1. Key Messages

The Victorian State Trauma System provides support and retrieval services for critically injured patients requiring definitive care, transfer and management. This older person trauma guideline provides advice on the initial management and transfer of major trauma patients who present to Victorian health services with severe injuries.

This guideline is developed for all clinical staff involved in the care of trauma patients in Victoria. It is intended for use by frontline clinical staff that provides early care for major trauma patients; those working directly at the Major Trauma Service (MTS) as well as those working outside of a MTS.

These guidelines provide the user with accessible resources to effectively and confidently provide early care for critically injured patients. They provide up-to-date information for front-line healthcare clinicians. The guideline is evidence based, has followed the AGREEII methodology for guideline development and is under the auspice of the Victorian State Trauma Committee (VSTC).\(^1\)

**Clinical Emphasis Points:**

- Older person trauma patients are a specialised patient population that requires consideration of the effect that increased age has on physiological functions.
- The older patient may be more vulnerable and less adaptable to changes due to pre-existing injuries / illness and co-morbidities.
- They may be on multiple medications that mask signs of shock and may make assessment and management more challenging.\(^2\)
- Diminished senses such as vision and hearing combined with slower reaction times are associated with an increased risk of trauma in the older population.
- Trauma may have been precipitated by a medical condition. It is important to consider potential precipitants during patient workup.
- Older patients are often under-triaged. A higher index of suspicion of injury should be maintained even with a seemingly innocuous mechanism of injury.
- The principles of emergency assessment and management are the same for the older person population.
- As in all clinical scenarios, the patient should be viewed in the context of the person as a whole, not just as an injury or illness. This should include their medical history, their functional capacity (including their ability to participate in therapies including transportation) and their personal values.
- Established Advance Care Plans and Goals of Care should be integrated into management strategies. Patient Centred Care should aim to preserve or improve Quality of Life, not simply extend Quantity of Life.
Older Person Trauma

Make early contact with ARV for advice from the major trauma services and to initiate retrieval.

**Early Activation**
- Gather vital information
- Activate Trauma Team
- Designate roles
- Set up to receive patient
- Ensure safety using PPE

**Primary Survey**

**AIRWAY / C-SPINE**
- Assess airway stability & protect as required
- May have diminished cough and gag
- Care needed when inserting CPA/Endo
- Incomplete, ill-fitting dentures may need to be removed prior to intubation
- Maintain full spinal precautions

**BREATHING**
- Identify and treat life threats
- Assess RR, work of breathing, SpO2, & symmetry
- Oxygen therapy to maintain SpO2 between 94-98%
- ETCO2 monitoring if intubated, maintain b/w 35-45mmHg

**CIRCULATION:**
- Insert x 2 large bore IV cannulas
- IO access if required
- Assess HR/SpO2/Cap refill
- Initial management of hypovolaemia - crystalloid fluids, 20ml/k, then consider blood products
- Monitor the patient’s physiological response

**DISABILITY**
- Assess conscious level - AVPU
- Check pupils
- Test SSL
- Note if patient is taking anti-coagulant medication

**EXPOSURE / ENVIRONMENT**
- Fully expose and inspect patient
- Prevent heat loss
- Log roll

**ADJUNCTS**
- FAST scan
- Analgesia
- X-ray: Chest, Pelvis
- Bloods – FBE, X-match, U&E, Lipase, LFT, Lactate, ABG, Troponin
- 12 lead ECG
- Oesophageal tube if intubated
- AMPLE mnemonic

**Mechanism**
- Falls are the leading cause of trauma-related mortality in the older person population, with low falls (<= 1m) steadily rising. Trauma may also have been preceded by a medical event.
- A higher index of suspicion of injury should be maintained even with a seemingly innocuous mechanism of injury.
- Older patients are twice as likely to have a spiral cord injury as a younger patient with the same mechanism. Degenerative changes and stiffening of the lower cervical spine make higher (C1-C2 and odontoid) fractures likely.

**Pre-existing Illness**
- The older patient may be slower or unable to generate an adequate physiological response to shock.
- Fluid resuscitation – administer 20ml/kg crystalloid fluid and observe the response, especially if the patient has a cardiac history.

