for Healthsystem Elders (NICHE) demonstrated reduction of the incidence of delirium and patient complications, as well as reduced hospital LOS.²⁴ Please see Table 3 for a model frailty pathway.

Table 2. Trauma Specific Frailty Index (TSFI)

15-Variable Trauma-Specific Frailty Index			
Comorbidities			
Cancer history	Yes (1)	No (0)	
Coronary heart disease	Myocardial infarction (1) Medication (0.5)	Coronary artery bypass graft (0.75) None (0)	Percutaneous coronary intervention (0.5)
Dementia	Severe (1) No (0)	Moderate (0.5)	Mild (0.25)
Daily Activities			
Help with grooming	Yes (1)	No (0)	
Help managing money	Yes (1)	No (0)	
Help doing housework	Yes (1)	No (0)	
Help toileting	Yes (1)	No (0)	
Help walking	Wheelchair (1) No (0)	Walker (0.75)	Cane (0.5)
Health Attitude			
Feel less useful	Most time (1)	Sometimes (0.5)	Never (0)
Feel sad	Most time (1)	Sometimes (0.5)	Never (0)
Feel effort to do everything	Most time (1)	Sometimes (0.5)	Never (0)
Feel lonely	Most time (1)	Sometimes (0.5)	Never (0)
Falls	Within last month (1)	Present, not in last month (0.5)	Never (0)
Function			
Sexual activity	Yes (0)	No (1)	
Nutrition			
Albumin	<3 (1)	>3 (0)	

Scoring: Circle the appropriate answer to each of the 15 variables and sum the scores. The total score obtained from the questionnaire is divided by 15 to obtain the TSFI. Patients can also be stratified based on their TSFI into nonfrail (TSFI < 0.25) and frail (TSFI ≥ 0.25) groups.¹¹
 From: Joseph B, Pandit V, Zangbar B, et al. Validating trauma-specific frailty index for geriatric trauma patients: A prospective analysis. *J Am Coll Surg.* 2014; 219(1): 10-17.e1. doi: 10.1016/j.jamcollsurg.2014.03.020

Table 3. Model Frailty Pathway and Action Plan

Frailty Pathway Intervention	Action Plan
Early hospitalist consultation	<ul style="list-style-type: none"> • Tackle the complex medical needs of the geriatric patient • Obtain consultation with a palliative care specialist service for patients with certain medical conditions and poor prognostic criteria
Expedited use of physical and occupational therapy services	<ul style="list-style-type: none"> • Reduce the risk of falls and difficulty with activities of daily living (ADLs)
Use of a standardized admission order set	<ul style="list-style-type: none"> • Avoid polypharmacy and treatments that can lead to confusion, delirium, and other described neuropsychiatric sequelae
Multimodal pain management	<ul style="list-style-type: none"> • Provide adequate pain control • Use opioid-sparing agents • Improve functional status
Cautious use of fluids	<ul style="list-style-type: none"> • Initiate timely de-resuscitation • Avoid fluid overload
Early engagement of social workers	<ul style="list-style-type: none"> • Discuss potential placement options after surgery
Proactive geriatric consultation/comprehensive geriatric assessment	<ul style="list-style-type: none"> • Engage inpatient multidisciplinary care teams • Address geriatric-specific syndromes • Improve documentation of delirium • Perform medication adjustment • Provide comprehensive geriatric care • Address goals of care
Geriatric nursing care	<ul style="list-style-type: none"> • Have a geriatric surgery nurse champion • Promote evidence-based best practices for the nursing care of older surgical patients • Improve adherence to and compliance with evidence-based best geriatric practices
Rigorous postdischarge follow-up	<ul style="list-style-type: none"> • Improve surgeon communication with the primary care provider for elective high-risk patients • Help facilitate the transition both into and out of the hospital

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DELIRIUM

KEY POINTS

- Age is a known independent risk factor for delirium.
- Patient development of delirium is dependent on a complex interaction between predisposing patient-related factors and precipitating factors during the patient's in-hospital stay.
- The Confusion Assessment Method (CAM) and the CAM-ICU are recommended for identification of delirium.
- Prevention of delirium focuses on minimizing the modifiable risk factors and treatment of underlying conditions that put the patient at risk for delirium.

Delirium is an acute or subacute disorder characterized by disturbance in attention and awareness or cognition that develops within hours to days, and it tends to fluctuate in severity during the course of a day. It is not a result of a preexisting or other neurocognitive disorder.¹ Age is a known independent risk factor for delirium. Hospitalized older adults have an increased risk of delirium, increasing from 3% for adults aged less than 65 years, to 14% for those aged 65 to 74 years, and to 36% for patients aged 75 years and older.² The probability of developing delirium is estimated to increase by 2% each year after age 65.³ In a study of trauma patients older than 50 years admitted to the intensive care unit (ICU), the incidence of delirium was 61%, and the risk of delirium increased by 10% for every year older than age 50.⁴ Delirium is disturbing for both affected patients and their relatives, and it is associated with worse cognitive outcome, increased ICU and hospital LOS, and greater costs.⁵

Delirium is subcategorized into three entities: hypoactive, hyperactive, and mixed. Hypoactive is most common (53%), followed by mixed (30%) and hyperactive (17%); studies report hypoactive and mixed delirium, compared with hyperactive delirium, are more closely associated with hospital mortality.⁶ Development of delirium is dependent on a complex interaction between predisposing patient-related factors and precipitating factors during the patient's in-hospital stay.⁷ Because delirium is common in the hospitalized geriatric trauma patient, especially if admitted to the ICU, it is important to identify the patient's

risk factors for developing delirium and to screen for the occurrence of delirium. Table 4 lists risk factors for delirium and examples.^{4,5,8,9}

Delirium Assessment

The CAM is widely used for identification of delirium.¹⁰ The CAM was designed to allow nonpsychiatric clinicians to diagnose delirium quickly and accurately following brief formal cognitive testing. It assesses the presence, severity, and fluctuation of nine delirium features: acute onset, inattention, disorganized thinking, altered level of consciousness, disorientation, memory impairment, perceptual disturbances, psychomotor agitation or retardation, and altered sleep-wake cycle.¹⁰ Its outcome is binary—delirium is present or not present. The CAM-ICU is an adaptation of the CAM for patients who cannot communicate verbally. It can be completed in approximately 2 minutes.⁵ It is one of the two screening tools recommended in the Society of Critical Care Medicine's 2018 Clinical Practice Guidelines.¹¹

Delirium Prevention

The focus for prevention of delirium is on minimizing modifiable risk factors and treating underlying conditions that put the patient at risk for delirium.¹² Recommendations for prevention of delirium include multicomponent nonpharmacologic interventions that reduce modifiable risk factors for delirium, improve cognition, and optimize sleep, mobility, hearing, and vision.¹¹⁻¹³ Studies of multicomponent bundles that combine cognitive and physical therapy early during critical illness demonstrated improved outcomes, with significant reduction in incidence of delirium, duration of delirium, ICU LOS, and hospital mortality.¹¹⁻¹³ The multicomponent interventions focused on cognitive impairment were reorientation, cognitive stimulation, music, and use of clocks. Interventions focused on sedation/sleep disruption were reducing sedation and minimizing light and noise. Early rehabilitation and mobilization were directed at immobility, while the use of hearing aids and glasses decreased hearing and visual impairment. The awakening and breathing coordination, delirium monitoring/management, early exercise/mobility and family engagement (ABCDEF) bundle is clinically related and evidence-based, and it is associated with less delirium, reduced mortality, and more ICU days without coma or delirium.¹¹

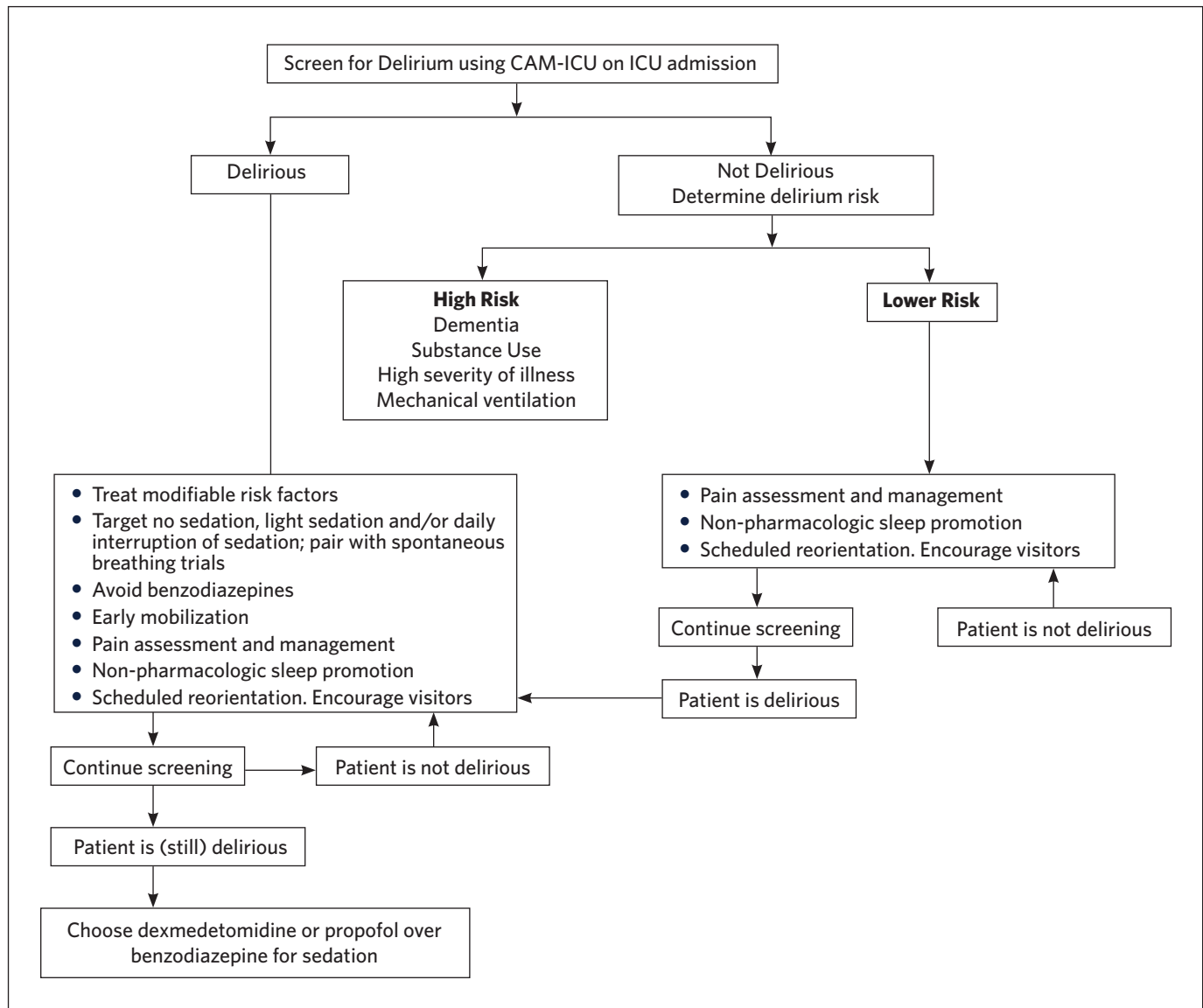
Table 4. Delirium Risk Factors

Risk Factor	Example
Age	Age 65 years and older
Gender	Males more than females
Baseline cognitive impairment	Dementia
Baseline hypertension	
Neurological disorders and injuries	Central nervous system (CNS) malignancy or abscess, cerebrovascular accident, ICH, Parkinson’s disease, TBI
Nutritional deficiencies	Malnutrition, “failure to thrive,” malabsorption disorders, hypovitaminosis (e.g., deficiencies in vitamin B12, folate, niacin, thiamine)
Trauma	Physical trauma and injury, heat stroke, hyper-/hypothermia, severe burns, surgical procedures
Endocrinopathies	Hyper-/hypothyroidism, hyper-/hypoparathyroidism, hyper-/hypoadrenalism, hyper-/hypoglycemia, hyper-/hypopituitarism
Behavioral/psychiatric disorders	Excessive emotional distress, depression, schizophrenia, bipolar disorder
Medication use	Several pharmacologic agents are highly deliriogenic, including GABAergic agents (e.g., benzodiazepines, barbiturates, propofol), anticonvulsants, anticholinergic agents, analgesics (e.g., opioids, ketamine, NSAIDs), antihistamines, fluoroquinolones, digitalis, warfarin, sympathomimetic agents
Decreased oxygenation	Anemia, anoxia, low perfusion/oxygenation states
Infections	Pneumonia, urinary tract infection (UTI), sepsis, viral infection
Pain	Both pain and medications used for treatment of pain are associated with development of delirium
End organ failure	Hepatic failure, renal failure
Substance use and abuse	Acute substance intoxication and substance withdrawal states, particularly from CNS depressant agents (e.g., alcohol, benzodiazepines, barbiturates, muscle relaxants, opioids)
Electrolyte abnormalities and fluid imbalance	Electrolyte disturbances, hypovolemia, hypervolemia
Isolation and sensory deprivation	Sensory impairments such as decreased visual and auditory acuity, increased functional dependence
Light, sleep, and circadian rhythm disturbances	Sleep disorders, sleep deprivation, disturbances in sleep-wake cycle
Metabolic disorders	Acidosis, alkalosis, hypoammonemia, urinary retention, fecal impaction
Restraints and immobility	Use of physical restraints, external immobilizing technologies (e.g., ventilators, ventricular assist devices, extracorporeal membrane oxygenation, intravenous lines, bladder catheters, intermittent pneumatic leg compression devices)
Medication-induced coma	Emergence from medication-induced sedation, coma, or paralysis

Data on pharmacologic prevention and treatment of delirium are mixed, which may in part be related to a lack of concurrent multicomponent nonpharmacologic prevention strategies. The use of dexmedetomidine is associated with a 23% decrease in delirium when compared with benzodiazepines for sedation in mechanically ventilated ICU patients.^{14,15} When compared with propofol in patients being treated with light sedation approaches, dexmedetomidine did not differ in delirium outcomes.¹⁶ The typical antipsychotic medication, haloperidol, is often used to treat

both hyper- and hypoactive ICU delirium, as are atypical antipsychotic medications (e.g., olanzapine, quetiapine, risperidone, and ziprasidone). A multicenter, randomized, double-blind, placebo-controlled trial examined the effects of haloperidol or ziprasidone on delirium during critical illness and found that neither medication altered the duration of delirium.¹⁷ See Figure 1 for a practical approach to preventing the development of delirium and limiting its duration in ICU patients through a multicomponent set of strategies.

Figure 1. Preventing the Development of Delirium and Limiting Its Duration in ICU Patients through a Multicomponent Set of Strategies



Adapted from various sources^{14,16,17} and Brummel NE, Girard TD. Preventing delirium in the intensive care unit. *Crit Care Clin.* 2013;29(1):51-65.

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CARDIAC COMORBIDITIES

KEY POINTS

- An intravenous beta blocker (e.g., labetalol) or direct vasodilation using hydralazine is a reasonable first-line treatment for initial hypertension management.
- Judicious fluid administration is good clinical practice for all older adults when they are not actively hemorrhaging.
- Consider noninvasive cardiac output monitoring or ultrasound to help assess volume status in the acute resuscitation of the patient with heart failure.
- For trauma patients with atrial fibrillation, maintain cardiac output and ensure perfusion with rate control and thoughtful fluid management.

Hypertension

More than 75% of adults 65 years and older meet diagnostic criteria for hypertension and recommended treatment with antihypertensive medication to reduce complications from cardiovascular events.¹ In the acute setting of trauma, antihypertensive medications (e.g., diuretics, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, beta blockers, and calcium channel blockers) are often held due to hypotension, fluid status management, side effects (e.g., risk of kidney injury), and NPO (nothing by mouth) status. An intravenous beta blocker (e.g., labetalol) or direct vasodilation using hydralazine is a reasonable first-line treatment for initial hypertension management. Resume oral antihypertensive medications during hospitalization as the patient's physiology allows.

Geriatric trauma patients may require targeted blood pressure management for acute hemorrhage, vascular injury, TBI, or spinal cord injury (SCI). For patients admitted to the ICU requiring acute blood pressure management, consider an arterial line for blood pressure monitoring. Patients who are very hypertensive at baseline may require higher blood pressure targets to prevent relative ischemia. Intravenous formulations or continuous infusions can be titrated and help prevent inadvertent iatrogenic hypotension.

Coronary Artery Disease/Acute Coronary Syndrome

Atherosclerotic cardiovascular disease remains the leading cause of morbidity and mortality in the US, with increasing prevalence and incidence as individuals age.² For patients with or without known coronary artery disease, continue home medications when possible, as determined by treatment of the acute injury. A complete history and physical with medication reconciliation can help clinicians determine if a patient has prior cardiac stents in place and if they have risk of bleeding or cardiac stent thrombosis. Resume statins during hospitalization, as the patient's physiology allows.

