Silver Trauma

Learning module for PGY 1-4
45 minutes
Objectives

1. Revise the physiological and other age-related changes in the elderly.

2. Understand how these affect their
   a) risk of injury
   b) responses to trauma
   c) responses to treatment

3. Learn about current treatment recommendations for elderly trauma patients.
Why study geriatric trauma?

The Silver Tsunami
Like most developed countries, Australia's population is ageing as a result of sustained low fertility and increasing life expectancy. This has resulted in proportionally fewer children (under 15 years of age) and a large increase in those aged 65 and over.
Trauma stats in the elderly

- Elderly patients with simple falls are the **most frequent trauma admission** in the UK.
- In the US, falls are the **leading cause of fatal and non-fatal injuries** in the elderly.
- The elderly have increased mortality across the trauma trimodal death curve: immediate (ie, at the scene), early (ie, within the first 24–48 hours), and delayed (ie, after 48–72 hours).
The deadly trifecta

Ageing anatomy + physiology

Polypharmacy

Comorbidities
Age-related Changes
Cardiovascular

- Less effective pump
- Minimal reserve
- Medication effects
- Ischemia/Hypoxia
Renal

• Diminished renal blood flow
• Progressive decline in filtration function
• Decreased drug elimination
Respiratory

• Lungs
  – Decreased elasticity
  – Decreased alveoli

• Musculoskeletal
  – Decreased Chest Wall Strength
  – Increased Chest Wall Rigidity

• Infectious Risks
  – Decreased Force of Cough
  – Decreased Clearance Rate
Effect in Trauma

• Overall, elderly patients will need to work harder with each inspiration to open collapsed airways.
• This is exacerbated by their injuries, and worsened further by pre-existing lung disease.
• Minor chest injuries frequently result in significant complications and morbidity
• Age > 65 with a RR < 10 = 100% mortality rate

EAST Practice Management Guidelines Work Group J Trauma 2003;54:391
CNS

- More atrophy
- Increased dural vein fragility and tension
- More space for hematoma collection before symptoms
- Age >65 have 30%–85% mortality with intracranial hemorrhage (ICH) – this is 2 - 5 x higher than younger patients with matched injuries.

Case 1

• A 97-year-old woman fell while getting out of bed

• Normal activity throughout day; eventually presents with moderate upper neck pain

• No neurological deficits on exam
Your next step should be:

a) Clear her neck using the Canadian C-spine rule
b) Do plain films
c) Do plain films at 45 degrees rotation
d) Do a CT of her C-spine
The answer is:

d) Do a CT of her C-spine

- Age >65 = 2 × more likely to have C-spine fractures
- Odontoid: 20% of C-spine fractures vs. 5% in younger patients
- Age >65 is identified as high risk in the Canadian C-Spine Rule


Other age related changes

- Poor visual acuity
- Poor hearing
- Impaired reaction times
- Limited neck rotations
- Slower gait
- Poor muscle coordination/reflex
Case 2

A 72 year old patient in a nursing home fell and caught her arm against the bed rail.

Given the minor mechanism of injury, what is the MOST likely explanation for the severity of this laceration?

*Paramedic on-line learning centre*
a) There was a pre-existing injury on the patient's arm that reopened when she fell.

b) The patient is lying about the mechanism in order to cover up abuse by a caretaker.

c) The patient's skin has become thinner and lost elasticity as she has aged.

d) Joint weakness caused the patient to fall with greater force than normal for this mechanism.
The answer is:
c) The skin has lost elasticity

As people age, their skin becomes thinner and less elastic. Trauma to the skin becomes more likely, and more severe lacerations can be caused by comparatively less force.
Comorbidities

- diabetes
- COPD
- hypertension
- IBD
- dermatitis
- uveitis
- bipolar
- obesity
- stroke
- dyslipidemia
- anxiety
- depression
- hyperlipidemia
- fibromyalgia
Prevalence of pre-existing conditions

- 4th decade—17%
- 6th decade—40%
- 7th decade—69%
- 9th decade—80%

Comorbidities make it difficult for patients to respond to the acute stress of trauma
Some carry a higher mortality

• A retrospective review found that
  – previous CVA (p=0.003) and
  – history of CCF (p=0.0009) carried higher morbidity.

• Higher **numbers** of comorbidities (p=0.0273) were significantly associated with mortality.