**Medications**
- A combination of cardiac medication may blunt a patients response to trauma, masking the physiological signs of shock.
- Patients taking oral anticoagulants have a higher risk of significant ICH due to minor head injury, with a higher frequency of bleeding and severity. A lower threshold to CT scan these patients should be considered.
- A reduction in mortality of those with intracerebral haemorrhage is seen when the anticoagulation is rapidly reversed.

**Management Considerations**

**Key Points**

**Patient needs potential major trauma criteria?**
- Yes
- Notify ARV to conduct case assessment
- Manage cervical spine using NEXUS criteria
- Perform secondary survey
- Monitor vital signs and GCS closely
- Observe in totality
- Provide required care, discharge and follow up as necessary

- No
- Consider social situation prior to discharging the older person over night, particularly if they live alone. Ensure safety.

**Does patient meet potential major trauma criteria for inter-hospital transfer?**
- Yes
- Prepare patient for retrieval and definitive care
- Perform any interventions as necessary to stabilise patient for transfer
- Imaging as required if time and safety allows
- Maintain spinal precautions as required
- Prevent heat loss
- Monitor vital signs and respond promptly to deterioration
- Ensure clear, accurate and concise documentation
- Obtain history & commence secondary survey if time allows
- Consider Analgesia / Antibiotics / Tetanus
- Communicate with and support family and friends
- Communicate advanced treatment orders

- No
- Perform complete trauma evaluation including secondary survey
- Monitor vital signs and GCS closely
- Observe in totality
- Seek advice from ARV coordinators regarding treatment options
- Provide required care
- Involve other medical specialties as required
- Consider discharge destination, especially if it involves an extended journey
- Contact ARV if deterioration in patients condition occurs

**Treatment orders**
- Established Advance Care Plans should be integrated into management strategies. Patient care must aim to preserve or improve quality of life, not simply extend it.
- It is vital to consider the patient's requests with relation to resuscitation as well as the options for a quality of life. Early consultation with the patient and/or next of kin is essential to understand the patient’s wishes.

**ARV**
Adult Retrieval Victoria

1300 36 86 61 Statewide 24 hours
3. Introduction

Management of elderly trauma patients presents a unique set of challenges. The incidence of elderly major trauma in Victoria is increasing, with now 36.4% of adult major trauma presentations related to patients aged 65 years or over at 2014-2015. As clinicians we are all aware of the increasing population of elderly individuals. Those elderly individuals with sustained good health and greater autonomy are pursuing exciting and perhaps novel experiences which at times culminate in injury whilst other elderly patients are succumbing to trauma and injury during mundane everyday events. There is gender equality within the Elderly Trauma Population (ETP) as compared with the younger male-dominated Trauma population.

With the aging population comes more complex management issues unfamiliar to the younger trauma patient. Importantly it is a patient's physiologic reserve which can determine their recovery from traumatic injury rather than merely their chronological age. Co-morbid clinical conditions can fundamentally dictate an elderly patient's recovery and even survival following Major and even Minor Trauma. Be aware that even in situations where there are no overt life-threatening injuries the patient may succumb due to a limited physiologic reserve.

We are gradually understanding that we need to be pro-active in the pre-hospital setting and triage older trauma patients directly to MTS. There is the potential to under-estimate the burden of their injuries leading to protracted complex Hospital admissions increased morbidity and ultimate mortality.

Prehospital triage guidelines relating to vital signs may be unreliable in the older population, with certain medications masking the physiologic effects of trauma. Older patients are less likely to partake in risk taking behaviour and therefore less likely to be injured than younger individuals however older people are more likely to have a fatal outcome from their injuries. After admission for a fall ≤1 metre, the 1 year mortality rate for age 65 and older is approximately 47%. Elderly patients are less likely to die from the initial injury, rather due to secondary complications. The older patient will present with comorbid health conditions, prescribed medication and a frailty, making them more vulnerable to trauma and subsequent complications of hospitalisation such as pneumonia, infections and venous thromboembolism to name a few. Delirium can have a significant impact on Morbidity and Mortality for the Elderly Trauma patient - in both the short and long term. The in-hospital death rate for major trauma patients aged 85 years and over is as high as 35.2%.

The elderly may be more susceptible to injury due to co-morbidities and physical changes associated with aging and it is essential to be aware of these differences when managing the older person trauma patient.