Older adults can develop acute coronary syndrome as a complication of a traumatic injury. The spectrum of acute coronary syndrome includes conditions compatible with acute myocardial ischemia and/or infarction due to an acute or abrupt reduction in coronary blood flow.³ In the acute trauma setting, immediately evaluate patients with evidence of acute coronary syndrome using a 12-lead electrocardiogram (ECG), and repeat the ECG to detect ischemic changes. Obtain serial cardiac enzymes beyond 6 hours after the presumed event's initial onset to capture any rise in enzymes. In the acute setting, limit transfusions to patients with a hemoglobin level below 8.0 mg/dL.⁴ Ideally, trauma patients with acute coronary syndrome are comanaged with cardiology to determine if acute intervention is required. Consider the risks and benefits of periprocedural or long-term anticoagulation drug administration when procedural interventions may be performed.

Heart Failure

The annual incidence of heart failure (HF) doubles with each decade after age 65, and the prevalence is more than 10% in those 80 years of age and older.⁵ Fluid limitation is especially important for patients with known heart failure or when cardiac history is unknown. Judicious fluid administration is good clinical practice for all older adults when they are not actively hemorrhaging.

When possible, obtain a prior or baseline ECG, echocardiogram, or cardiology notes to guide care. If volume status is unknown, recall that classic measures (i.e., blood pressure, heart rate, and urine output) used to guide fluid administration can be altered in the older patient. Consider noninvasive cardiac output monitoring or ultrasound to help assess volume status during an acute resuscitation.

- For patients cleared for physical mobilization, perform a straight leg-raise test to assess for fluid responsiveness.
- For patients with evidence of shock, obtain a new echocardiogram or even repeated echocardiograms during hospitalization to ensure that patients are not given too much fluid.
- For patients with known or newly diagnosed structural abnormalities of the heart (e.g., valvular stenosis or regurgitation), use echocardiogram findings to determine a treatment strategy.

After resuscitation is complete, use noninvasive measures to monitor patients with poor cardiac output who are mobilizing fluids back into the intravascular space. For patients who are sensitive to large fluid shifts, consider continuous loop diuretic administration (e.g., furosemide or bumetanide) that is titrated to prevent large fluid shifts. Add acetazolamide to those patients with acute heart failure that are at high risk for loop diuretic resistance.^{6,7} For patients with oliguric renal failure, consider renal replacement therapy (RRT) for fluid removal.

Patients at extremely high risk are those with severe heart failure, severe pulmonary artery disease, or a ventricular assist device. Consider transfer to a center with appropriate expertise if the facility is not experienced in caring for this population.

Dysrhythmias

Atrial fibrillation (AF) is the most common arrhythmia in the geriatric population, and it is found in about 10% of patients over the age of 80 years.⁸ AF is classified as paroxysmal (two episodes that terminate spontaneously within 7 days), persistent (continuous episode sustained

beyond 7 days), longstanding persistent (continuous episode lasting more than 12 months), or permanent. Of patients with AF older than 65 years, 50% have cooccurring heart failure.² The longer a patient's AF episode, the harder it becomes to regain sinus rhythm.

For trauma patients with AF, it is essential to maintain cardiac output and ensure perfusion with rate control and thoughtful fluid management. For patients with known preexisting AF, continue home medications if able. Consider the following medications for treatment of acute AF to achieve the desired heart rate: AV (atrioventricular) nodal blockers such as beta blockers, calcium channel blockers, or digoxin. Amiodarone can be added for rhythm control. Overdistension of the right atrium from volume expansion can be treated with diuretics as appropriate. Maintain electrolytes in the normal range.

Evaluate the acute onset of new AF with an ECG and electrolytes, and add cardiac enzymes when concern exists for new ischemia. Echocardiography can be helpful to assess for new or preexisting structural cardiac abnormalities and to develop a treatment plan that can be used for future outpatient care.

Calculate a patient's annual risk of thromboembolism and stroke using the CHA₂DS₂-VASc score, a scoring system ranging from 0 to 9 points (see Table 5).⁹⁻¹¹ CHA₂DS₂-VASc considers the presence of congestive heart failure, HF, diabetes, prior stroke, and vascular disease and accounts for age and sex to assign risk points.

Discuss long-term initiation, resumption, or continuation of anticoagulants prior to discharge, based on a patient's overall quality of life, risk of thrombosis, and risk of recurrent trauma, such as falls. Refer patients with a high risk of stroke and recurrent trauma or bleeding for close outpatient follow-up by a physician who will continue to assess ongoing risks and benefits of anticoagulation after discharge.

Table 5. Risk Factors and Scores for CHA₂DS₂-VASc Score for AF

Risk Factor	Score
Congestive heart failure: Signs/symptoms of heart failure or objective evidence of reduced left ventricular ejection fraction	1
Hypertension	1
Age ≥ 75 years	2
Age 65–74 years	1
Age < 65 years	0
Diabetes mellitus	1
Previous stroke, transient ischemic attack, or thromboembolism	2
Vascular disease (prior myocardial infarction, peripheral artery disease, or aortic plaque)	1
Female gender	1

Peripheral Arterial Disease

The estimated prevalence of peripheral arterial disease (PAD) in individuals older than 70 years is 30%.¹² Patients with diabetes, hypertension, hypercholesterolemia, or a history of smoking are more likely to have PAD. Diagnostic and therapeutic considerations are important for older adult trauma patients with PAD. For patients with extremity injuries, PAD can limit the accuracy of noninvasive blood pressure measurements and measurement of the arterial-brachial index, because blood vessels are noncompressible. Extremity ischemia may result from decreased blood pressure, emboli, or thrombosis when extremity vasculature is already compromised. Abnormal coagulopathy can lead to vascular thrombosis in extremities, which are already at risk. Be vigilant, and identify early changes in vascular status to initiate treatment. Therapeutic anticoagulation can be administered on a case-by-case basis.

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ANTICOAGULATION ASSESSMENT AND REVERSAL

KEY POINTS

- Obtain a history of anticoagulant use from all older adult trauma patients, followed by a coagulation profile to identify individuals needing close monitoring or aggressive reversal of anticoagulation.
- Trauma protocols for rapid anticoagulation reversal are associated with improved outcomes in injured patients.
- In patients with high thrombosis risk, consider prophylactic doses of easily reversible anticoagulants before reintroducing the full therapeutic dose of a DOAC.

More than 80% of the 30 million prescriptions for warfarin written annually in the US are for older adults.¹ Use of non-vitamin-K-antagonist oral anticoagulants other than non-vitamin K antagonists, also known as DOACs, is rapidly increasing, because they provide more predictable activity than warfarin with lower risk of major bleeding.² The mortality of trauma patients over age 70 increases significantly due to preinjury anticoagulation, especially when combined with cardiac issues.^{3,4}

Patients who are anticoagulated have a higher risk for significant bleeding events, even in the context of minor injury.^{5,6} Bleeding in an anticoagulated older adult can range from minor to life-threatening and can result from both mild and major injuries. Anticoagulation hemorrhage can be occult or obvious, delayed or immediate. Drugs such as aspirin, clopidogrel, ticagrelor, ticlopidine, and eptifibatide can all increase the risk of serious bleeding. Potent antiplatelet medications like clopidogrel pose a significant risk for uncontrolled hemorrhage in trauma patients.⁵ Increased mortality trends are reported for older adults taking all antiplatelet groups involving thromboxane A2 inhibitors and platelet P2Y12 inhibitors, and the likelihood of significantly higher complications occurred with platelet P2Y12 inhibitors.⁶

Assessment of Anticoagulation Status

Obtain a history of anticoagulant use from all geriatric trauma patients, assess a coagulation profile, and identify individuals needing close monitoring or aggressive

reversal of anticoagulation.⁷ Important elements of an anticoagulation history include the agent used, dose, and time of last dose. Additionally, inquire about the possibility of anticoagulant overdose; renal, hepatic, or oncologic disease; and other medications taken that could increase anticoagulant drug effects.

Except for warfarin, where the anticoagulant effect parallels the INR, no laboratory test is yet available to determine the anticoagulant effect of DOAC medications. A normal INR usually excludes the presence of significant levels of dabigatran or other DOACs, although the INR may be only minimally increased with therapeutic doses of rivaroxaban and dabigatran.

TEG, a functional test of whole blood coagulation, tests the shear elasticity and dynamics of clot formation and stability of formed clots. TEG is useful in identifying the presence of DOACs, and it is a promising tool in the targeted resuscitation of multitrauma patients.^{8,9} Consider TEG evaluation for patients on a DOAC or antiplatelet agents who have serious hemorrhage or hemorrhage risk (e.g., TBI, intraabdominal solid organ injury, bony pelvic injury, retroperitoneal hematoma, or hemorrhagic shock requiring emergent surgical intervention).

Anticoagulation Reversal

The increasing number of anticoagulation agents makes an understanding of drug-specific reversal strategies essential (see Table 6). Trauma protocols for rapid anticoagulation reversal are associated with improved outcomes in injured patients. Drugs for reversal of new anticoagulants are being developed and approved for use.

Reversal of Coagulation in Older Adults with TBI:

Short-term reversal of anticoagulation is needed when imaging shows any ICH in the anticoagulated older adult. Repeat the CT scan at 6 to 8 hours to check for stability of the ICH or when subtle signs of neurologic worsening occur.¹⁰ Pharmacologic reversal of anticoagulation is indicated for clinical deterioration, evidence of ICH, and a supratherapeutic INR.¹¹⁻¹³ The risk of immediate mortality far outweighs the risk of adverse embolic events from the preexisting condition. Temporary discontinuation of warfarin, aspirin, or clopidogrel does not increase thrombotic or ischemic events.¹⁴⁻¹⁷

Anticoagulant Reversal Agents

Vitamin K/Fresh Frozen Plasma (FFP): Reversal of warfarin was traditionally managed using a combination of vitamin K and plasma. One study suggests that immediate transfusion of 2 units of unmatched FFP, followed by 2 units of matched FFP, decreases the time to reversal from 4.3 to 1.9 hours.¹⁸ Progression of ICH in treated patients dropped from 40% to 11%, and subsequent reduction in mortality went from 50% to 10%.¹⁸ Unfortunately, the volume of FFP required for reversal may range from 2–4 liters, causing fluid overload and limiting the use of this treatment for geriatric patients with impaired cardiac and renal function. Transfusion-associated circulatory overload was the leading cause of transfusion-related mortality in the US between 2013 and 2017.¹⁹

Prothrombin Complex Concentrates (PCC): Four-factor PCC (II, VII, IX, X) was designed specifically to reverse warfarin coagulopathy.²⁰ PCC results in more rapid reversal of INR than vitamin K and FFP, decreasing hematoma growth.^{21–23} Typical PCC dosage is 25–50 IU/kg, based on body weight, degree of anticoagulation, and desired level of correction.¹⁸ At 30 units/mL, the volume required for reversal is easily tolerated by most older adults. A recent US study using a low, fixed dose of 1,500 units successfully achieved an INR \leq 1.5 with no thrombotic events.^{24,25} Three-factor concentrates lack factor VII and must be given with either plasma or recombinant-activated factor (rVIIa).

Idarucizumab: In 2015, the FDA approved idarucizumab for the reversal of anticoagulation effects of dabigatran, a direct thrombin inhibitor.²⁶ Idarucizumab is a monoclonal antibody with an affinity 350 times higher than factor II for the dabigatran molecule. The effects of dabigatran are reversed within minutes.

Andexanet Alfa: Andexanet alfa (AndexXA) was approved in 2018 by the FDA for reversal of anticoagulation effects of rivaroxaban and apixaban (both are factor Xa inhibitors) in patients with life-threatening hemorrhage.²⁷

Antiplatelet Agents: No direct reversal agents exist for antiplatelet drugs such as aspirin, clopidogrel, or ticlopidine. Inadequate evidence supports routine use of platelet transfusion after trauma in patients taking antiplatelet agents, and no outcome benefit (i.e., improved mortality)

exists for platelet transfusion in patients on antiplatelet agents.^{28–33} Desmopressin (DDAVP) has been shown to improve platelet function in volunteers on aspirin and clopidogrel but had no effect on platelet aggregation inhibition by ticagrelor, although primary hemostatic activity was significantly increased.^{34–37} Patients with ICH who presented with preinjury antiplatelet therapy and received DDAVP had a lower incidence of hematoma expansion in patients with mild TBI.³⁸

Recombinant Factor VIIa: Due to increased risk of thrombotic events, recombinant factor VIIa is *not* recommended as first-line treatment for traumatic bleeding, and its use is *no longer* recommended for the off-label indications of prevention and treatment of bleeding in patients without hemophilia.³⁹

Tranexamic Acid (TXA): TXA, a general hemostatic agent blocking the conversion of plasminogen to plasmin, slows clot breakdown and causes a mild procoagulant state. TXA use in trauma surgery safely decreases mortality and reduces blood loss and transfusion need without related thrombotic complications (when given within three hours of injury).⁴⁰ The British Committee of Standards in Haematology recommends TXA for its bleeding reduction action in patients who have a residual anticoagulant effect.²⁹ TXA is safe and effective in older adults with intertrochanteric fractures.⁴¹

Resuming Anticoagulation After Trauma

The decision to resume anticoagulation for geriatric trauma patients is based on the assessment of risk benefit of hemorrhage to thrombosis, as well as the reason for prior anticoagulation.

General Considerations: A multidisciplinary approach with input from the patient's primary care provider as well as hematologists, cardiologists, hospitalists, and/or geriatricians is often helpful to determine if or when to resume anticoagulation, and the decision often depends on the reason for anticoagulation. The British Committee of Standards in Haematology recommends the following:²⁹

- Do not reintroduce DOACs at full dose until at least 48 hours postprocedure following a high-risk procedure in patients with an increased bleeding risk or in any situation where any increased risk of bleeding is unacceptable.

Table 6. Anticoagulation Reversal Agents

Anticoagulant	Time from Last Dose to Full Reversal*	Test	Reversal Agent(s)
Vitamin K Inhibitor Warfarin (Coumadin) Acenocoumarol (Sintrom)	7-8 days	PT/INR	FFP, vitamin K PCC 3 factor (Profilnine) PCC 4 factor (Kcentra)
Low-Molecular-Weight and Unfractionated Heparins Enoxaparin (Lovenox) Dalteparin (Fragmin) Nadroparin (Fraxiparine)	6-7 days	PTT/INR	Protamine sulfate Ciraparantag (still investigational)
Factor Xa Inhibitor Fondaparinux	3-4 days		Recombinant factor VIIa (off label)
Oral Factor Xa Inhibitor Rivaroxaban (Xarelto) Apixaban (Eliquis)	1-2 days 1.5-3 days	Anti-Xa levels	TXA, factor IIa, PCC and aPCC, andexanet alfa (AndexXa) ²⁷
Edoxaban (Savaysa/Lixiana) Betrixaban (Bevyxxa)	1.3-2 days 4-5.5 days	Unreliable PT/ INR levels	PCC, aPCC only
Direct Thrombin Inhibitors Argatroban (Acova) Bivalirudin (Angiomax/Angiox)	4-5 hours	PTT, plasma-diluted thrombin time	No reversal agent approved. Discontinue therapy. Supportive care
Oral Direct Thrombin Inhibitor Dabigatran (Pradaxa)	2.5-3.5 days	Prolonged PTT shows presence only (normal PTT excludes drug)	Idarucizumab (Praxbind)
Antiplatelet Agents Aspirin Clopidogrel (Plavix) Ticagrelor (Brilinta) Ticlopidine (Ticlid) Eptifibatide (Integrilin)	2 days 2-3 weeks 2 days 4-5 days 20-24 hours		No direct reversal agents currently exist. 1-deamino-(8-D-arginine) vasopressin (DDAVP) may be useful. Platelet transfusion cannot be recommended for routine use. ⁴²

*Anticoagulation is considered to have resolved fully after 5 half-lives of the drug have elapsed, given normal renal function.

- Consider prophylactic doses of easily reversible anticoagulants before reintroducing the full therapeutic dose of DOAC in patients with high thrombosis risk.
- Consider the specific trauma and procedures performed, which vary in risk of subsequent hemorrhage. Immobility heightens the hypercoagulable state, and delays in ambulation may be a reason to consider interim anticoagulation.

The American Heart Association recommends hospitals adopt multidisciplinary DOAC reversal and perioperative management protocols.⁴³

Cardiac Stents: In cases of surgery within 6 weeks of bare-metal coronary stent placement, the American College of Clinical Pharmacy recommends continuation of clopidogrel in the perioperative period.⁴⁴ For surgery within 12 months of drug-eluting coronary stent placement, continuation of aspirin and clopidogrel in the perioperative period is recommended.