• Patients **with** comorbidities were between 2 - 8 x more likely to die within five years of injury compared to those without.
Polypharmacy
Drugs can contribute to trauma

- Anti-hypertensives (postural hypotension causing falls)
- Diuretics (getting up at night causing falls)
- Sedatives (unsteadiness causing falls)
- Antidepressants (higher serotonergic activity)
- Diabetic medications (hypoglycaemia causing falls)

Preventing Falls: 10 types of medications to review if you’re concerned about falling by Leslie Kernisan, MD MPH
Drugs can *complicate* trauma

- Beta blockers leading to blunting of the contractile and inotropic cardiac response
- A normal BP for a younger patient can constitute frank hypotension in an elderly patient who has a hypertensive history.
- Anticoagulants and anti platelet agents cause increased bleeding.
Warfarin and head trauma

- 9% of elderly patients with head injury are on warfarin
- Risk of spontaneous ICH on warfarin is 0.3–5.4%
- In head trauma on warfarin with no symptoms, 7%–14% have an ICH
- Patients often have a high INR, 11% have INR > 5
Case 3

- 90-year-old woman presents 3 days after fall in bathroom, when she hit her head on toilet
- No symptoms for 2 days
- This morning, mild headache and face pain
- Medications: warfarin, oxycodone, amitriptyline
Which is true of rapid warfarin reversal protocols:

a) They significantly decrease mortality in patients with intracranial bleeds who are on warfarin

b) They are difficult to implement

c) They do not change outcomes

d) They are effective in patients on anti-platelet medications
The answer is:
a) Significantly decrease mortality

- Protocol for patients with suspected head trauma on warfarin
  - Immediate evaluation and CT brain
  - Cross match, thaw 2 units FFP
- +ve head CT: FFP, Vit K IV, neurosurg R/V
- -ve head CT: admit for observation
- 82 patients, 19 with ICH
- Time to warfarin reversal ↓ from 4.3 hrs → 1.9 hrs
- Mortality dropped from 48% to 10%

Treating Silver Trauma

“Treat the patient with injuries, NOT the injuries on a patient”
Improving triage

• They may have “normal” vital signs
• Simple falls from standing are USUALLY UNDER TRIAGED.
• The Injury Severity Score proves erratic when applied to older patients.
• Based on age alone, a higher level of trauma activation decreased ED LOS and mortality in injured geriatric patients.

Hammer, P. Journal of Trauma and Acute Care Surgery: July 2016 - Volume 81 - Issue 1 - p 162–167
Managing head trauma

• Low threshold for head CT
• Rapid confirmation of ICH with CT, combined with prompt treatment and reversal of anticoagulation when indicated, decreases progression of ICH and reduces mortality
• In patients > 65 years, a GCS < 8 is associated with a dismal prognosis.
Managing the C-spine

• Low threshold for CT
• Higher instance of Central Cord syndrome due to age related narrowing of cervical canal and vascular disease of spinal arteries
• Higher instance of C-spine fractures
Case 4

You are caring for an otherwise healthy elderly patient who fell down a flight of stairs.

The patient is a 79 year old female complaining of neck pain. You provide the patient will full spinal immobilization and are transporting her to the local trauma centre for evaluation.

While en route your patient begins to complain of increasing dyspnea.
What is most likely causing your patient's dyspnea?

a) The straps on the backboard are misplaced.

b) The patient's COPD is increasing her respiratory effort.

c) The patient is suffering from a pulmonary embolism.

d) The patient's neck is being hyperextended.
The answer is:

d) Her neck is being hyperextended

• Elderly people may develop spinal curvatures that make using a backboard problematic.
• Hyperextension of the head can lead to occlusion of the airway.
• You may need to use extra padding to accommodate your patient.
Managing chest trauma

- Prospective cohort of 405 patients admitted with rib fractures from blunt trauma
- 113 patients > 65 years old
- **Elderly had much higher mortality (20% vs. 9%)**
- Isolated thoracic trauma
  - 75% of elderly patients sustained this by fall from standing
  - Mortality 15% if age >65; 0% if <65
  - Pneumonia 34% if age >65; 11% if <65
- Most geriatric deaths occurred >72 hours after trauma and resulted from sepsis or respiratory failure

Case 5

• A 78-year-old female, lap-belted driver sustains blunt chest trauma following a collision. Her medical history includes mild chronic airway disease.

• Vital signs = BP 156/84 mmHg, HR 88/min, RR 26/min, SaO2 88%.

• Breathing is splinted. Palpation reveals tenderness along the posterior aspect of the right chest wall.

• A CXR shows 3 nondisplaced rib fractures, with no pneumo or hemothorax.
Which of the following management plans is best for this patient?

a) Do a CT chest, and if no aortic injury or pneumothorax, discharge and arrange follow-up within 48 hours.

b) Do an ABG, and admit for observation, incentive spirometry, and aggressive pulmonary toilet.

c) Do an intercostal nerve block, observe the patient for 6 hours, repeat the CXR, and discharge if no new changes.

d) Prescribe pain medication, and arrange a follow-up visit within 48 hours.
The answer is:

b) ABG, observation, spirometry etc

• Blunt trauma risks damage to both the chest wall and structures like lungs, vessels, diaphragm etc

• Geriatric patients with rib fractures do poorly. It is critical to monitor them with continuous pulse ox and early ABG. Admit patients with ≥ 2 rib fractures and treat with early ambulation, incentive spirometry, and aggressive pulmonary toilet.

• Rib fractures cause splinting, atelectasis, retained secretions, and pneumonia. Adequate pain relief is crucial, but not sufficient treatment.

David B. Levy, DO, FAAEM, FACEP
When to send to ICU?