Older person Anatomy and Physiology

Head and Neck:
- A decreased brain mass leads to stretching of the bridging veins, making them more susceptible to tearing and bleeding.
- There is a higher risk of significant ICH due to minor head injury, with a higher frequency of bleeding and severity if taking oral anticoagulants. A lower threshold to CT scan these patients should be considered.

3
A higher number of significant neck fractures occur in the elderly, even after low risk incidents.
Swallowing reflexes may be deficient, leading to possible airway challenges.

Cardiac:
- Pre-existing heart disease will lead to a diminished cardiac reserve.
- Patients with a history of CHF and those on anticoagulant and antiplatelet medication or negative inotropes and/or chronotropes are at higher risk of poor outcomes after trauma.
- The myocardium loses contractility resulting in a decreased cardiac output.
- Maximum heart rates and ability to compensate for hypotension may decrease as a result of age and medications.
- Vasculature thins and stiffens with ageing.
- Increased risk of dysrhythmias.
- Thrombosis may occur as a result of the trauma but also due to underlying undiagnosed malignancy.

Pulmonary:
- Underlying chronic obstructive pulmonary disease will impair lung function.
- Increased chest wall rigidity and worsening kyphosis may lead to decreased respiratory vital capacity and poor respiratory reserve.
- Lower lung capacity with significant hypoxia with physiological stress, making them more susceptible to the stressors of acute blood loss and fluid resuscitation.

Abdomen:
- Cirrhosis increases the risk of ischemia and reperfusion injuries as well as haemorrhage, post trauma complications and mortality.
- Pre-existing renal impairment in combination with volume depletion will lead to further renal function compromise with at times critical questions to be considered regarding Renal Replacement Therapy. It also makes the elderly population more prone to contrast induced nephropathy.
- Chronic kidney disease may be reflected in a high normal creatinine level due to a lower muscle mass.
- Urinary and Bowel aberrations can evolve insidiously.

Musculoskeletal:
- Kyphosis and an increased anteroposterior diameter of the thoracic cage can lead to a loss of intra-thoracic volume and thoracic cage compliance.
- Weaker bones and degeneration of joints make the ETP more susceptible to fractures, even in minor trauma.
- Frailty leads to decreased mobility and deconditioning, increasing the risk of falls and injury.
Frailty:

- Frailty is defined as a clinically recognisable state of vulnerability due to ageing associated decline in reserve and function in multiple physiologic systems.
- Frail patients with poor functional status and multiple comorbidities have worse outcomes after trauma. Pre-existing nutritional deficits may also play a role.
- Prolonged immobilisation will impact more significantly on the older patient. Active strategies to prevent deconditioning and pressure injuries will be required.

**Mechanism of Injury**

**Falls**

Falls are the leading cause of trauma related mortality in the elderly, with elderly patients more likely to require hospitalisation, suffer complications, have longer stays and require discharge to a rehab facility. Even relatively minor impact falls will often represent a major traumatic mechanism in the older person population and can lead to significant morbidity and mortality. Low falls (<1m) are steadily rising with a burgeoning number of our elderly patients falling from a standing position.

Direct contribution to the risk of falling can be due to decreased reaction times from arthritis, poor vision, as well as prescribed or over the counter medication. Syncope is also a common culprit, due to cardiac arrhythmias, neurological deficits, glucose derangements, poor blood pressure control as well as volume depletion. Poor pain management can also lead to an increase in falls as there can be a fear of moving which in turn weakens muscles and leads to gait disturbances.

Environmental factors also contribute to falls in the elderly due to stairs, rugs, uneven ground, pets as well as ill-fitting footwear.

**Road safety**

As the population continues to age, there will be more elderly drivers on the roads who are at risk of being killed or seriously injured. Older patients are more likely to have severe injuries at lower speeds, with drivers aged 75 years or over at a higher risk than any other group. Additionally, almost a quarter (24%) of pedestrians who lost their lives in 2015 were aged 75+. Slower reaction times, loss of clarity in vision and hearing, loss of muscle strength and flexibility as well as the use of prescription medication which may cause drowsiness all contribute to how well older people drive. Ambulance and emergency services will need to maintain a high index of suspicion to the potential of major trauma in this group so as not to under-triage.