Mechanical Heart Valves (MHVs): MHVs are a high-risk indication for lifelong anticoagulation. A systematic review of early postoperative anticoagulation revealed that after aortic valve replacement, the risk of thromboembolic events falls from 16 per 100 patient years in the early postoperative period to 1.4 per 100 patient years at 5 years postoperative. Similarly, after mitral valve replacement, the risk falls from 21 per 100 patient years to 2.5 per 100 patient years.⁴⁵

Antiphospholipid Disease: Patients with recurrent thromboembolic events are high-risk and require the resumption of anticoagulation. Bridging therapy such as intravenous or low-molecular-weight heparin may be used until full anticoagulation is considered safe.

Atrial Fibrillation (AF): Well-established risk prediction tools, including the CHA₂DS₂-VASc and HAS-BLED scoring tools, are available to assist with the anticoagulation risk/benefit calculation.

Falls: If a fall was the mechanism of injury, assessment by a fall specialist or physical therapist is recommended prior to renewal of anticoagulation. The risk of recurrent fall injury and bleeding must be weighed against the risk of the medical condition necessitating anticoagulation. Initiation of one of several evidence-based fall-reduction interventions is suggested to reduce the risk of future falls. Man-Son-Hing, et al. used a Markov decision analytical model to determine the optimal anticoagulation strategy for older adults with AF and risk of falling.⁴⁶ Among patients with AF and at average risk of stroke and falls, warfarin therapy was associated with 12.90 quality-adjusted life-years, aspirin therapy with 11.17 years, and no therapy with 10.15 years.⁴⁶ For the risks of warfarin therapy to outweigh the benefits among patients with AF who fall, the risk of subdural hematoma must be 535 times greater than the risk among those who do not fall. In their model, the average person over 65 years had 1.81 falls a year, so it was estimated that a person taking warfarin would need to fall 295 times in one year before warfarin was not regarded as the optimal therapy.⁴⁶

Intracranial Hemorrhage (ICH): No randomized trial evidence exists to guide anticoagulation resumption in ICH patients. The European Stroke Initiative suggests starting with a review of the indication for anticoagulation and that oral antithrombotic therapy may be restarted 10–14 days postoperative, depending on the perceived risk of thromboembolic occlusion and intracranial bleed recurrence.⁴⁷ Albrecht, et al. demonstrated that despite increased risk of hemorrhage, a net benefit for TBI patients favored anticoagulation due to reduced risk of stroke, however, median time to anticoagulation resumption was 31 days.⁴⁸ Retrospective studies also reported that anticoagulation resumption was associated with fewer ischemic events.^{49,50}

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SYNCOPE

KEY POINTS

- The etiology of syncope in older adults can include reflex-mediated causes, orthostatic hypotension, arrhythmia, structural disease of the heart, or cardiopulmonary abnormalities.
- A best practice for older adults presenting with syncope and a serious traumatic injury is hospital-based evaluation and treatment.

Syncope is an abrupt, transient, complete loss of consciousness (LOC) associated with rapid and spontaneous recovery. Older adults are more vulnerable to syncope and associated falls because of age-associated cardiovascular and autonomic changes, decreased fluid conservation, multiple comorbidities, and associated pharmacological therapies. The following are three major categories of true syncope:

- Reflex-mediated, or vasovagal, syncope has an incidence of 21% and occurs due to vasodilation, bradycardia, or both reducing blood flow to the brain.¹ The reflex can be triggered by exposure to emotional stress or pain, stimulation of the carotid sinus, or specific actions such as micturition, defecation, coughing, swallowing, or laughing.
- Orthostatic hypotension syncope has an incidence of 9%. It is a decrease in blood pressure when moving from a sitting to an upright posture (systolic decrease > 20 mm Hg, or diastolic decrease > 10 mm Hg).¹
- Cardiac syncope has an incidence of 9% and results from arrhythmia, structural disease of the heart, or cardiopulmonary abnormalities (e.g., pulmonary hypertension, blood flow obstruction, vasodilation, or acute vascular dissection).¹ Older adults have an increased probability of cardiac syncope, which has a significantly worse prognosis than neurally mediated syncope.

The cause of syncope is unknown in up to 37% of patients.¹⁻³ Other causes for transient LOC include seizures, sleep disturbances, intoxication, psychogenesis, transient ischemic attacks, and hypoglycemia.

Initial Evaluation

During the history, focus on the situations in which syncope occurs, prodromal symptoms, medication use, and comorbidities such as preexisting cardiovascular disease. Specific areas on which to focus during the physical exam include:

- Orthostatic vital signs
- Heart sounds to evaluate for possible structural heart disease
- A basic neurological exam to identify focal deficits suggesting a need for further neurological evaluation
- In the absence of a focal deficit, no further inpatient neurological workup is recommended, including carotid artery imaging.^{1,2,4}

An ECG can help identify a cause of syncope, and transthoracic echocardiography can be useful if structural heart disease is suspected.^{1,5} For patients expected to undergo a surgical procedure, the recommended practice is a preoperative transthoracic echocardiography.

Risk Assessment

Syncope may be a manifestation of serious underlying disease. Perform risk stratification during the initial evaluation to differentiate older adults with high-risk cardiovascular conditions that require urgent investigation from those with low-risk conditions that can be evaluated as an outpatient.⁵ The Risk Stratification of Syncope in the Emergency Department (ROSE) and the San Francisco Syncope Rule are two commonly cited scoring systems used to predict adverse outcomes after syncope.³ Affected older adults can be classified as being at low or high risk of serious outcomes and mortality based on triggers, signs, symptoms, and comorbidities (see Box 2).

Box 2. Low- and High-Risk Factors of Serious Outcomes and Mortality Associated with Syncope

Low Risk	High Risk
<ul style="list-style-type: none"> • Prodrome (light-headedness, sweating, nausea) • Preceded by a painful or emotionally distressing stimulus • After prolonged standing • During a meal or postprandial • Triggered by cough, urination, or defecation • Carotid sinus pressure or head rotation • Orthostasis • Absence of structural heart disease • Normal physical examination • Normal ECG 	<ul style="list-style-type: none"> • Chest discomfort, dyspnea, abdominal pain, headache • During exertion • Palpitations • No warning symptoms or prodrome • Family history of sudden cardiac death • While in sitting or supine position • Structural cardiac disease • Coronary artery disease • Systolic BP < 90 in ED • Persistent bradycardia • Undiagnosed systolic murmur • Abnormal ECG • History of pulmonary hypertension • History of implantable cardioverter defibrillator (ICD) • Anemia, Hgb < 9 g/dL • Brain or B-type natriuretic peptide > 300 pg/mL

Patient Disposition

Further evaluation of syncope can be performed during inpatient or outpatient care. Hospital-based evaluation is selected to expedite the treatment of identified serious conditions or to continue the diagnostic evaluation if a presumptive cause of syncope is unknown. Many diagnostic procedures used to search for the cause of syncope are expensive and have a low yield unless findings from the history or physical examination suggest a particular cause.²

Hospital-based evaluation and treatment are a best practice for patients presenting with syncope and a serious medical condition, such as a traumatic injury. See Box 3 for other examples of serious medical conditions that warrant inpatient workup. After ruling out serious medical conditions, patients with reflex-mediated syncope can have outpatient evaluation, because hospital-based evaluation for this group of older adults is unlikely to improve long-term outcomes. In older adults with a suspected cardiac etiology, inpatient telemetry can be a valuable diagnostic modality, especially with high suspicion of an arrhythmic cause, but the diagnostic yield is low.¹

Box 3. Conditions Indicating Importance of an Inpatient Syncope Workup

Cardiac Arrhythmia Conditions	Cardiac or Vascular Conditions (Nonarrhythmia)	Noncardiac Conditions
<ul style="list-style-type: none"> • Ventricular tachycardia • Conduction system disease • Bradycardia or sinus pauses • Supraventricular tachycardia • Pacemaker or ICD malfunction • Predisposition to arrhythmias 	<ul style="list-style-type: none"> • Myocardial ischemia • Critical aortic stenosis • Cardiac tamponade • Hypertrophic cardiomyopathy • Prosthetic valve dysfunction • Pulmonary embolism • Aortic dissection • Acute heart failure • Moderate to severe left ventricular dysfunction • Elevated cardiac enzymes 	<ul style="list-style-type: none"> • Anemia • Gastrointestinal (GI) bleeding • Major traumatic injury due to syncope • Persistent vital sign abnormalities

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NEUROLOGICAL COMORBIDITIES

KEY POINT

- Preexisting neurological disorders may complicate the initial evaluation of the trauma patient, especially if the patient's medical history is unknown.

Older adults are disproportionately affected by neurological disorders such as cerebrovascular disease, dementia, movement disorders, epilepsy, and brain neoplasms.¹ Age-associated remodeling of the immune system and vascular aging contribute to frailty and vulnerability in the older adult, and these are implicated in the pathophysiology of major chronic comorbid conditions in both the CNS (stroke, Parkinson's disease, and Alzheimer's disease) and peripheral nervous systems (polyneuropathy).² See Box 4 for potential neurological comorbidities that may cloud the initial evaluation of a trauma patient.

Box 4. Neurologic Comorbidities

- Malignant or benign tumors
- Seizure disorders
- Developmental disorders (Down syndrome)
- Movement disorders (Parkinson's, multiple sclerosis)
- Dementia (Alzheimer's)
- Stroke
- Neurological infections
- Previous trauma to the brain or spinal cord

Psychiatric comorbidities such as mood and anxiety disorders often co-occur with common neurological comorbidities.^{1,3} Preexisting neurological disorders may complicate initial evaluation of the trauma patient, especially if the patient's medical history is unknown.

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PULMONARY COMORBIDITIES

KEY POINTS

- Judiciously administer resuscitation fluids to trauma patients with chronic obstructive pulmonary disease (COPD).
- When patients with pulmonary artery hypertension (PAH) require surgery, perform it at a center proficient in the treatment of patients with PAH.

Chronic Obstructive Pulmonary Disease

Overall pulmonary function deterioration and lifelong exposures to risk factors predispose older adults to pulmonary diseases such as COPD. COPD is highly associated with other geriatric syndromes and can co-occur with physical function impairment, cognitive decline, and depression.¹ Poor pulmonary function can be further compromised by traumatic injury as a result of pain, rib fractures, TBI, or physical injuries that limit mobility and rehabilitation potential.

During the history and physical examination, identify the severity of baseline disease; home use of medications, inhalers, and oxygen; and baseline performance status. Access to prior pulmonary function tests (and a preinjury room-air arterial blood gas study, if available) helps with understanding a patient's baseline function. Consider baseline hypoxia or hypercarbia when interpreting arterial blood gas results.

Judiciously administer resuscitation fluids to patients with COPD who have traumatic injury. Continue home medications or resume them as soon as possible, including oral medications and breathing treatments. Scheduled respiratory therapy assessments and treatments can aid patient recovery. Patients with acute COPD exacerbation may also benefit from antibiotics, steroids, or noninvasive ventilation,¹ although risks and benefits must be considered. Investigate the cause of acute respiratory failure (e.g., reduced ventilatory capacity, muscle weakness, reduced cardiac output, or a complication such as pneumonia, pulmonary embolism, or medication-related adverse events). When planning extubation after mechanical ventilation is used, a lower target oxygen saturation or higher carbon dioxide level may be acceptable.

Pulmonary Artery Hypertension

PAH is a progressive condition that leads to right ventricular dysfunction and right heart failure. PAH syndrome is defined as a mean pulmonary artery pressure exceeding 25 mm Hg with a pulmonary capillary wedge pressure \leq 15 mm Hg.^{2,3} PAH can occur at all ages but is more common in older adults. Recent data suggest that PAH is occurring more frequently among older adults, who may have a more advanced disease stage at diagnosis.⁴

Physiologic changes resulting from aggressive resuscitation and fluid shifts can be dangerous and precipitate right ventricular decompensation and right heart failure. Clinically, right heart failure is diagnosed with a reduced cardiac output (< 2.5 L/min/m²) and elevated right ventricular filling pressure. Echocardiography is a useful bedside adjunct to assess pulmonary arterial pressures and evidence of right heart failure. While invasive monitoring with a pulmonary artery catheter is rarely used, it may provide useful information for a decompensating patient. Treat any arrhythmias, and reduce afterload to ease stress on the heart. Coordinate care with a heart failure team to evaluate the patient and determine a comprehensive care plan.

The American College of Chest Physicians recommends that patients with PAH avoid unnecessary surgery. For patients with PAH who require surgery, perform it at a center proficient in the treatment of patients with PAH.³

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RENAL COMORBIDITIES

KEY POINT

- Promptly evaluate the patient with acute kidney failure to identify reversible causes, change medication doses, and initiate discussions about renal replacement therapy (RRT).

Acute Kidney Injury

Acute loss of kidney function is common in geriatric trauma patients. It can be attributable to causes such as hypovolemia or hemorrhagic shock, nephrotoxic medications, rhabdomyolysis, or sepsis. AKI leads to the accumulation of metabolic waste products and the dysregulation of electrolyte and fluid homeostasis. For the geriatric trauma patient, AKI is associated with fluid overload and resultant pulmonary dysfunction, altered mental status from uremia, and severe electrolyte and acid-base abnormalities.

Two common classifications of AKI are the RIFLE (Risk, Injury, Failure, Loss, End-stage) and AKIN (Acute Kidney Injury Network) criteria (see Table 7).¹⁻³ Promptly evaluate the older adult to identify reversible causes, change medication doses, and initiate discussions about RRT.⁴ Urine electrolytes can help distinguish between prerenal and intrinsic renal causes of AKI. Once the AKI diagnosis is established, medications and doses are selected in consultation with pharmacists. Avoid nephrotoxic medications, or follow therapeutic levels in cases of fluctuating renal function. Carefully consider the risks and benefits of nephrotoxic medications such as nonsteroidal anti-inflammatory drugs (NSAIDs), high-dose loop diuretics, and aminoglycosides.

Table 7. Two Classifications of AKI Criteria

	Stage	Serum Creatinine Criteria	Urine Output Criteria
RIFLE	Risk	1.5 times baseline OR glomerular filtration rate (GFR) decrease > 25%	Urine output < 0.5 mL/kg/h for 6 hours
	Injury	2 times baseline OR GFR decrease > 50%	Urine output < 0.5 mL/kg/h for 12 hours
	Failure	3 times baseline OR > 4.0 mg/dL OR GFR decrease > 75%	Urine output < 0.3 mL/kg/h for 24 hours OR anuria for 12 hours
	Loss	Complete loss of kidney function for > 4 weeks	
	End-stage	End-stage kidney disease for > 3 months	
AKIN	1	1.5-1.9 times baseline OR ≥ 0.3 mg/dL increase from baseline	Urine output < 0.5 mL/kg/h for 6-12 hours
	2	2.0-2.9 times baseline	Urine output < 0.5 mL/kg/h for ≥ 12 hours
	3	3.0 times baseline OR ≥ 4.0 mg/dL OR initiation of RRT OR in patients ≤ 18 years old, decrease in estimated GFR to < 35 mL/min per 1.73 m ²	Urine output < 0.3 mL/kg/h for ≥ 24 hours OR anuria for ≥ 12 hours

Data from: Khwaja A. KDIGO clinical practice guidelines for acute kidney injury. *Nephron Clin Pract.* 2012; 120(4): c179-184; Mehta RL, Kellum JA, Shah SV, et al. Acute Kidney Injury Network: report of an initiative to improve outcomes in acute kidney injury. *Crit Care.* 2007; 11(2): R31; Bellomo R, Ronco C, Kellum JA ... Acute Dialysis Quality Initiative workgroup. Acute renal failure - definition, outcome measures, animal models, fluid therapy and information technology needs: The Second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group. *Crit Care.* 2004; 8(4): R204-212.

For patients needing long-term RRT, access via the jugular vein is preferred. Subclavian veins carry a risk of central stenosis. For patients who may be kidney transplant candidates, avoid the femoral veins. Life-threatening indications for emergent RRT include hyperkalemia, acidemia, pulmonary edema, and complications of uremia (e.g., bleeding). Nonemergent RRT can be performed for electrolyte and acid-base abnormalities, volume control, and fluid removal. It is currently unknown if the timing of RRT initiation affects long-term clinical outcomes. For patients with acute bleeding risk, impaired coagulation, or systemic anticoagulation for other reasons, consider holding anticoagulation for RRT. Continuous RRT is recommended for hypotensive or unstable patients.