- Shock
- Chronic cardiovascular or renal disease
- Pelvic fracture
- Haemoperitoneum
- Base deficit may be useful in determining the status of initial resuscitation and risk of mortality. Consider ICU admission for patients > 65 years with an initial base deficit of ≤ −6 mEq/L
Case 6:

An 80-year-old man sustains multiple contusions and abrasions following a fall in his apartment building.
The ambulance officers found him at the bottom of a flight of 7 concrete steps.
He appears somewhat confused.
Which step is most appropriate during the initial assessment and stabilization of this patient?

a) Consider early invasive monitoring of arterial blood pressure, CVP, and pulmonary oxygen saturation

b) Employ less aggressive resuscitation measures than would be used for younger patients

c) Interpret normal blood pressure and heart rate values as indicating satisfactory tissue perfusion

d) Remove dentures to facilitate bag-mask ventilation
The answer is:

a) Consider early invasive monitoring

- Significant compromise can exist despite apparent haemodynamic stability (HR, BP). Early invasive monitoring can markedly improve outcome.
- Age often mistakenly biases caregivers against rendering aggressive care for elderly trauma patients.
- Hypertension and stiffening of blood vessels can give falsely high readings in older patients. Even with satisfactory BP and HR, many patients may be in occult shock.
- Well-fitting dentures facilitate bag-valve-mask ventilation and should be left in place to improve the mask seal.
Take-Home Points

• Elderly patients break easily
• **Falls = Trauma**
• Advanced age is not an absolute predictor of poor outcomes, so should NOT be used as the sole criterion for limiting care in trauma.
• Most elderly trauma patients will return home, and up to 85% will return to independent function.
Do

- Do look for a causative event / comorbidities
- Do resuscitate early
- Do be alert for altered responses
- Do have a low threshold for CT and ICU
- Do admit rib fractures
Don’t

• **DO NOT** force the patients positioning
• **DO NOT** keep patients supine
• **DO NOT** use too much of any medication
• **DO NOT** delay surgery unnecessarily
• **DO NOT** limit care purely based on age
You have completed the module.

Click to do your test.
1. What is the leading cause of injury in the over 65 year old population?

a) Motor vehicle accident
b) Suicide
c) Pedestrian versus Car
d) Falls
2. Possible causes of falls include:

a) Polypharmacy
b) Alcohol
c) Dizziness
d) All the above
3. Patients aged > 65 years old with 2 or more rib fractures have a higher than 30% mortality rate.

a) True
b) False
4. Which of the following regarding patients on warfarin is **not** true?

a) Delayed acute subdural hemorrhage occurs in patients on warfarin.

b) 11% of all patients on warfarin presenting to an emergency department have an INR > 5.

c) In cases of head trauma in patients on warfarin with no symptoms, the incidence of intracranial hemorrhage is 4%.

d) 9% of all elderly patients with traumatic brain injury are on warfarin.
5. Which statement is true?

a) Osteoarthritis is not associated with canal stenosis.

b) Dramatic changes to the skin in elderly patients can cause hyperthermia and accelerated healing.

c) Elderly patients experience fractures most commonly in the elbows, fingers and knees.

d) Treatment of elderly patients should include attention to nutrition, drug interactions, and chronic diseases.
6. Concerning the epidemiology of geriatric trauma, which is true?

a) Blood pressure usually proves a reliable parameter during monitoring for shock

b) Diminished physiologic reserve capacities of the heart and lungs contribute considerably to the high morbidity and mortality rates associated with geriatric trauma

c) The initial Injury Severity Score generally correlates well with predictions of morbidity and mortality in geriatric trauma

d) Only 10% of previously healthy elderly patients with major trauma will eventually return to independent living
7. What makes the elderly more likely to sustain a brain injury?

a) Decreased brain size
b) Increased skull size
c) Decreased skull size
d) Increased brain size
8. Which is most true: elderly patients are susceptible to falling because:

a) Their ability to balance deteriorates.

b) They are uncomfortable using aids such as canes and walkers.

c) They often wear shoes without sufficient traction.

d) Their homes are often in disrepair and contain more falling hazards.
9. The most common cause of cervical spine injuries in the elderly is:

a) MVA
b) Fall down stairs
c) Same level falls
d) Pedestrian vs. car
10. All of these statements are true of geriatric trauma patients EXCEPT:

a) Symptoms of intracranial haemorrhage may be delayed
b) Cervical spine fractures are less common with increasing age
c) Elderly patients have decreased pulmonary reserve
d) Orthopedic injuries alone may cause significant hypovolemia
You are finished! Please rate this module honestly so we may continue to improve your learning experience.

• Do you feel you achieved the stated learning objectives?
  (No/Somewhat/Mostly/Definitely)
• Was the content relevant to your clinical practice?
  (No/Somewhat/Mostly/Definitely)
• Was the format easy to follow?
  (No/Somewhat/Mostly/Definitely)
• Was the time frame (1 hour) appropriate?
  (Too long/Too short/Correct time)
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  (Box allowing them to type)
Thank you for your feedback.

Your test score is:
A certificate will be emailed to you.