**Elder abuse**

In the assessment of an elderly trauma patient intentional injury to the patient must be considered. It is known that some cases of trauma are as a result of physical abuse. In the older patient injuries sustained may result in higher mortality than in younger patients. As part of secondary survey as detailed history and examination should be performed. A variance in story, physical signs or delay in treatment could be indicators of elder abuse having occurred. This should prompt further investigation and reporting.
4. Early activation

Pre hospital services should notify the receiving hospital that a trauma patient is on their way. This information may be crucial to the management of the severely injured patient and can allow for communication to vital members of the response team as well as time to prepare the department for the patient’s arrival.

Once notification has been received it is important to:

1. Gather vital information from the notifier using the MIST mnemonic:
   - M Mechanism of injury
   - I Injuries found or suspected
   - S Signs: respiratory rate, pulse, blood pressure, SpO2, GCS or AVPU
   - T Treatment given

2. Ensure all staff involved in patient care are wearing gloves, aprons and eye protection. Personal protective equipment is vital in the care of trauma patients.

3. Activate the trauma team and available support departments (medical imaging, pathology). In small health service settings this may only consist of two clinicians. Additional staff may be gathered from wards or on call. It may be necessary to utilise the skills of all available resources including emergency response personnel in the initial trauma management.

4. Ensure good communication between all parties involved in managing the trauma. Use closed-loop communication, which ensures accuracy in information shared between response staff. Repeat instructions, make eye contact and provide feedback. Misinterpreted information may lead to adverse events. Designate roles and specific tasks to staff and maintain an approach based on teamwork.

5. Set up the receiving bay for the patient, including equipment checks, documentation, medications and resuscitation equipment.

If it is anticipated that transfer to an MTS will be required, early retrieval activation is essential (phone ARV on 1300 368 661).

- Early retrieval activation ensures access to critical care advice and a more effective retrieval response.
- Early activation and timely critical care transfer improves clinical outcomes for the patient.

If you are undecided, call the ARV coordinator who can provide expert guidance and advice over the phone or via tele/videoconference and link to an MTS as required.

5. Primary Survey

Using a systematic approach to trauma management remains the same in the elderly population. Comprehensive reviews are expected of the elderly patient and tertiary examinations can often be quite revealing - hence do them early and carefully.

Airway

Establishing and maintaining a patent airway to provide adequate oxygenation is the first objective.

Maintenance of an adequate airway can be complicated in the older patient due to dentition, tempero-mandibular joint arthritis, nasopharyngeal fragility, macroglossia (enlargement of tongue) and microstomia (small oral aperture).
Assess for stability:
- Attempt to elicit a response from the patient.
- Look for signs of airway obstruction (use of accessory muscles, paradoxical chest movements and see-saw respirations).
- Incomplete, ill-fitting or broken dentures may need to be removed. Well fitted full dentures may be beneficial left in place until definitive airway control is achieved.

Attempt simple airway manoeuvres if required:
- Open the airway using a chin lift, jaw thrust and neck tilt. (Do not apply a neck tilt if a spinal injury suspected.)
- Suction the airway if excessive secretions are noted or if the patient is unable to clear it themselves. Older patients may have a diminished cough and gag as well as hypertrophied mucous glands.
- Care must be taken when placing an oropharyngeal airway (OPA)/nasopharyngeal airway (NPA) due to the nasopharyngeal friability of the older patient.

Secure the airway if necessary (treat airway obstruction as a medical emergency).
If intubation is necessary it should be performed by a clinician experienced in airway management due to the increased difficulty from the effects of arthritis.

Consider intubation early if any of the following apply:
- Ongoing airway obstruction is present despite OPA.
- Adequate ventilation using a bag valve mask is not possible.
- An inhalation injury.
- Neurologically flaccid, decerebrate/decorticate posturing.
- A requirement for definitive airway protection.
- Altered level of consciousness, unresponsive to pain OR GCS < 8.
- Evidence of decompensation/ respiratory distress requiring invasive ventilation/chest wall injury.
Decrease in pulmonary reserves may impact on the timing of intubation.
Prior to attempting intubation, always have a plan for managing a difficult airway or failed intubation. Alternate adjuncts should be checked and prepared to accommodate the challenging airway.