Dehydration

Dehydration is multifactorial in etiology and can be attributed to age-related changes in total body water, thirst perception, altered renal function, recent vomiting or diarrhea, illness, altered mental status, or environmental changes (e.g., lack of electricity or air conditioning on a hot day). Dehydration is common among nursing home residents, and elder abuse or neglect can also be a contributor. Dehydration is commonly associated with diagnoses such as pneumonia and UTIs. It can also be a red flag of failure to thrive. About 20% of elderly Medicare patients hospitalized with a principle diagnosis of dehydration die within 30 days of admission, and 30% more die in the subsequent 11 months.⁵

For trauma patients in whom dehydration is a contributor for admission, treat the traumatic injury as well as the underlying cause of dehydration. Perform a frailty assessment, consider a home safety evaluation, and discuss advanced directives, as appropriate.⁶

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INFECTION COMORBIDITIES

KEY POINTS

- Determine if an older adult has an infection during the initial admission evaluation.
- The geriatric patient is at high risk for nosocomial infections.

For geriatric trauma patients, infection-related conditions are potentially life-threatening and could be the causal factor behind trauma-related injuries (e.g., a GLF can be precipitated by a UTI). Determine if an infection is present during the initial admission evaluation. Cultures at admission can guide antibiotic therapy. For patients with a history of hospital admission, review prior cultures to help select empiric antimicrobial regimens.

The older adult is at high risk for nosocomial infections. The most commonly recognized nosocomial infectious diseases are pneumonia and UTI, although other infections are possible (e.g., bloodstream infection, intraabdominal infection, endocarditis, empyema, and soft tissue infections).¹⁻⁶

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SUBSTANCE USE

KEY POINTS

- Obtain a substance use history as soon as possible after trauma center arrival to guide the assessment and treatment plan.
- Use evidence-based tools to closely monitor a geriatric trauma patient with identified substance use for complications from acute intoxication and/or withdrawal (e.g., delirium).
- Focus screening to identify substance use disorders, including high-risk use, binge alcohol use, and prescription drug misuse.
- Provide brief interventions based in motivational interviewing and other person-centered approaches that are nonjudgmental and nonconfrontational.

Substance use by older adults is described as an invisible epidemic. Factors include ageism, patients and caregivers minimizing substance use, healthcare providers overlooking substance use, and mistaking indicators of substance use for comorbid issues (e.g., depression, dementia).¹ In prior generations, older adults generally had a lower incidence and prevalence of problematic substance use than younger populations; however, substance use rates among older adults increased as the baby boomer cohort moved into older adulthood.² Substance use problems in older adults can have significant physical and mental health consequences. Substance use can be an injury risk factor (e.g., falls, MVCs)³ and a complication for treatment and recovery.

Geriatric trauma patients may have chronic patterns of substance use from early in life, or underlying psychiatric or psychosocial stressors may have led to increased substance use over their lifetime. Older adult substance use demographic factors include being male, Caucasian, younger, and having more financial resources.² Psychosocial risk factors include bereavement, retirement, homelessness, social isolation, and not being married.² When an older adult is experiencing acute intoxication or withdrawal upon arrival to the trauma center, the clinical assessment of mental status is often more difficult.

Alcohol

Alcohol is the most frequently used substance by older adults. The rate of alcohol use among older adults increased 22.4% between 2001 and 2013.⁴ High-risk alcohol use increased by 65.2%.⁴ Alcohol use disorders (drinking alcohol in a disordered pattern) increased by 106.7%.⁴ Risk factors for binge consumption patterns include Latino heritage, current smoking status, and concurrent illicit drug use.⁴ Risk factors for an alcohol use disorder include current smoking status, concurrent illicit drug use, and depression.⁴ General risk factors for alcohol use problems include male gender, loss of spouse, other losses (e.g., retirement), family history of alcohol use problems, and comorbid psychiatric disorders.¹

Even small amounts of alcohol can impact older adults by increasing risk for falls, MVCs, and other unintentional injuries. Irrespective of gender, older adults who exceeded the National Institute of Alcohol Abuse and Alcoholism (NIAAA) recommended daily and/or weekly drinking limits were more susceptible to nonfatal fall injuries than those who never consumed alcohol.³

Marijuana

Marijuana use is increasing in older adults, and it is the second-most frequently used substance.² Marijuana use can be associated with memory impairment and increased cardiovascular risks (e.g., increased heart rate, increased blood pressure). Because of the potential for marijuana interaction with other medications, assess whether it is used and counsel the patient on potentially harmful interactions.

Methamphetamine

While many trauma centers have noted an increased use of methamphetamine in all age groups, no good data exist specifically on methamphetamine use and trauma outcomes in the geriatric trauma patient. A 2007 study found that patients testing positive for methamphetamine use had increased ICU admission and increased length of hospital stay.⁵ More studies are needed to evaluate the outcomes and effects of this drug on older adults.

Other Drugs

A review of recreational and nonmedical drug use found that the baby boomer cohort uses more drugs than prior older adult cohorts.⁶ Some older adults use opioids/heroin, cocaine, and marijuana, with the majority also concurrently using alcohol.⁶ Between 1992 and 2005, heroin and cocaine use were the most common drugs associated with older adults seeking substance use treatment.⁷ Research on the nonmedical use of prescription opioids in older adults is limited.⁶ Older adults may not decrease drug use as they age, and significant comorbid physical, psychological, and cognitive impacts are associated with chronic drug use.⁸ Geriatric trauma patients who use drugs like cocaine, heroin, or methamphetamine often require additional resources during their hospitalization.

Prescription Drug Misuse

Older adults have higher rates of medication use and are at risk for inappropriate use, which may occur unintentionally.^{1,9,10} Medications originally prescribed to older adults for a medical purpose may become misused or abused to manage problems with sleep, pain, or depression (e.g., benzodiazepines for anxiety and insomnia, opioids for pain management). Older adults may have medications prescribed by multiple providers, increasing the risk for dangerous drug interactions. Risk factors for misuse or abuse of prescription drugs may include female gender, major social or economic losses, and history of psychiatric and/or substance use problems.^{1,2}

Older adults may also be at increased risk for opioid use disorder due to the population's higher prevalence of pain and pain-related medical encounters. If an older trauma patient is identified to have long-term prescription opioid use, utilize consulting services to address pain management and/or underlying psychiatric conditions in the context of the trauma admission.

Screening and Assessment

Trauma centers are required to screen for alcohol use problems and provide brief intervention. Please see the *ACS TQP Best Practices Guidelines for Screening and Intervention for Mental Health Disorders and Substance Use and Misuse in the Acute Trauma Patient* for additional information on screening and assessment.¹¹

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PSYCHIATRIC COMORBIDITIES

KEY POINTS

- Use well-established screening tools, including instruments designed for older adults, to identify psychosocial comorbidities.
- Screen older adults for psychiatric comorbidities using sensitive communication skills, keeping in mind that they may be less likely to endorse psychiatric or substance use problems due to stigma or other reporting barriers.
- A lack of social support and/or social isolation is one of the greatest risk factors for psychiatric comorbidities.

Psychiatric Illness

The rate of psychiatric illnesses generally decreases with age.¹ While psychiatric illness is less prevalent in older adults, behavioral health problems in this population have significant consequences, including high suicide risk, decreased functioning, chronic illness, and self-neglect.²

The most common psychiatric disorders in older adults are depression, mood disorders, and anxiety disorders.³ Gender differences in psychiatric illness were noted in older adults up to age 85. Women have a higher prevalence of mood and anxiety disorders, while men have a higher prevalence of substance use and personality disorders.⁴ Older adults can also experience subclinical symptoms of psychiatric illness that can interfere with trauma care and recovery.

Depression

Depression in older adults carries significant risks, including increased morbidity, mortality, and suicide risk, as well as decreased functioning. Older women and individuals in long-term care facilities are more likely to be depressed. An estimated 50% of geriatric major depressive disorder cases have a late-life onset (60 years or older).² Late-life onset may be due to changes in the brain, medical illness, and/or reactions to life events (e.g., illness, impairment).

Medical illness and health problems are significant contributors to depressive symptoms in geriatric patients.⁵ Geriatric trauma patients may have premorbid depressive symptoms and/or develop symptoms as a result of their injury, associated impairments, loss of independence, and

loss of autonomy. Depression is a common secondary condition in older adults with TBI, and it is associated with poorer outcomes.⁶

Geriatric trauma patients who are no longer able to live independently, either temporarily or permanently, may grieve for these functional losses. One injury may take “everything away” from older adults who were previously fully independent. Providers need to offer inpatient supportive counseling and behavioral health referrals for both the patient and their caregivers to assist with this difficult adjustment. Simple validation of difficulties associated with adjusting to these sudden changes can facilitate conversation with patients and families.

Suicide

The highest rates of suicide occur in older adults, particularly in older men.⁷ The baby boomer cohort has higher suicide rates than previous birth cohorts.⁸ Suicide is more likely related to depression among older adults than among any other age group. Older adults use more lethal means for suicide, often engaging in more planning and less verbalization of suicidal ideation. Up to 70% of older adults aged 55 years and older who die by suicide visited their primary care physician within a month of death.³

Acute and Posttraumatic Stress Disorders

Older adults have a significantly lower prevalence of posttraumatic stress disorder (PTSD) and trauma-related stress reactions compared with younger cohorts.⁹ However, older adults may experience symptoms of posttraumatic stress after injury, including in response to traumatic events not typically associated with PTSD, such as falls.¹⁰ Older adults may have experienced traumatic events earlier in life (e.g., military trauma, childhood trauma) that may impact how they cope with new trauma. Older adults with TBI may be more likely to experience PTSD.¹¹

Anxiety

While research is limited, the prevalence of anxiety disorders decreases with age.^{4,12} Anxiety was reported to be highly comorbid with depression in geriatric populations.³ This suggests the importance of assessing hospitalized patients for anxiety.

Screening

Please see the *ACS TQP Best Practices Guidelines for Screening and Intervention for Mental Health Disorders and Substance Use and Misuse in the Acute Trauma Patient* for information about screening older adults.¹³

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OTHER PSYCHOSOCIAL ISSUES

KEY POINTS

- Assess geriatric patients for elder abuse and neglect.
- Promote resilience in older adults with resources and referrals to maintain activity and social connectedness.

Interpersonal Violence

Refer to the *ACS TQP Best Practices Guidelines for Trauma Center Recognition of Child Abuse, Elder Abuse, and Intimate Partner Violence* for management of concerns related to interpersonal violence targeted to older adult trauma patients.¹

Resilience

Most older adults are resilient after trauma. Several key factors in older adult resilience include adaptive coping, optimism, hopefulness, positive emotions, social support, independence, and physical activity.² Older women may be more resilient than older men because of their adaptability to lifetime adversity and increased social connectedness.¹ Help bolster resilience by promoting these buffering factors and providing resources and referrals to maintain activity and socialization. Assess the geriatric patient's support structure early in the care process, and assess and identify psychological needs, spiritual and/or religious beliefs, cultural identity, and other strengths. Addressing these factors can influence care and bolster patient and family resiliency.³

Social Support: Social support is widely accepted as a primary factor of health, and resilience in combination with perceived social support is associated with positive physical and behavioral health outcomes, especially after trauma.^{1,3} In contrast, social isolation and disconnectedness are associated with negative health outcomes after trauma. Older adults may have challenges with social connectedness due to age-related circumstances such as retirement, bereavement, and functional limitations.⁴

Make an effort to facilitate expanded social support of older adult patients. Provide education to the patient and family regarding the importance of social support for patient recovery. Provide resources and referrals to organizations that can help older adults maintain social connectedness. Ask if social work and care management teams can contribute to the development and provision of these resources and referrals. Investigate how hospital- and community-based supports may be directed toward vulnerable populations, including older adults who are experiencing homelessness and/or have premorbid functional impairments.

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BEST PRACTICES GUIDELINES
**GERIATRIC TRAUMA
MANAGEMENT**

A close-up, low-angle shot of a hand in a white glove pouring white, round pills from a blister pack into a pill tray. The scene is dimly lit with a blue tint. The pills are scattered on the dark surface of the tray. The background is dark and out of focus.

MEDICATION MANAGEMENT

PAIN CONTROL

KEY POINTS

- When planning injury pain management, consider an older adult's potential for pain related to coexisting illness and other causes of underlying pain.
- Consider the age-related physiologic changes that affect an older adult's ability to self-report pain, as well as to respond to pain and pain management medications.
- Use an opioid-sparing multimodal strategy to manage pain in older adults, including medications, regional analgesia, complementary physical therapies, and cognitive strategies.

Pain treatment in the geriatric patient is complicated by the presence of coexisting illness, use of concomitant medications, cognitive decline, and depression. Many older adults have a degree of chronic pain that can impair ADLs and ambulation and contribute to underlying depression.¹ Pain may be further exacerbated by deconditioning, gait abnormalities, or injury. Older adults often have several causes of underlying pain even before being injured, including the following:^{2,3}

- Nociceptive pain occurs from actual or threatened tissue damage, such as osteoarthritis.
- Central neuropathic pain may result from damage to the central somatosensory nervous system by conditions such as Parkinson's disease, post-stroke myelopathies, or spinal stenosis.
- Peripheral neuropathic pain may occur from conditions such as postherpetic neuralgia, diabetes, alcoholism, or nerve compression or entrapment.

A complete medical history, including prescription medications, over-the-counter medications, and herbal supplements, is essential to avoid potentially harmful drug-drug interactions.

Assessment

Pain assessment in the adult often focuses on pain presence and the degree of pain. Self-report is the most valid and reliable indicator of pain; however, it may be necessary to ask the older adult about pain in different ways.⁴ Allow time for the older adult to process the question and formulate

an answer. Sensory impairments are common in the older adult, so adjustments such as an enlarged pain assessment tool or better lighting are helpful.

Assess older adults with intact cognitive skills using well-known tools such as a numeric rating scale, the Visual Analogue Scale, and the Defense and Veterans Pain Rating Scale.⁵ Older adults with cognitive impairment from dementia, stroke, and movement disorders have more difficulty communicating their degree of pain. For those with mild dementia, the Numeric Rating Scale and verbal descriptors remain useful for pain assessment. The American Society for Pain Management Nursing recommends a hierarchical pain assessment approach in nonverbal patients:^{6,7}

- Attempt to obtain a self-report of pain
- Look for an underlying cause of pain
- Observe for pain behaviors
- Seek input from family and caregivers

Pain behaviors include guarding, rubbing the affected part, grimacing, and noises or words indicating pain.⁸ While vital sign elevations are not considered a reliable indicator of pain, they may indicate a need for a pain assessment.⁹

To assess patients with severe cognitive impairment, the United Kingdom National Guidelines recommend the use of either the Pain Assessment in Advanced Dementia (PAINAD) scale or DoloPlus-2.^{4,10,11} Other scales for patients with advanced dementia include the Mobilization-Observation-Behaviour-Intensity-Dementia (MOBID-2) Pain Scale and the Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC).^{12,13} The MOBID-2 assesses pain related to the musculoskeletal system and from the internal organs, head, and skin. It demonstrated sensitivity in measuring the effects of pain treatment.¹⁴

Medications in the Aging Population

Treat the older adult with an opioid-sparing multimodal strategy, using pharmacologic methods, regional analgesia, and complementary physical and cognitive strategies. The oral route of administration is preferred, and intramuscular injections are avoided. Because of the propensity for constipation in the older adult, any multimodal strategy requires the use of a prophylactic bowel regimen.

Treat underlying depression that can worsen the perception of pain. Delirium, a significant risk in the older adult, may result not only from medications used for pain treatment but also from inadequate pain treatment. The American Geriatric Society (AGS) Beers Criteria identifies potentially inappropriate medications to avoid in the older adult, both in most circumstances and in the presence of specific diseases or conditions.¹⁵ Many medications used for pain management are included on this list. Because of physiologic changes, the older adult may have exaggerated responses to medications and require adjusted dosing.

The following medications provide the backbone of a clinician's pain management strategy in the older trauma patient. Each has potential drawbacks when used in the elderly.

Acetaminophen: Acetaminophen is most effective for injury pain when used as a scheduled medication, but hepatic toxicity is a risk. A total dose of 4 grams per day may be considered for short-term use. Clearance is reduced with aging, and a maximum of 2 grams per day is suggested beginning at age 80 years. A lower total daily dose (2 g/day) or avoidance is also recommended for patients at increased risk of hepatotoxicity, including those with liver dysfunction, heavy alcohol use, malnutrition, low body weight, febrile illness, and use of cytochrome p450-inducing drugs.^{16,17} Ensure that patients are aware that several over-the-counter medications contain acetaminophen.

NSAIDs: NSAIDs are known to have increased side effects in the older adult. Limit the length of NSAID courses, and use the lowest effective dose. Avoid NSAIDs in older adults with stage 3 chronic kidney disease (creatinine clearance < 50 mL/min), GI bleeding, platelet dysfunction, reduced cardiac output, hypovolemia, hyponatremia, hepatic impairment, or anticoagulation.¹⁵ Traditional NSAIDs reversibly inhibit platelet functioning and may alter the cardioprotective effects of aspirin. Their use with selective serotonin reuptake inhibitor (SSRI) antidepressants decreases platelet function in an additive manner. An increased risk of gastropathy is present, and pharmacologic gastroprotection is indicated.¹⁵ Because of age-related changes in renal function, NSAIDs can cause or worsen renal insufficiency. COX-2 selective agents are not associated with platelet dysfunction, but the patient may need gastroprotection if on concurrent low-dose aspirin.