Maintain full spinal precautions if indicated
Elderly patients are twice as likely to have a spinal cord injury (SCI) as a younger person with the same mechanism of injury. Degenerative changes and stiffening of the lower cervical spine make higher (C1-C2 and odontoid) fractures likely.
- Maintain full spinal precautions if indicated. Remember that an arthritic cervical spine increases the risk for injury.
- It may be necessary to place a towel or elevation device under the patients’ neck to maintain neutral alignment in the kyphotic elderly patient.
**Breathing**

The elderly patient has a decreased respiratory reserve and an increase in chronic disease. The combination of fragile tissues and degenerative changes make this patient group less tolerant of pulmonary injuries with associated increased mortality. 10% of elderly trauma patients have rib fractures, and up to 50% of fractures in this group are undetected on x-ray. Those over the age of 65 with rib fractures have an increased mortality.\(^{10}\)

**Record the oxygen saturation (SpO2)**

- Administer high-flow oxygen to maintain oxygen saturations between 94-98% in the initial resuscitation period.
- When managing patients who may be CO2 retainers the priority remains with maintaining oxygenation in the initial resuscitation period. This risk for hypoventilation as a result must be accepted and if it occurs intubation and mechanical ventilation may be necessary.

**Assess the chest**

- Measure the respiratory rate and work of breathing.
- Observe the chest movement, work of breathing including use of accessory muscles.
- Auscultate the chest for air entry/ breath sounds. This will assist in the identification of thoracic injuries but also identify co-morbidities that may impact on management.
- If breathing is inadequate first clinically exclude a tension pneumothorax by identification of the following:
  - Hypoxia.
  - Severe respiratory distress.
  - Shift in mediastinum or trachea to contralateral side.
  - Distended neck veins.
  - Absent or decreased breath sounds.
  - Hyper-resonance to percussion.
  - Tachycardia with peripheral vasoconstriction and in hypotensive shock.

**Circulation**

The older person responds more slowly to insults in their cardiovascular system and finds it difficult to generate an adequate response. Normal blood pressure and normal heart rate may not indicate normovolaemia. It is important to consider other signs of poor perfusion while assessing the older trauma patient.

**Assess circulation and perfusion:**

- Check the heart rate, blood pressure and neck veins. A BP which appears to fall in the normal range may in fact be relative hypotension if the patient is normally hypertensive.
- Inspect for any signs of haemorrhage and apply direct pressure to any external wounds. Consider the potential for significant internal bleeding related to mechanism of injury, which may lead to signs and symptoms of shock.
Anticoagulants are common medications for the elderly. This must be considered early and appropriate tests conducted if available.

- Insert two large-bore peripheral intravenous (IV) cannulas.
- As the IV is inserted take blood for glucose, full blood exam, cross-match, urea electrolytes and creatinine, lipase, liver function tests, lactate and blood gas if available. Troponin should also be performed if any signs of chest trauma.
- If intravenous access is difficult, obtain intraosseous access. Bone marrow aspirated from the IO can be used to X match blood and test BSL. Inform the laboratory that the specimen is taken from an IO. All medications and blood products can be safely administered through the IO line. Monitor IO continuously for signs of subcutaneous extravasation of fluids (“tissuing”) or failure of any kind. If this occurs, cease IO fluid administration and assess for compartment syndrome.
- Assess for other signs of shock such as colour, warmth, capillary refill, conscious state and urine output. Consider a low or high respiration rate or deteriorating mental state as a marker of inadequate circulation.
- Attach monitoring to assist in the early identification of deterioration and frequently assess.
- If the older patient is demonstrating signs of shock then administer 20mls/kg of isotonic crystalloid fluid. Monitor the patient’s physiological response. Volume resuscitation may result in clinical oedema due to pre-existing cardiac conditions. Take caution with the elderly, normally hypertensive patient on diuretics.

If necessary, perform a FAST scan
Consider the need for FAST (Focused Assessment with Sonography in Trauma) if available and if staff are trained in its use. FAST is used primarily to detect pericardial and intraperitoneal blood, and it is more accurate than any physical examination finding for detecting an intra-abdominal injury.\(^\text{11}\)
Elderly patients can be at risk of haemorrhage from even small pelvic or hip fractures. If the patient is hemodynamically stable and there are no signs of significant internal bleeding then it may be delayed until the secondary survey.

Disability
With the decreased brain mass elderly patients have a higher incidence of subdural and intraparenchymal haematoma. CT scanning can be a useful examination method and liberal use in the elderly patient may be beneficial, particularly if they are also on anticoagulant medication.\(^\text{7}\)
Changes with age such as visual and auditory decline, as well as decreased cognition due to Alzheimer’s / underlying dementia can make assessing the GCS in the elderly patient difficult.

Assess level of consciousness
- Perform an initial AVPU assessment (Alert, responds to Voice, responds to Pain, Unresponsive); check the pupillary response.
- Test blood sugar levels.
• Ensure that any alterations in level of consciousness are not related to a metabolic cause. Co-morbidities associated with the older patient place them at greater risk for abnormalities both causing and complicating management.

**Exposure/Environmental Control:**

• Remove all clothing from the patient and assess to ensure there are no other obvious, life-threatening injuries present. A log roll can be considered at this stage or be left until the secondary survey.

• Hypothermia can be detrimental in any trauma patients. Older patients are particularly at risk of loss of thermal regulation due to a decrease in dermal thickness and loss of vascularity. They have impaired ability to increase heat production and decrease heat loss by vasoconstriction.?

• Patient temperature should be monitored repeatedly via tympanic or axillary methods. Continuous monitoring via, oral, nasopharyngeal or rectal routes may be beneficial if available. Beware of thermometers that do not read below 35 degrees.

• Keep the patient normothermic by means of external warming, passive re-warming with blankets and a warm environment. If available, the use of a forced air-warming machine is recommended.

• Maintain modesty where possible (cover with sheet etc.).

• In the elderly trauma patient skin is sensitive and pressure areas can evolve rapidly. Ensure regular pressure area care is attended to, especially where transfer may be prolonged.

### 6. Secondary Survey

The secondary survey is only to be commenced once the primary survey has been completed and any life-threatening injuries have been treated. If during the examination any deterioration is detected, go back and reassess the primary survey.

**History**

Taking an adequate history from the patient, family members, bystanders or emergency personnel of the preceding events can assist with predicting possible injuries.

Elderly patients may require a longer period of time to divulge all elements of the history - be patient, listen and engage. It is also important to involve family members as well as the General Practitioner and the patient’s local pharmacist in determining an accurate and comprehensive history. Note any history of drugs or alcohol prior to and at the time of injury.

Use the AMPLE acronym to assist with gathering pertinent information:

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<thead>
<tr>
<th>A</th>
<th>Allergies</th>
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<tr>
<td>M</td>
<td>Medication (especially anticoagulants, antiplatelet agents, cardiac medications etc.)</td>
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<tr>
<td>P</td>
<td>Past medical history (include any recent falls as well as normal functional status)</td>
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<tr>
<td>L</td>
<td>Last meal</td>
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<td>E</td>
<td>Events leading to injury²²</td>
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Medications
Elderly patients are likely to be on a number of medications prior to the traumatic event. Studies have shown that patients taking a combination of Beta blockers, calcium channel blockers and an angiotensin converting enzyme inhibitor or angiotensin receptor binding agent show blunted haemodynamic responses to trauma.\textsuperscript{4} Sedatives and antihypertensive medications can increase the chance of trauma, particularly falls. Oral anticoagulants are prescribed for a number of conditions and their use places those at greater risk of dying particularly from head or abdominal injuries. A reduction in mortality of those with intracranial haemorrhage is seen when the International Normalised Ratio (INR) is rapidly reversed.

Limitation of treatment orders
It is vital to consider the patients requests with relation to resuscitation as well as the possible futility of efforts. The risk of mortality is increased in elderly patients who are hypotensive, aged greater than 74 years with a higher injury severity score. Early consultation with the patient and/or next of kin is essential to understand the patients’ wishes.

Head-to-toe examination
During this examination, any injuries detected should be accurately documented and any required treatment should occur, such as covering wounds, managing non-life-threatening bleeding and splinting fractures.

Head and face:
- Inspect the scalp. Look for any bleeding or lacerations. Do not probe the scalp and be cautious when examining as bone fragments and fractures may be present. Gently palpate for any depressions or irregularities in the skull. If a penetrating object remains lodged, do not remove it.