Gabapentinoids: Gabapentin and pregabalin are effective treatments for neuropathic pain, but sedation and dizziness may limit their usefulness in the frail older adult. Because of delayed onset, gradual titration over weeks is recommended to improve tolerability and avoid the risk of oversedation and overdose. Because elimination is entirely through the renal system, dosing will require adjustment in patients with renal impairment.

Muscle Relaxants: Patients with muscle spasm may benefit from a muscle relaxant such as cyclobenzaprine, methocarbamol, or diazepam. Most muscle relaxants are poorly tolerated by older adults, because some have anticholinergic adverse effects, can cause sedation, and can increase risk of fractures. Their effectiveness at dosages tolerated by older adults is questionable.¹⁵ Closely monitor the patient if used.

Opioids: Older adults are more susceptible to opioid-induced side effects, including respiratory depression, hypotension, delirium, constipation, and excessive sedation. With advancing age, opioids are associated with a prolonged half-life and prolonged pharmacokinetics. Especially in opioid-naïve patients, begin with low initial doses and titrate gradually to decrease the risk of overdose. Compared with dosing for a healthy adult, decrease the initial dose by 25% in 60-year-old patients and by 50% for 80-year-old patients, while administering at the same intervals.¹⁸ Oral opioid administration is preferred over parenteral opioid administration.

For additional information on pain management in the older adult, please see the *ACS TQP Best Practices Guidelines for Acute Pain Management in Trauma Patients*.⁵

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MEDICATIONS AND MEDICATION RECONCILIATION

KEY POINTS

- Compile a complete list of all medications taken by an older adult from the individual, a family member, the primary care provider, or the living facility.
- Use the Beers Criteria to review all medications an older adult usually takes to identify those with higher risk for adverse effects and to reduce polypharmacy.
- Perform this review on admission, and reevaluate medications prescribed during hospitalization.

The incidence and severity of traumatic injuries in older adults is associated with comorbidities, substance abuse, and polypharmacy.^{1,2} Multiple studies identified associations between preinjury medications and subsequent morbidity and mortality after trauma.²⁻⁴ Preadmission psychotropic medications, medications with anticholinergic properties,

and benzodiazepines are known to be associated with delirium.⁵ Use of medications listed within the Beers Criteria is prognostic for increased hospital admissions and LOS.^{3,4,6}

The Beers Criteria provides a guideline for medication review, which can be effective in decreasing the risk for medication-related adverse events in older adults.⁶⁻⁸ When time is limited, a dedicated trauma team member, such as a pharmacist or geriatrician, could facilitate the formal medication review to help reduce polypharmacy and high-risk medication use, as well as assist in the provision of quality care to older adults.

Because older adults are at particular risk for adverse medication events, completion of a medication review is recommended at admission, with reevaluation throughout the hospitalization. See Table 8 for guidelines to perform general medication reconciliation.

Table 8. Guidelines for General Medication Reconciliation

General Medication Reconciliation Recommendations	Additional Guidance
Establish an accurate preadmission medication list, including over-the-counter and complementary/alternative medications.	Consider contacting the patient’s immediate family, living facility/group home, outpatient pharmacy, or primary care physician to aid in obtaining a current medication list when the patient is unable to provide it.
Use the Beers Criteria to guide decision-making about pharmacotherapy.	See Box 8 for medications associated with fall risk..
Clarify home medications with instructions for use as “prn.”	Ask what “prn” means to the patient; some patients may be using prn medications daily and scheduled.
Continue or taper medications with withdrawal potential, including SSRIs, serotonin and norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants (TCAs), chronic benzodiazepines, chronic narcotics, anticonvulsants, antipsychotics, monoamine oxidase inhibitors (MAOIs), clonidine, and corticosteroids.	Make sure to restart these medications as soon as possible if any are held for surgery.
Avoid starting a new benzodiazepine during hospitalization.	Prescribe a new benzodiazepine, as appropriate, when certain medical situations exist or arise (e.g., seizure disorders, benzodiazepine withdrawal, ethanol withdrawal, and periprocedural anesthesia).
Use nonopioids early for pain control.	Please see the Pain Control section on page 46 for further details.
Continue a beta blocker or start one, if indicated.	
Continue statins where appropriate.	
Adjust doses of medications for renal function based on GFR.	
Include the diagnosis for antibiotic therapy and identify start/stop dates.	
Clarify anticoagulation status in all patients.	Please see the Anticoagulation Assessment and Reversal section on page 27 for further details.

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BEST PRACTICES GUIDELINES
**GERIATRIC TRAUMA
MANAGEMENT**

A photograph of a nurse in white scrubs sitting at the side of a hospital bed, holding the hand of an elderly patient. The patient is lying in the bed, looking up at the nurse. The scene is dimly lit, with a blue tint. A vertical red line is on the left side of the page.

**PATIENT-CENTERED
CARE OF THE
GERIATRIC TRAUMA
PATIENT**

CARE OF THE OLDER ADULT PATIENT

KEY POINTS

- Abuse of the older adult is common and infrequently detected, and the Geriatric Injury Documentation Tool can help with its documentation.
- Patient-centered interdisciplinary interventions benefit geriatric patients requiring emergency surgery.

Geriatric Injury Documentation

Documentation of injuries and the history of the traumatic incident is important. Abuse of the older adult is common but is frequently undetected.¹⁻¹¹ Research suggests that as few as 1 in 24 cases of abuse are identified and reported to authorities.² Abuse results in higher mortality rates, and it is also associated with depression, dementia, and worsening of chronic conditions.^{6,12-14} Presentation to the hospital following injury provides a critical opportunity to detect abuse of the older adult and initiate intervention. For a more thorough review of abuse and more detailed recommendations for obtaining and documenting a history and complete physical exam, please see the *ACS TQP Best Practices Guidelines for Trauma Center Recognition of Child Abuse, Elder Abuse, and Intimate Partner Violence*.¹⁵ The Geriatric Injury Documentation Tool is a potentially useful guide for clinical documentation of elder abuse.¹⁶

Interdisciplinary Care

Geriatric trauma patients benefit from an interdisciplinary approach to care beginning in the ED. Interdisciplinary care is optimal for care of geriatric patients with complex medical and injury conditions. Increasingly, models for interdisciplinary care are demonstrating improved outcomes, including admission avoidance or reduced death and dependence. Geriatric ED best practices of interdisciplinary care include the following:

- A pharmacist for medication review
- A physical therapist for gait evaluation and provision/teaching of gait aids
- A social worker for concerns of abuse/neglect and arrangement of home services
- A case manager to provide durable home medical equipment

Comprehensive assessment coupled with patient-centered interdisciplinary interventions benefits older patients requiring emergency surgery.

Trauma surgeons typically do not have adequate social service support to assist with ED transitions home. This must be anticipated to avoid poor transitions.

Box 5. Resources to Improve Care Transitions for Geriatric Patients

- Care Transitions Intervention: www.caretransitions.org
- Guided Care: www.guidedcare.org
- Better Outcomes by Optimizing Safe Transitions (BOOST): www.hospitalmedicine.org/BOOST
- Bridge Model of social worker assessments: www.transitionalcare.org

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HOSPITAL CARE

KEY POINTS

- Implement a geriatric-friendly hospital environmental design to minimize the hazards of hospitalization.
- Implement geriatric-friendly care that focuses on delirium prevention, reduced indwelling urinary catheter use, early and safe mobilization practices, nutritional interventions, and promotion of sleep.

Hospital care of geriatric trauma patients includes systematic, interprofessional care processes, as well as environmental design to minimize the hazards associated with hospitalization. The Acute Care for Elders model emphasizes a prepared environment, patient-centered care, medical review, and interprofessional care. Provision of acute geriatric unit care in medical wards is associated with decreased LOS, fewer discharges to nursing homes, and lower costs.¹ The application of similar geriatric-friendly principles in an emergency surgical setting also demonstrated clinical effectiveness.² In the trauma setting, early involvement of geriatric clinicians is associated with a reduction in delirium, decreased discharge to long-term care, less readmission to ICUs, and improved functional recovery at one year.³⁻⁵ Checklists and order sets can improve quality of care for older adult patients by integrating reminders into everyday care to ensure practice standards are met.

Geriatric-friendly hospital design shifts the focus from fall prevention to promotion of safe mobility.

This includes handrails in hallway corridors, an uncluttered environment, paint colors that emphasize contrast to aid with depth perception, diffuse lighting that minimizes glare, door levers, large clocks and calendars in rooms to facilitate orientation, raised toilet seats, and space to encourage visits and socialization.⁶ Flexible visiting policies may be associated with reduced frequency of delirium and lower severity of anxiety symptoms.⁷ HELP includes core intervention protocols for daily visits, orientation, therapeutic activities, sleep enhancement, early mobilization, vision and hearing adaptation, fluid repletion, and feeding assistance. See help.agscocare.org for more information.

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GERIATRIC INTERDISCIPLINARY TEAM

KEY POINT

- Consider a hospitalist consult for all geriatric trauma patients admitted to the trauma service.

Multiple models of care for the geriatric trauma patient were evaluated, including geriatric wards, geriatric consultative services, and geriatric interdisciplinary teams. Mangram, et al. studied the geriatric team model by comparing 673 trauma patients aged 60 years and older. Patients were admitted to a geriatric trauma unit with a model of care consisting of an interdisciplinary team focused on the needs of geriatric trauma patients. Patients experienced decreased time in the ED, hospital LOS, ICU LOS, and mortality as compared with historical matched controls.¹

Grund, et al. evaluated patients over 75 years of age with hip and pelvic ring fractures admitted to a geriatric trauma team (GTT), compared with a historical group. The GTT consisted of a patient comanagement model with a geriatrician and trauma surgeon. Findings revealed a reduction in ICU admissions (13.4% vs. 20.7%; 95% CI of 9.3% to 18.5%; $p=0.057$). A trend towards decreased mortality (6.5% vs. 9.5%; $p=0.278$) and increased ICU LOS (53 hours vs. 48 hours; $p=0.973$) was also found. A statistical increase in overall LOS for the GTT group was found (16.9 days vs. 13.7 days; $p<0.001$).² Of note, in the subgroup analysis of patients aged 64 to 75 years, no comparable trends were found.²

A Cochrane database meta-analysis for surgical patients found that comprehensive geriatric assessment (a process that includes evaluation and care by an interdisciplinary team) resulted in patients being “less likely to die and more likely to return home” than their traditional care counterparts.³

Multidisciplinary teams are important in the management of the geriatric trauma patient. The geriatrician or hospitalist has a unique opportunity to make significant contributions to the team effort, based on their experience with a patient’s comorbidities. While not all elderly patients require an interdisciplinary team approach, age alone provides a simple criterion by which all team members can identify an at-risk patient. This criterion removes complex guidelines and any confusion as to which patients are to be seen by the interdisciplinary team. Consider implementing this approach in Level I and II trauma centers at least 3 days per week. Level III centers, having less resources, may consider implementing the same strategy as Level I centers, but at a reduced frequency.

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PATIENT DECISION-MAKING CAPACITY

KEY POINT

- Assessment of an older adult's capacity is essential in situations that require life-or-death decisions.

Determining Capacity

Determining patient capacity—the ability to make one's own medical treatment decisions—is part of most clinical encounters. To have capacity, patients must meet the following criteria:¹

- Demonstrate understanding of the medical problem
- Express that they have a choice
- Appreciate the condition for which the treatment is being offered
- Have the ability to compare options and the consequence of those choices

Determination of capacity is particularly important when unexpected events require life-or-death decisions. A recommended practice is to actively assess capacity in patients with cognitive impairment (for whatever reason), particularly when patients are faced with decisions that have dramatically differing consequences (e.g., life or death). Trauma results in altered physical, cognitive, and emotional states that threaten high-quality decision-making. Older adults who are hospitalized for their injuries are frequently treated in the ICU and have cognition further compromised by sedating medications and delirium. Capacity and cognition are associated but not directly correlated with one another. Cognitive tests alone (e.g., the mini-mental state examination) do not measure capacity. Do not presume that patients with dementia and mental health disorders lack capacity based solely on their diagnoses.

It is recommended that healthcare providers who routinely treat geriatric patients adopt a mental model when assessing patient capacity.² Do not mistake conversational ability for capacity. Studies show only modest agreement between family members and healthcare providers in assessing capacity.³ Unless initial trust is established, patients and their advocates can interpret questions about capacity as disrespectful or biased.

Healthcare providers often need to reevaluate capacity during hospitalization due to the frequent changes in a patient's cognition due to treatment. It is important to recognize that a patient may have capacity at one moment but lack it at another time. Furthermore, based on the complexity and content of decisions, patients may have capacity to make some types of medical decision but not others.

Healthcare providers approaching patients about informed consent for treatments are responsible for assessing capacity at the time of consent. Do not rely on determination of capacity by consultants or other members of the team. An example of legally relevant criteria for decision-making capacity and approaches to the assessment of the patient can be found in Appelbaum's "Assessment of Patients' Competence to Consent to Treatment."¹

Patients lacking capacity require surrogate decision-makers or proxies. It is considered a best practice for surrogates to use substituted judgment to make decisions they think the patient would have made. Preexisting advance care plans about surrogate designation and desires regarding life-sustaining treatment can help guide decisions and protect patient autonomy. Unfortunately, advance care plans are frequently unavailable in emergencies. If the patient's wishes are unknown, it is recommended that surrogates and healthcare providers partner to make decisions in the patient's best interest. Rarely, guardians are appointed by the courts to make medical treatment decisions when no surrogate or relatives are willing or available. In emergent situations, when surrogates cannot be found in a timely way, healthcare providers can waive informed consent to act in the patient's best interest and preserve life.⁴

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GOALS OF CARE

KEY POINTS

- Excellent communication is needed to promote patient-centered care.
- Goals-of-care conversations are an opportunity to engage patients and families in shared decision-making.
- Quality communication ensures that surgical interventions offered align with a patient's values and preferences.
- Time-limited trials can be used in situations where the patient or family is ambivalent or when disagreement exists among the care team and family.
- Improving communication skills requires training, practice, and feedback.

In the older adult population, it is important to establish goals of care early and to revise these goals at critical points in the patient's care trajectory. Feasible quality indicators for surgical palliative care have been established and are useful in the ED resuscitation phase of care.

Healthcare providers are often tasked with engaging patients and families in goals-of-care discussions to make treatment decisions for seriously ill patients. A systematic approach to this discussion is more likely to yield empathic, high-quality conversations with patients and families, outcomes that promote patient-centered care, and align medical interventions with patients' values, preferences, and treatment goals.

In the acute setting, such conversations frequently include dual communications tasks of breaking bad news and discussing goals of care. In the ED, decisions need to be made to intubate, perform emergent procedures, initiate surgery, or begin intensive care. These potentially life-and-death choices need to be made using palliative care principles. Although time horizons may differ, follow similar principles for both time-pressured discussions upon admission in the ED and interdisciplinary family meetings in the ward or ICU that occur later in the hospital course.

Assess Illness Understanding and Prognostic Awareness

After establishing a mutually agreed-upon agenda, a best practice is to assess the patient's and family's understanding of the patient's medical condition. This information can be elicited by asking, "What do you understand about your injury/illness?" By actively listening to the patient and family, one becomes aware of their understanding of the illness, level of prognostic awareness, and readiness to hear additional medical updates. It is common to hear a patient or family member express an overly optimistic or unrealistic illness trajectory or prognosis. It is particularly important to address and discuss the needs of trauma patients with underlying frailty or comorbidities that pose additional risks and barriers for recovery. Promoting accurate illness understanding often requires multiple conversations over time.

Deliver Updates and Prognostic Information

After asking permission and preferences for information, proceed with delivering news and prognostic information. When delivering bad news, it is recommended that the health professional provide an alert to the patient and family that bad news is coming. For example, "I'm afraid the CT scan was not what we had hoped." It is a best practice to present the information succinctly and directly while avoiding medical jargon.¹ Helpful questions include, "How much information would you like about what lies ahead with your injury?" Then, information can be presented accordingly.^{2,3}

Hope/worry statements are effective ways to convey prognostic information. For example, a clinician may state, "I hope your condition improves, and I worry that based on the condition, you won't regain your prior abilities." Normalizing the inherent uncertainty in future projections helps set realistic expectations while maintaining a sense of hope.⁴

Expect and Respond to Emotion

In all discussions, anticipate and be prepared to respond to patient and family member emotions. Some health professionals experience discomfort in the presence of strong emotions and worry that their actions directly caused a patient or family member to become upset. More often, a strong emotional reaction is a positive sign that the information was appropriately received and internalized. Avoid responding from a place of discomfort by offering false reassurance or backtracking on the information delivered. This can lessen the credibility of the information conveyed or reduce the patient's and family's confidence in the clinician. Instead, a best practice is to use empathic actions or statements to respond to emotions. Examples include the use of therapeutic silence or offering a "NURSE" statement (see Box 6). Statements such as, "I wish things were different," help the health professional align with a patient's hopes while acknowledging the reality of a poor prognosis.

Box 6. Guidance Statements for Responding to Patient and Family Emotion

- N** - Naming
"This seems overwhelming."
- U** - Understanding
"If I understand you correctly, you are worried about what to say to your family."
"I can only imagine how difficult this must be."
- R** - Respecting
"I can see how hard you've been working to care for your dad."
- S** - Support
"We'll take care of your dad, no matter what happens."
- E** - Explore
"I hear this is upsetting. Can you tell me more about that?"

Explore Patient Values and Preferences

When exploring patient preferences and values, seek an understanding of the patient's acceptable quality of life in terms of function and level of dependency, as well as trade-offs the patient is willing to accept to achieve important goals.⁵ Responses can help the health professional consider treatment options that are more likely to help the patient while avoiding those that may pose unacceptable burdens or outcomes. Questions such as, "If your loved one becomes

more ill, how much would they be willing to go through to gain more time?" leads to an understanding of trade-offs a patient is willing to accept.

Patient preferences can vary based on cultural beliefs. These beliefs may impact the type of information they desire, who they want present for goals-of-care discussions, the extent to which family members participate in decision-making, and which treatments they are willing to undertake. Refer to Box 7 for sample statements and questions to use during goals-of-care conversations.

Box 7. Key Questions and Empathic Statements for Goals-of-Care Discussions

- "What do you understand about your injury/illness?"
- Warning statement: "I'm afraid the CT scan was not what we had hoped."
- "How much information would you like about what lies ahead with your injury/illness?"
- "I hope your condition improves, and I worry that based on the condition, you won't regain your prior abilities."
- "I wish things were different."
- "When you look to the future, what are you most hopeful for?"
- "If your loved one becomes sicker, how much would they be willing to go through in order to gain more time?"
- "Would it be helpful if I shared my recommendation regarding the treatment options?"

Discuss Options and Make a Recommendation

After the health professional has an understanding of patient values and preferences regarding important goals, acceptable trade-offs, and standards for quality of life, specific therapeutic options can be addressed. A best practice is to frame options in the context of burdens or benefits posed by the options, as well as the likelihood of achieving outcomes acceptable to the patient. Importantly, a patient's values, beliefs, and preferences may also provide sufficient guidance to determine that particular treatments would not meet the patient's goals or would impose unacceptable burdens. Healthcare providers do not need to feel obligated to present every option available, and treatments offered can be tailored based on information gained from the preceding discussion. After the discussion of available options, it is important to check in with the patient and family to ensure accurate understanding of each option.

Finally, healthcare providers play a critical role in the medical decision-making process by offering the patient and family a recommendation. Assess the patient’s and family’s willingness to hear a recommendation by asking, “Would it be helpful if I shared my recommendation regarding the treatment options?”⁶ For patients and families who are receptive, it is recommended to include the rationale accompanying the recommendation. A best practice is to rely on the information obtained about the patient’s values and preferences to provide a recommendation that best aligns with the patient’s priorities.³

Finalize the Treatment Plan and Follow Up Post Discussion

To complete the goals-of-care conversation, finalize a treatment plan. In urgent circumstances, the healthcare provider often needs to continue exploring patient hesitation or ambivalence related to decision-making. Patients and families may not always agree with a clinician’s recommendation, or they may hesitate to forgo potentially beneficial treatments if associated with significant risk or burden. In situations where the patient or family is ambivalent or disagreement exists among the care team, consider a time-limited trial in which medical treatments are used over a prespecified period with close monitoring for prespecified outcomes. Patients, families, and healthcare

providers all need to finish the discussion with a clear understanding about which treatments are being pursued, the timeframe in which the patient’s clinical condition will be reevaluated, and any downstream treatment options that may be considered in future discussions.

Healthcare providers often need guidance or education to have effective conversations with patients and families (see Table 9).

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Table 9. Communication Tools for Goals-of-Care Discussions with Trauma Patients

Communication Resource	Description	Audience	Tools
Best Case/Worst Case https://www.hipxchange.org/BCWC	Strategy to change surgeon communication and promote shared decision-making during high-stakes surgical decisions	Surgeons, clinicians	<ul style="list-style-type: none"> • Step-by-step instructions • Templates with hypothetical examples, including ICU • ICU pocket card
VitalTalk https://www.vitaltalk.org/	Resources and courses to strengthen healthcare provider communication skills	Healthcare providers	<ul style="list-style-type: none"> • In-person workshops • Online courses • Conversation guides and videos • VitalTalk App
The Institute for Health Communications https://healthcarecomm.org/training/faculty-courses/conversations-at-the-end-of-life/	Conversations during Serious Illness program; Care Not Cure workshops	Healthcare providers	<ul style="list-style-type: none"> • Faculty preparation • Online courses • Continuing education
The Center for Practical Bioethics https://practicalbioethics.org/resources/end-of-life-resources.html	Advance care planning; patient-physician relationship; informed consent	Healthcare providers	<ul style="list-style-type: none"> • Case studies • Audio interviews, videos

FAMILY MEETINGS

KEY POINTS

- After learning important clinical information, patients and families value shared decision-making during discussion-oriented meetings.
- Planning for a family meeting involves having the patient care team reach consensus on a unified message that helps the family gain clarity in a stressful environment.
- A best practice is having trauma team members prepare caregivers and patients for the postdischarge demands on them, especially if patients are to be released to their homes.

Family meetings are a recommended best practice for intermediate or intensive care of geriatric trauma patients, because older adults may suffer from cognitive impairment or share decision-making responsibilities with their family and/or caregivers.¹ These meetings have many purposes, including:¹⁻³

- Delivering the prognosis and treatment options
- Guiding decision-making
- Providing emotional support

Family meetings offer older adult patients and their families the space to process the prognosis, ask questions, and make informed decisions in an ICU setting with the guidance of physicians and nurses. Families report higher satisfaction with decision-making in the ICU after attending family conferences.²

Clinicians often face challenges in conducting family meetings when the patient is in the high-stress environment of the ICU. Standardizing clinician approaches to family meetings may help overcome some of these challenges. Important goals for family-clinician communication during family meetings include:³

- Establishing trust
- Providing emotional support
- Conveying clinical information
- Understanding the patient as a person
- Facilitating careful decision-making

While other modes of communication contribute to these goals, family meetings enable participation by the family members. While physicians must deliver medical advice and details of care during these meetings, conveying clinical information is an important goal in family-clinician communication. Patients favor having a role in shared decision-making processes over passive or autonomous roles. Family meetings with clinicians need to be interactive and discussion-based.

Planning for the Family Meeting

Make a meeting plan with the entire care team before the meeting. Before facing the patient and their family, the patient's care team needs to reach a consensus on how to approach the meeting. Making a plan will help the care team convey clinical information concisely. During the meeting itself, the patient and family members direct the agenda with their questions and concerns; however, the care team can present a unified message to the patient and their family, providing them with clarity in a stressful environment.

Invite patient and family to share their understanding of the reason for the discussion, as well as what questions they want addressed. The lead clinician conveys the purpose for the meeting, and then the patient and family are invited to share their understanding of the situation and describe the concerns they hope to have addressed.

Use active listening with validation. To promote discussion and engagement during the decision-making process, clinicians can practice active listening with validation. Through head nods and verbal affirmations, the patient care team can provide space for patients and their families to vocalize their thoughts and concerns.

Ask open-ended questions. Prompt patients and families through open-ended questions about their priorities and concerns. This facilitates clinical decision-making by clarifying patients' needs. Further, the process of answering questions serves as a goal-setting exercise for patients and their families.

Offer social work or spiritual and pastoral support. To understand the patient as a person, the recommended practice is for the care team to acknowledge the family's values, cultural practices, and background. Inclusion of social work or pastoral care staff is one way to accomplish this.³ It also increases the patient's psychosocial and spiritual support while in the ICU.

Summarize the meeting. At the conclusion of the family meeting, summarize the areas of consensus, areas of disagreement, and decisions made. Clarify the ongoing plan, and seek endorsement from those attending the family meeting. Offer a final opportunity for questions, other concerns, and comments.⁴

Postdischarge Care and Transition Planning

Consideration of postdischarge care and transition planning must begin on the first day of admission. The family needs to be emotionally and mentally prepared for the likelihood that the patient will transition to a postacute care facility. Families and patients may require time to process and understand postdischarge care options before they can make decisions and plan. Furthermore, the clinical course is often dynamic and involves multiple decisions as a patient's prognosis changes or develops. The earlier the family is engaged, the better equipped they will be to handle a changing situation.

Social workers and case managers specialize in working with patients and families to develop specific discharge plans to the home or to another facility.⁵ By gathering the patient's goals and needs, social workers and case managers assist families and patients in transition planning, a process the family may feel is isolating and intimidating.⁶ In a study of older adults with heart failure and their family caregivers, a social worker assessment of patient and caregiver needs for discharge was associated with caregivers feeling better prepared and reporting more satisfaction in their caregiver roles.⁷ Extending this program and support to all geriatric trauma patients and their families will allow for ICUs and trauma care settings to further support and prepare caregivers for their roles.

Caregiver Burden and Interventions to Support Caregivers

When geriatric patients have supportive families and/or caregivers, a recommended practice is for patient care teams to take the time to acknowledge the caregiver's needs and concerns to mitigate risks of caregiver burden. The Zarit Burden Interview is a 22-item questionnaire and a popular measure for assessing caregiver burden along two axes: personal strain and role strain.⁸ A higher score indicates higher burden. Using the Zarit Burden Interview, studies found that caregiver burden increased as the number of patient comorbidities increased and as patient functional autonomy declined.^{9,10} Patient and caregiver function influence the level of caregiver burden, and higher levels of burden can impact patient outcomes.^{9,11} Research on the impact of caregiver burden on patient outcomes is sparse; however, some evidence indicates that caregiver burden is a determinant predictive factor of rehospitalization among older adults within 3 months of an ED visit.¹¹

The burden on family caregivers can be immense, because these individuals automatically assume responsibility of care around the time of hospitalization, without proper preparation or information. The following interventions improve caregivers' sense of preparedness and comfort.^{7,12}

- Nurses engaging in "transition coaching" to teach patient and caregiver skills for postoperative care, promoting continuity of care
- Patient care teams offering options for postoperative support after discharge for caregivers and patients

ICU and Transition Coaching

Caregivers report that the worst part of the caregiving experience is seeing their loved one in the ICU for the first time just after surgery. Nurses can guide patients and caregivers through the ICU or geriatric surgical ward before surgery, orienting them and explaining what can be expected during the postoperative experience. Familiarity with the environment can help buffer the caregiver's shock of seeing their loved one postoperatively.¹³

A best practice is having trauma team members prepare caregivers and patients for the postdischarge demands on patients and caregivers, especially if patients are to be released to their homes. Postoperative care responsibilities of family caregivers can include medication management, emotional support, and mobility assistance. Depending on the patient's prognosis, training on tasks such as transporting patients and medication management can be done while patients are in the ICU or on the hospital floor. This optimizes the time caregivers spend in the hospital by focusing on information needed from health professionals so caregivers feel more confident in supporting the patient at home. A major stressor for caregivers is the fear of making a mistake. Proper training and explanation can significantly alleviate stress.

Postdischarge Support

Healthcare provider responsibilities for care do not cease at discharge, so patient care teams must communicate clearly and commit to ongoing caregiver support following discharge. Caregivers report the need for a point person for advice and support after discharge. Advice and support may be provided by follow-up care from the primary care physician or a postdischarge phone call from nurses and/or social workers.

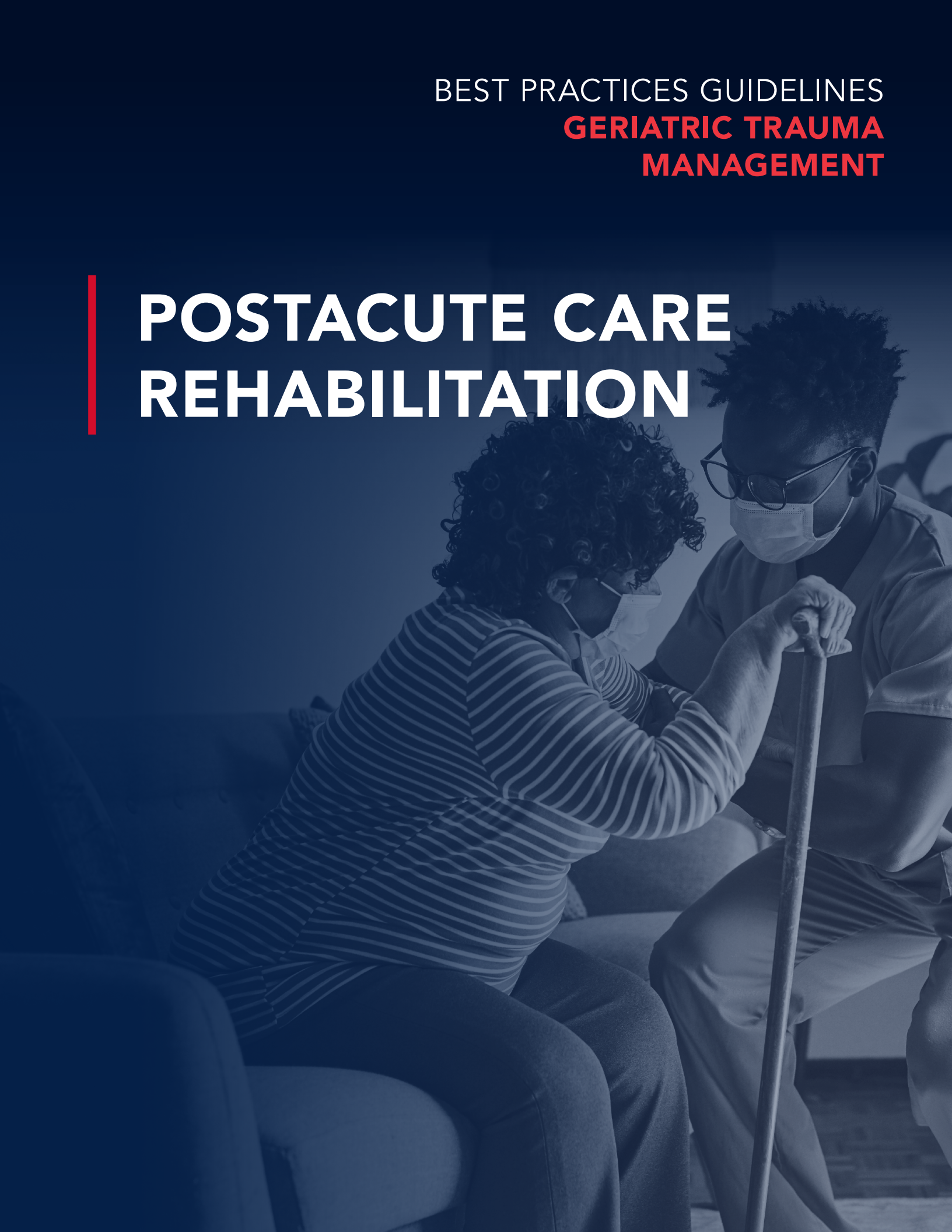
Additional resources for families and caregivers can include caregiver support groups, case management, and postoperative counseling on expectations. Support groups are a validated method for providing caregivers with guidance in the transition from the ICU.¹² Studies show that nursing-home-sponsored support groups contributed positively to caregiver coping during patient transitions to new facilities.¹² Provide families with information about postdischarge support groups before discharge.

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BEST PRACTICES GUIDELINES
**GERIATRIC TRAUMA
MANAGEMENT**

POSTACUTE CARE REHABILITATION



POSTACUTE CARE REHABILITATION

KEY POINTS

- Postacute care (PAC) rehabilitation is an essential service for improving health outcomes of older adults associated with injury and hospitalization.
- Rehabilitation involves evaluating the patient's functional needs and establishing goals for improved function to improve the patient's ADLs and level of independence.

The full continuum of trauma care extends to rehabilitation and reintegration into society. Even when the older adult's condition improves during hospitalization, their ability to function at home and in the community may be impacted. PAC rehabilitation is an essential service for improving an older adult's health outcomes resulting from the injury and/or hospitalization, such as deconditioning, frailty, mortality risk, and disability.¹⁻⁵ Additionally, long-term outcome data captured during PAC rehabilitation (e.g., quality of life, level of function, and patient-centered outcomes) help inform the acute-phase care team's continuous quality improvement program.^{2,6}

Older adults must be adequately evaluated by a specialized medical care team to receive the appropriate referral for ongoing medical care and therapy.²⁻⁵ This may include transition to rehabilitation from discharge and then to postrehabilitation care. PAC options for older adults include discharge to home or to an inpatient PAC setting, such as a skilled nursing facility (SNF) or inpatient rehabilitation facility.³ Patients may also use more than one type of PAC service in a single episode of care, such as a SNF, home healthcare, and outpatient physical therapy (PT) or occupational therapy (OT).³⁻⁵

PAC rehabilitation can serve as a temporary support, bridging the transition from acute care to home-based care. PAC rehabilitation may include a multidisciplinary rehabilitation team composed of a geriatric physiatrist, or physical medicine and rehabilitation (PM&R) physician, as well as trained rehabilitation therapists. These healthcare providers evaluate the patient's functional needs and work with the patient and caregiver to provide the right assistive devices and equipment (e.g., canes or walkers), exercise programs, and related services with the goal of improving the patient's ADLs and independence.

PAC rehabilitation care often requires the integration of an interdisciplinary team of rehabilitation professionals with a different set of skills to properly treat the patient.³⁻⁵ The rehabilitation care team may include PT, OT, and speech therapy (ST) providers, who are often supervised by a physician. Additional healthcare professionals on the PAC rehabilitation team include social workers, registered dietitians, and case managers. These various disciplines collaborate in a coordinated fashion to reach the care plan goals. They need to meet and communicate regularly to establish patient health goals and evaluate how well those goals are met.

Skilled Nursing Facility

A SNF provides medical care and less intensive rehabilitation therapy after hospitalization.⁷ Generally, patients receive 45–60 minutes of therapy per day and are examined by a physician or nurse practitioner within the first 2 weeks following admission. The average LOS in a SNF is 26 days.⁸ This type of facility might be the most suitable option for frail patients who have difficulties with cognition or memory, lack support at home, or complex chronic health problems and physical functional limitations. SNF care may be provided by registered nurses, licensed practical or vocational nurses, and nursing assistants, as well as rehabilitation therapists (e.g., PT and OT providers). Nursing care includes the basics of hygiene and skin care, assistance with meals, medication administration, and care coordination. The goals of PT are to promote mobility and relieve pain through exercise and complementary therapies.

Inpatient PAC Rehabilitation

Inpatient PAC rehabilitation hospitals provide medical treatment and intensive rehabilitation care.⁷ The goal of inpatient rehabilitation care is to assist the patient to gain independent functioning prior to discharge. Care includes at least 3 hours of rehabilitation therapy per day for at least 5 days per week.⁹ Rehabilitation services may include OT, PT, and ST, in either a one-on-one or a group format. A PM&R physician manages the patient's medical problems. Nurses provide education and support activities that promote functional return and prevent additional health complications. The average LOS is 12 days.¹⁰ Facilitate a safe return home by equipping patients and caregivers with the necessary skills to safely manage the patient's injury sequelae and prevent future hospitalization.

Home-Based Rehabilitation PAC

Home-based PAC rehabilitation care is a suitable option following hospital discharge if the patient is physically unable to leave the home (or an assisted-living facility) without help, or if leaving the home will be unsafe for the patient.^{7,11} This option may be appropriate if the patient has support at home and is more advanced in recovery but still has some issues related to balance, strength, or endurance. To be eligible for home services, the patient must need less than 8 hours of care each day. Nurses and rehabilitation therapists may perform home assessments prior to initiating home-based therapy services. Home healthcare agencies can provide services such as OT, PT, and ST in the patient's home. Social work services or health aid services can be part of the home healthcare service plan. More information can be found at www.medicare.gov/what-medicare-covers/whats-home-health-care.

Outpatient PAC Rehabilitation

Outpatient PAC rehabilitation is appropriate for medically stable patients who have the ability to safely and regularly leave their homes.⁷ Outpatient PAC rehabilitation may occur in a clinic or rehabilitation setting, and the patient returns home afterwards. This service is often part of a recovery plan that started when the patient was hospitalized. The treatment plan might include one or more rehabilitation professionals such as a PT, OT, and ST, with the goal of improving overall function and physical recovery. A qualified PM&R physician will plan and supervise the treatment based on a comprehensive evaluation of the patient's injury, medical history, disease and/or neurological reports, diagnostic imaging, and laboratory tests. Electromyography and nerve conduction tests may be used to evaluate nerve and muscle function. The rehabilitation treatment may involve weekly therapy sessions according to the patient's needs, including any combination of medication, PT, OT, massage, exercise, spinal injections, and more. The goal is to improve the patient's function and daily activities. The patient's progress is carefully tracked until the symptoms have resolved or stabilized. Most health payers cover these services as part of the injury treatment.

The American Physical Therapy Association has a database to assist healthcare professionals in identifying outpatient therapy clinics and therapists accordingly to the patient living arrangements: aptaapps.apta.org/APTAPTDirectory/FindAPTDirectory.aspx.

Additional Options for PAC

Long-term care hospitals provide care to patients with severe injuries who need to be in the hospital for many weeks.⁷

Adult day healthcare programs can provide caregivers a respite while supporting the patient's wellbeing and independence. Many programs have full-day or hourly options. Although these programs are limited in skilled rehabilitation and nursing therapies, patients enjoy the educational and recreational programs, as well as the opportunity to socialize with peers in a safe and disability-friendly environment.

Long-term PAC includes a range of services provided for patients unable to care for themselves.⁷ This may be a temporary situation resulting from an injury or medical event, or an ongoing issue related to a chronic or progressive health condition or disability. Long-term care is appropriate when the patient has complex medical needs requiring 24-hour medical care and/or health monitoring. It is also recommended for patients who are recovering from serious and/or debilitating medical conditions and injuries. Patients with permanent physical impairments that affect their ability to manage basic ADLs (e.g., bathing, dressing, or toileting) are also good candidates for long-term PAC services. Patients with cognitive impairment that impacts safety or appropriate medication adherence, or who have difficulty getting to medical appointments, are also good candidates.

PAC and Hospital Readmission Rates

The main reason for hospital readmission is impaired function due to noncompliance with PAC discharge recommendations.¹² PAC rehabilitation supports that are important in reducing the total number of hospital readmissions include:

- Appropriate referral based on the patient's diagnosis to a PAC provider or facility that has outcome metrics specific for that diagnosis
- Use of home health or nursing facilities to identify potential at-risk patients needing intervention before an ED visit or hospital readmission occurs
- Collaboration between hospitals, home health providers, and SNFs to create a patient-centered care plan to avoid potential readmission

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FALL EVALUATION AND PREVENTION FOR THE GERIATRIC TRAUMA PATIENT

KEY POINTS

- Falls can result from poor physical condition, multiple medications, and environmental factors.
- Geriatric patients need a focused fall risk assessment and fall-prevention plan.

Falls are a major threat to the health and independence of older adults.¹ However, falling is not an inevitable part of aging, and it can be prevented. In addition, with the proper treatment and care, an older adult can fully recover from a fall.^{1,2} A fall is a sudden, unintentional, and unexpected change in position causing an individual to land at a lower level (e.g., on the floor, an object, the ground, or another surface) without known LOC.² The definition excludes falls from a major intrinsic event (e.g., seizure, stroke, syncope), which need to be evaluated and managed differently.¹

Fall Etiology

A fall usually has multifactorial causation, including:

- Intrinsic factors (e.g., poor balance, weakness, chronic illness, visual or cognitive impairment)
- Extrinsic factors (e.g., polypharmacy)
- Environmental factors (e.g., snow, poor lighting, no safety equipment, loose rugs)

Commonly, a fall is a nonspecific sign for one of many acute illnesses in older adults.^{1,2}

Polypharmacy Risks: Medications can have a significant impact on an older adult's health and risk for falls. Patients and caregivers need to be educated about increased fall risks associated with polypharmacy and certain medications, especially benzodiazepines, opioids, and sleep medications (see Box 8). Evidence supports a significant decrease in geriatric falls when psychotropic medications are eliminated.^{3,4} Healthcare providers need to carefully review the medications history and limit high-risk medications, as well as the total number of medications prescribed. Consider any medication initiated or increased shortly before a fall as a possible cause of the fall.

Box 8. Common Medications Associated with Falls Based on the 2023 Beers Criteria(BC)⁴

NSAIDs
 Non-TCA/non-SSRI (SNRI^{BC})
 TCA (avoid^{BC})/SSRI
 Benzodiazepines^{BC}
 Polypharmacy (4 or more medications)
 Other sedatives (avoid^{BC}), hypnotics
 Opioids
 Anticonvulsants (avoid^{BC})
 Antipsychotics (avoid^{BC})
 Antiarrhythmics (Class 1A)
 Antihypertensives
 Loop diuretics

Inpatient Care and Discharge Planning

Geriatric patients have a higher risk for complications from bedrest. For this reason, a comprehensive injury care program needs to include a preinjury functional status assessment, a current mobility function assessment, and a fall risk assessment (see Table 10).

A well-planned fall care and prevention program can improve patient outcomes, ADLs, and quality of life.² Integrate the baseline and current functional status assessment needs to be integrated with patient discharge planning.⁵ Information about tools for fall risk assessment are found in Appendix B. The evaluation needs to include the patient's home environment risk, home modifications, and resources for activity and function, such as PT and use of assisted devices (e.g., cane, walker, wheelchair).^{5,6} The care team also needs to evaluate the risk/benefit of changing or resuming medications, when appropriate, with clear discharge instructions given to the patient and the persons who will be assisting and caring for the patient at home. As part of the fall assessment, the care team needs to perform functional assessments that evaluate the patient's ability to perform simple ADLs. Ask the patient the following:

- Can you get out of bed or a chair yourself?
- Can you dress and bathe yourself?
- Can you make your own meals?
- Can you do your own shopping?

Table 10. Summary of Fall-Prevention Screening and Assessment Recommendations

Core Area	Recommendation
Focused Fall History	<ul style="list-style-type: none"> • History of falls: Detailed description of the circumstances of the fall(s), frequency, symptoms at time of fall, injuries, other consequences • Medication review: All prescribed and over-the-counter medications, with dosages • History of relevant risk factors: Acute or chronic medical problems (e.g., osteoporosis, urinary incontinence, cardiovascular disease)
Physical Examination	<ul style="list-style-type: none"> • Detailed assessment of gait, balance, mobility function, and lower extremity joint function • Neurological function: Cognitive evaluation; tests of lower extremity peripheral nerves, proprioception, and reflexes; and tests of cortical, extrapyramidal, and cerebellar function • Muscle strength (lower extremities) • Cardiovascular status: Heart rate and rhythm, postural pulse, blood pressure, and, if appropriate, heart rate and blood pressure responses to carotid sinus stimulation • Assessment of visual acuity • Examination of the feet and footwear
Functional Assessment	<ul style="list-style-type: none"> • Assessment of ADL skills, including use of adaptive equipment and mobility aids, as appropriate • Assessment of the individual's perceived functional ability and fear related to falling • Assessment of current activity levels, with attention to the extent to which concerns about falling are protective (i.e., appropriate to given abilities) or are contributing to deconditioning and/or compromised quality of life (i.e., due to fear of falling, individual is curtailing involvement in activities he or she is safely able to perform)
Environmental Assessment	<ul style="list-style-type: none"> • Evaluate and monitor progress toward improving home safety (e.g., lighting, stairs, floors, rugs, showers) • Assure patient knows how to properly use assistive devices for mobility and balance (walking aids) • Make recommendations about safe living conditions, such as neighborhood sidewalks, uneven ground, and extreme weather (e.g., ice, snow, rain) • Proper footwear

If the patient responds negatively to any of these questions, perform a more in-depth functional evaluation, including full screening of ADL and instrumental activity of daily living abilities. Document the functional deficits, and consider implementation of perioperative interventions (e.g., referral to OT and/or PT) followed by a proactive fall-prevention discharge plan.

Multifactorial Fall Risk Assessment and Single Interventions

The AGS and British Geriatrics Society recommend that all adults older than 65 years be screened annually for a history of falls or balance impairment.² Each patient and setting (community, hospital, and nursing home) require a personalized assessment and intervention approach. An individualized multifactorial intervention involving multiple components can reduce fall rates.^{7,8} Studies vary widely on which components are most significant. Single interventions such as exercise alone are also an effective fall-prevention approach, even without a complete multifactorial assessment⁹

A multifactorial fall risk assessment is used to evaluate the conditions and frequency of falls, associated symptoms, injuries, medications (prescription and over-the-counter), other relevant acute or chronic medical problems, ADLs and use of assistive devices, and fear of falling.¹⁰ The physical examination includes evaluation of muscle strength, cognitive function, cardiovascular health (including postural dizziness/postural hypotension), assessment of visual acuity, and a comprehensive examination of gait ability, feet health, and footwear.¹⁰ It is also important to assess for possible environmental factors, such as home safety.¹¹ The Centers for Disease Control and Prevention (CDC) Stopping Elderly Accidents, Deaths & Injuries (STEADI) program includes checklists and free resources about home safety and risk factors for falling at www.cdc.gov/steadi/index.html. The "Stay Independent" brochure is available at www.cdc.gov/steadi/patient.html.¹²

The US Preventive Services Task Force and American Academy of Family Physicians do not recommend routine multifactorial intervention for all community-dwelling older adults at risk of falling but suggest that it may be appropriate for some patients.^{9,13} The CDC advises that moderate-risk patients (those with gait, strength, or balance impairment and a history of zero or one noninjurious fall) receive vitamin D supplementation with or without calcium, a medication review, and a referral to PT or a community fall-prevention program (e.g., *www.silversneakers.com*).¹⁴ For high-risk patients, the CDC additionally recommends a person-centered exercise program with muscle strengthening and gait and balance training; home environment modification; and management of postural hypotension, vision problems, foot problems, and footwear.²

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BEST PRACTICES GUIDELINES
**GERIATRIC TRAUMA
MANAGEMENT**



**IMPLEMENTATION
AND INTEGRATION
OF THE BEST
PRACTICES
GUIDELINES**

IMPLEMENTING THE *BEST PRACTICES GUIDELINES FOR GERIATRIC TRAUMA MANAGEMENT*

KEY POINTS

- Trauma medical directors (TMDs), trauma program managers, trauma liaisons, registrars, and staff have a leadership role in implementing and supporting geriatric trauma management BPGs and monitoring facility compliance.
- Implementation of the geriatric trauma management BPGs starts with a committed stakeholder work group (with representatives from internal medicine [internal/family/geriatric], a hospitalist, orthopaedics, neurosurgery, pharmacy, laboratory, rehabilitation, social work, transfer center, and EMS) that receives its directives from the TMD and trauma operations committee.
- This work group is charged with completing a gap analysis to identify priorities for developing or revising the trauma center's geriatric trauma management guidelines, identifying priorities, developing an educational plan to introduce the guidelines, and identifying a matrix with which to measure compliance.

Implementing trauma center BPGs begins with the TMD, trauma liaisons, and trauma program staff as leaders and change agents. These individuals are responsible for the oversight, management, and continuous commitment to improving care within the trauma center and trauma system, regardless of trauma center designation level. They define the leadership structure, culture, and implementation process for BPGs that foster stakeholder engagement. These leaders will define the following:

- Selection of the work group (composed of champions and stakeholders) to develop the geriatric trauma management guidelines
- Identification of the work group leaders (physician and nursing)
- The goals and timelines for completion of a gap analysis focused on the trauma center's geriatric trauma management and recommendations in the *ACS TQP Best Practices Guidelines for Geriatric Trauma Management*
- The reporting structure for the geriatric trauma management guideline work group

The geriatric trauma management guideline work group is charged with comparing the trauma center's current practices to those recommended in the BPGs and identifying any gaps between the two.¹ Gap analysis identifies opportunities to align the trauma center's geriatric trauma management practices with the *ACS TQP Best Practices Guidelines for Geriatric Trauma Management*. This work group, in conjunction with the trauma center's operations committee, establishes the priorities for change. Monthly progress reports regarding the completion of the gap analysis and assigned tasks are provided to the trauma operations committee. See Table 11 for an example of a geriatric trauma management guideline gap analysis.

The next step is to revise or develop the trauma center's geriatric trauma management guidelines for the phases of care provided by the facility. Each phase of the geriatric trauma management guidelines is reviewed and approved through the trauma operations committee. The trauma operations committee and its members are responsible for the dissemination and communication of the revised geriatric trauma management guidelines.

The next priority for the work group is to develop an educational plan to introduce the new geriatric trauma management guidelines to all stakeholders. The educational plan outlines the expectations for all health professional roles involved in geriatric trauma management, as well as the tasks associated with assessment, documentation, interventions, and reassessments.

The implementation date for the BPGs is determined as the work group completes geriatric trauma management guideline development and the target date for completion of the educational plan is near. The performance improvement and outcome measures to monitor compliance with the geriatric guideline are defined by the TMD, liaisons, and trauma program staff prior to implementation.

Table 11. Geriatric Trauma Management Guideline Gap Analysis

Geriatric Trauma Management Guideline	Met	Partially Met	Unmet	Priority	Comments
Trauma registry criteria include same-height falls.					
Geriatric trauma management activation protocol is documented.					
Geriatric-specific resuscitation guidelines are documented.					
Geriatric guidelines address changes in GCS, and dementia assessment is documented.					
Specific lab values for geriatric trauma resuscitations are documented.					
Pain management guidelines for geriatric trauma patients are documented.					
Specific precautions to prevent hypothermia and skin injury are documented.					
Timeframes for frailty assessment are documented.					
Capacity assessment guidelines are documented.					
Goals of care are documented in the phases of care.					
Guideline includes assessment, interventions, and reversal agents for anticoagulation management, as well as restarting therapy following operative interventions.					
Medication management and guidelines for reconciliation define when and how often this is completed and documented.					
The AGS Beers Criteria is included in the medication management.					
Guideline includes and documents geriatric trauma ICU admission criteria.					
ICU guidelines specifically address lung protection, nosocomial infection, venous thromboembolism (VTE), and pressure sores.					
Delirium screening, prevention, and treatment guidelines are documented.					
Specific measures to address TBI in geriatric trauma are documented (e.g., imaging and treatment algorithms).					
Specific measures to address spinal cord injuries in geriatric trauma are documented (e.g., imaging and treatment algorithms).					
Guideline includes and documents geriatric trauma ward care.					
Geriatric syncope assessment algorithms are documented.					
Routine geriatric comorbidity management recommendations (e.g., hypertension, coronary artery disease, heart disease, dysrhythmias, PAD) are included in the guideline.					
Routine geriatric common event prevention (e.g., deep vein thrombosis (DVT), GI bleeding, VTE, mobilization, feeding, skin protection) is addressed and documented.					

A geriatric interdisciplinary team is identified and assists in geriatric trauma assessments throughout the continuum of care and discharge.					
Palliative care resources and management are documented.					
Psychosocial resources and measures to address abuse (physical, emotional sexual, drug/alcohol, etc.), acute stress, PTSD, suicide, depression, social isolation, bereavement, and family needs are documented.					
Evidence-based fall-prevention measures are included and documented.					
The trauma center leaders are participating in the regional development and integration of geriatric field triage criteria and management guidelines.					
Elements of the geriatric trauma management BPGs are integrated into the electronic medical record (EMR) when applicable.					
Criteria for inpatient admission for serious medical conditions contributing to syncopal episodes are addressed.					

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EDUCATION PLAN FOR IMPLEMENTING THE BEST PRACTICES GUIDELINES FOR GERIATRIC TRAUMA MANAGEMENT

KEY POINTS

- Educational tools designed for each phase of care focus on staff member roles and responsibilities.
- Education is provided to all staff members who have a role in caring for the geriatric trauma patient.
- The geriatric trauma management BPGs are implemented after the education is completed.

The work group leaders developing or revising the geriatric trauma management BPGs identify members responsible for the development of the education plan and tools to support the implementation of the guidelines. The educational tools are designed to specifically address the phases of care for all facility staff participating in geriatric trauma care. Table 12 for an example of a geriatric trauma education plan gap analysis.

Table 12. Geriatric Trauma Education Plan Gap Analysis

Specific Education Plan Content	Integrated into Education Plan	Comments
Geriatric trauma incidence		
Geriatric trauma epidemiology		
Common mechanisms of injury		
Trauma team activation guidelines		
Geriatric trauma resuscitation roles and responsibilities		
Labs and imaging		
Syncope		
Common comorbidities		
Medication reconciliation		
Beers Criteria to reduce adverse medication events		
ICU care		
Anticoagulation and reversal		
Traumatic brain injury (TBI)		
Spinal cord injury (SCI)		
Common complications		
Hospital fall prevention		
Psychological implications of geriatric trauma		
Screening for abuse and neglect		
Caregiver support and education		
Community fall-prevention		
Community geriatric trauma injury prevention		

INTEGRATING THE *BEST PRACTICES GUIDELINES FOR GERIATRIC TRAUMA MANAGEMENT WITH THE TRAUMA PERFORMANCE IMPROVEMENT PROCESS*

KEY POINTS

- The trauma program will integrate elements from its defined geriatric trauma management BPGs into the trauma performance improvement (PI) process and trauma registry for review.
- The trauma registry will integrate geriatric trauma management guideline performance data elements to facilitate reports and outcome reviews.
- Trauma will integrate geriatric trauma management documentation standards into the EMR.
- The TQIP geriatric cohort outcomes are specifically included, reviewed, and addressed through the trauma review processes.

Based on the trauma center's scope of service, the TMD, liaisons, trauma program staff, and trauma operations committee identify key elements related to the geriatric trauma management BPG to monitor for compliance through the trauma PI process. The trauma PI elements recommended in Table 13 are applicable to all geriatric trauma activations and trauma admissions. The trauma program staff integrates these elements into the trauma registry data collection process, when possible, to facilitate tracking and reporting. An additional best practice is to integrate the documentation of key assessment findings into the EMR, (e.g., frailty score; dementia screening; goals of care; Beers Criteria; Screening, Brief Intervention, and Referral to Treatment; geriatric suicide; and abuse).

Trauma centers that participate in the ACS TQIP can use their TQIP geriatric cohort benchmark reports to identify geriatric trauma PI opportunities. The geriatric cohort reports include older adult, geriatric blunt multisystem trauma, abuse, palliative care, and isolated hip fractures.

The PI process identifies elements that are reviewed as a standard audit filter event. These standard audits are completed on all applicable trauma patients. Specific review events are scheduled for specific calendar dates identified through the PI process. Reports reflecting compliance with the standard audit filters and specific reviews are reported to the operations committee, based on the PI plan.

Geriatric trauma audit filters include incidence, epidemiology, and the following:

- Common injury mechanisms
- Trauma team activation guidelines
- Geriatric trauma resuscitations
- Labs and imaging
- Syncope
- Common comorbidities
- ICU LOS
- Ventilator days
- Anticoagulation and reversal
- TBI management
- SCI management
- Common complications
- Hospital fall-prevention outcomes
- Psychological implications and screening outcomes in geriatric trauma
- Caregiver support and education
- Community fall-prevention outcomes
- Community geriatric trauma injury prevention outcomes

Table 13. PI Recommendations* for the ACS TQP Best Practices Guidelines for Geriatric Trauma Management

Trauma Center PI Recommendations	Outcome Measure	Integration into Trauma PI Process
Geriatric trauma activation criteria compliance	80%	Standard audit filter event
Trauma resuscitation guidelines are followed	80%	Standard audit filter event
Appropriate pain management guidelines are followed	80%	Standard audit filter event
Temperatures are recorded, and hypothermia measures are initiated	80%	Standard audit filter event
Skin assessment during the secondary survey is documented	80%	Specific review
Frailty score is documented within 24 hours	80%	Specific review
Capacity assessment is documented	80%	Specific review
Goals of care are documented	80%	Specific review
Anticoagulation assessment and interventions are documented	80%	Standard audit filter event
Medication reconciliation is documented	80%	Standard audit filter event
ICU admission criteria is compliant	80%	Standard audit filter event
Delirium screening, prevention, and treatment are compliant	80%	Specific review
Imaging guidelines for TBI and SCI are compliant	80%	Specific review
Interdisciplinary rounds occur per the guidelines	80%	Specific review
Psychosocial assessments and interventions are documented	80%	Specific review
Abuse screening is performed, and intervention is documented	80%	Specific review
Fall assessment and interventions are documented	80%	Specific review
TQIP quarterly benchmark reports that review geriatric patients, geriatric blunt multisystem trauma, abuse, palliative care, and isolated hip fractures are evaluated for PI opportunities	100%	Specific review

*NOTE: PI elements will align with the phases of care provided to the geriatric trauma population.



APPENDIX A: ACRONYMS

A

ACS - American College of Surgeons
ADL - activity of daily living
AF - atrial fibrillation
AGS - American Geriatric Society
AKI - acute kidney injury
AKIN - Acute Kidney Injury Network
AV - atrioventricular

B

BC - BEERS Criteria
BD - base deficit
BGS - British Geriatrics Society
BPGs - best practices guidelines

C

CAM - Confusion Assessment Method
CDC - Centers for Disease Control and Prevention
CFS - Rockwood Clinical Frailty Scale
CNS - central nervous system
COPD - chronic obstructive pulmonary disease
CSHA-FI - Canadian Study of Health and Aging Frailty Index
CT - computed tomography

D

DDAVP - desmopressin
DOAC - direct oral anticoagulant
DSM-5 - *Diagnosis and Statistical Manual of Mental Disorders, Fifth Edition*
DVT - deep vein thrombosis

E

ECG - electrocardiogram
ED - emergency department
EMR - electronic medical record
EMS - emergency medical services

F

FFP - fresh frozen plasma
FRAIL - International Association of Nutrition and Aging Frailty Scale

G

GCS - Glasgow Coma Scale
GFR - glomerular filtration rate
GI - gastrointestinal
GLF - ground-level fall
GTT - geriatric trauma team

H

HELP - Hospital Elder Life Program
HF - heart failure

I

ICH - intracranial hemorrhage
ICU - intensive care unit
INR - international normalized ratio
IRF - inpatient rehabilitation facility

L

LOC - loss of consciousness
LOS - length of stay
LVF - low-velocity fall

M

MAOI - monoamine oxidase inhibitor
mFI - modified frailty index
MHV - mechanical heart valves
MOBID-2 - Mobilization-Observation-Behaviour-Intensity-Dementia [Pain Scale]
MVC - motor vehicle crash

N

NIAAA - National Institute of Alcohol Abuse and Alcoholism
NICHE - Nursing Improving Care of Health System Elders
NSAID - nonsteroidal anti-inflammatory drug

O

OH - occult hypoperfusion
OT - occupational therapy

P

PAC - postacute care
PACSLAC - Pain Assessment Checklist for Seniors with Limited Ability to Communicate
PAD - peripheral arterial disease
PAH - pulmonary arterial hypertension
PAINAD - Pain in Advanced Dementia, (screening tool)
PCC - Prothrombin Complex Concentrates
PI - performance improvement
PM&R - physical medicine and rehabilitation
PT - physical therapy
PTSD - posttraumatic stress disorder
PTT - partial thromboplastin time

R

RBC - red blood cell
RFS - Rockwood frailty score
RIFLE - Risk, Injury, Failure, Loss, End-stage
ROSE - Risk Stratification of Syncope in the Emergency Department
RRT - renal replacement therapy
RSI - rapid sequence induction
RUSH - rapid ultrasound in shock

S

SBIRT - Screening, Brief Intervention, and Referral to Treatment
SBP - systolic blood pressure
SCI - spinal cord injury
SDH - subdural hematoma
SFSR - San Francisco Syncope Rule
SI - shock index
SNF - skilled nursing facility
SNRI - serotonin and norepinephrine reuptake inhibitor
SSRI - selective serotonin reuptake inhibitor
ST - speech therapy
STEADI - Stopping Elderly Accidents, Deaths & Injuries

T


TBI - traumatic brain injury
TCA - tricyclic antidepressant
TEG - thromboelastography
TMD - trauma medical director
TQP - Trauma Quality Programs
TQIP - Trauma Quality Improvement Program
TSFI - trauma-specific frailty index
TUG - Timed Up and Go
TXA - tranexamic acid

U

UK - United Kingdom
US - United States
UTI - urinary tract infection

V

VES-13 - Vulnerable Elders Survey
VTE - venous thromboembolism



**APPENDIX B:
FUNCTIONAL
GAIT, BALANCE,
FALL RISK, AND
HEALTH-RELATED
ASSESSMENTS**

30-Second Chair Stand: Tests leg strength and endurance by asking the patient to place their hands on the opposite shoulder, crossed, and stand up from a chair to a full standing position in 30 seconds or less. Available at www.cdc.gov/steady/pdf/STEDI-Assessment-30Sec-508.pdf.

Timed Up and Go (TUG): This involves timing the patient as they rise from a chair with armrests, walks 10 feet (with an assistive device if applicable), turns, walks back to the chair, and sits. An older adult who takes ≥ 12 seconds to complete the TUG is at risk for falling. Available at www.cdc.gov/steady/pdf/TUG_Test-print.pdf.

30 Second Chair Stand: The provider records how many times the patient can fully stand and sit in 30 seconds. For patients 75–79 years old, < 11 stands in men and < 10 stands in women is considered abnormal and represents an increased fall risk. Available at <https://www.cdc.gov/steady/pdf/STEDI-Assessment-30Sec-508.pdf>.

4-Stage Balance Test: Patients are asked to stand for at least 10 seconds with feet beside each other, with insole of one foot touching great toe of other foot, in a tandem stance (heel of a foot touching toes of other foot), and on one foot. Patients unable to hold the tandem stance for 10 seconds are at increased risk of falling. This test can be delivered in conjunction with other measures, such as the 30-Second Chair Stand and TUG, for assessment of postural hypotension, which can help indicate if a patient is at risk of falling. Available at www.cdc.gov/steady/pdf/4-Stage_Balance_Test-print.pdf.

Berg Balance Scale: This is a 14-item objective measure that assesses static balance and fall risk in adults. Available at www.sralab.org/rehabilitation-measures/berg-balance-scale.

Mobility Devices: Observe a patient's use of assistive devices (e.g., cane, walker) or personal assistance, their extent of ambulation, and restraint use. Evaluate the fit of assistive devices.

- **Cane fitting:** Assess placement of the top of the cane, which should be at the top of the greater trochanter. When the patient holds the cane, their elbow is bent at approximately 15 degrees. Canes are most often used to improve balance but can also be used to reduce weight-bearing on the opposite leg.

- **Walker fitting:** Walkers are prescribed when a cane does not offer sufficient stability. Front-wheeled walkers allow a more natural gait and are easier for patients with cognitive impairment to use. Four-wheeled rolling walkers (i.e., rollators) have the advantage of a smoother, faster gait but require more coordination because of the brakes. Rollators are also good for outside walking, because the larger wheels move more easily over sidewalks.

Feet and Footwear Evaluation: Safe elements of footwear include proper anatomical fit, a well-fitting toe box, limited heel height, a sufficiently broad heel, a firm insole and midsole, an outsole with sufficient tread, firm heel counter with snug fit, and an easy and effective closing mechanism. Details available at www.sciencedirect.com/science/article/pii/S0378512219301318.

Measuring Orthostatic Blood Pressure: Make this part of the assessment protocol and follow the standard procedure. Description available at www.cdc.gov/steady/pdf/Measuring_Orthostatic_Blood_Pressure-print.pdf.

CDC STEADI—Three Key Questions. Patients are at risk if they respond affirmatively to any of the following questions:

1. Do you feel unsteady when standing or walking?
2. Do you have any worries about falling?
3. Have you fallen in the past year? » If YES, ask, “How many times?” and “Were you injured?”

The CDC STEADI guidelines are available at <https://www.cdc.gov/steady/pdf/STEDI-Algorithm-508.pdf>.

Stay Independent Check Your Risk for Falling: A 12-item fall risk self-assessment tool that is incorporated into the CDC STEADI initiative. Available at www.cdc.gov/steady/pdf/Stay_Independent_brochure-print.pdf.

The STRATIFY Scale: One of the most popular and well-studied fall risk assessment tools. It addresses five key factors and uses a point system: History of falling, whether the patient is agitated, visually impaired, needs frequent toileting, and whether patient has transfer and mobility issues. Available at www.ahrq.gov/patient-safety/settings/hospital/fall-prevention/toolkit/stratify-scale.html.

The Johns Hopkins Fall Risk Assessment Tool: Seven key factors are assessed—patient age, fall history, elimination, medications, mobility, cognition, and use of patient care equipment. Available at www.hopkinsmedicine.org/institute_nursing/models_tools/fall_risk.html.

The Morse Fall Scale: Six key factors are assessed—history of falling, secondary diagnosis, use of ambulatory aid, intravenous therapy, gait, and mental status. Available at networkofcare.org/library/Morse%20Fall%20Scale.pdf.

Tinetti Gait and Balance Test: Assesses perception of balance and stability during ADLs. Also assesses fear of falling and is utilized in individuals with neurodegenerative diseases such as Parkinson's disease and multiple sclerosis. Available at <https://www.ncbi.nlm.nih.gov/books/NBK578181>.

BEST PRACTICES GUIDELINES
**GERIATRIC TRAUMA
MANAGEMENT**



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