Lacerations can bleed profusely; control bleeding with direct pressure and bandaging. If this is not controlling the bleeding, consider temporary closure with staples or suturing. The wound will need to be thoroughly irrigated at a later stage.
- Inspect the face. Look for any lacerations or bruising. Periorbital bruising and/or mastoid bruising is indicative of a base of skull fracture; however, mastoid bruising will only occur 12–24 hours post injury.\textsuperscript{13}
- Look in the eyes for any foreign body, subconjunctival haemorrhage with no posterior limit, hyphema, irregular iris, penetrating injury or contact lenses.
- Assess the ears for any bleeding or blood behind the tympanic membrane, as well as any cerebrospinal fluid (CSF) leak. Check the nose for any deformities, bleeding, nasal septal haematoma or CSF leak. If a CSF leak is present, do not pack the nose; apply a bolster. To determine whether any clear fluid is CSF, the easiest method is to sample the fluid onto filter paper: if there is a formation of two rings (the ‘halo’ sign) this indicates the presence of CSF. Glucose should also be detected in the fluid, helping to differentiate it from mucus.
- Look in the mouth for any lacerations to the gums, lips, tongue or palate.
- Inspect the teeth, noting if any are loose, missing or fractured.
- Test eye movements, vision and hearing.
- Palpate the bony margins of the orbit, maxilla, nose and jaw.
• Inspect the jaw for any pain or trismus.

**Neck:**
• Inspect the neck. Ensure another colleague maintains manual in-line stabilisation while the hard collar is removed and throughout the examination.
• Gently palpate the cervical vertebrae. Note any cervical spine pain, tenderness or deformity.
• Check the soft tissues for bruising, pain and tenderness.
• Complete the examination of the neck by observing the neck veins for distension and by palpating the trachea and the carotid pulse; note any tracheal deviation or crepitus.

The patient will need to be log rolled to complete the full examination. This can be combined with the back examination. Elderly patients are at higher risk of pressure ulcers as a result of immobilisation in hard collars and may have difficulty tolerating lying flat. Those with severe degenerative neck problems (kyphosis or lordosis) may not tolerate standard rigid collars due to their postural alignment and should be held in the most comfortable position with soft padding and tape.10
If able, replace hard collar with a correctly fitted, longer term, padded cervical collar, e.g. Philadelphia collar.

**Chest:**
• Inspect the chest, observing movements. Look for any bruising, lacerations, penetrating injury or tenderness.

Blunt thoracic trauma carries a significant risk of complications and mortality, even with isolated rib fractures due to pneumonia and pulmonary contusions.
• Palpate for clavicle or rib tenderness. Even isolated rib fractures in the elderly population carries a significant risk of complications and mortality.
• Auscultate the lung fields; note any percussion, lack of breath sounds, wheezing or crepitations.
• Check the heart sounds: apex beat and the presence and quality of heart sounds.

**Abdomen:**
• Inspect the abdomen. Palpate for areas of tenderness, especially over the liver, spleen, kidneys and bladder. Look for any bruising, lacerations or penetrating injuries.

The abdominal examination may be unreliable due to decreased perception of pain and cognitive decline.
• Check the pelvis. Gently palpate for any tenderness. Do not spring the pelvis. Any additional manipulation may exacerbate haemorrhage.14

Pelvic fractures are less common but carry a high mortality with an increased risk of haemorrhage. Apply a binder if a pelvic fracture is suspected.
• Auscultate bowel sounds.
• Inspect the perineum and external genitalia.
Limbs:
Musculoskeletal injuries are very common in the elderly population, with forearm fractures being the most common, followed by hip fractures. Older person patients have a high mortality following a hip fracture and it is essential that these patients receive timely care with early surgical repair.

- Note any inequalities with limb response to stimulation and observe any shortening / rotation of lower limbs which may indicate a fracture to the hip.
- Inspect all the limbs and joints; palpate for bony and soft-tissue tenderness and check joint movements, stability and muscular power. Note any bruising, lacerations, muscle, and nerve or tendon damage. Look for any deformities, penetrating injuries or open fractures.
- Examine sensory and motor function of any nerve roots or peripheral nerves that may have been injured.

Back:
- Log roll the patient. Maintain in-line stabilisation throughout. Inspect the entire length of the back and buttocks noting any bruising and lacerations.
- Palpate the spine for any tenderness or steps between the vertebrae.
- Digital examination should be performed only if a spinal injury is suspected. Note any loss of tone.

Buttocks and perineum
- Look for any soft-tissue injuries such as bruising or lacerations.

Genitalia
- Inspect for soft tissue injuries such as bruising or lacerations. Check the urethra for any bleeding.

The priorities for further investigation and treatment may now be considered and a plan for definitive care can be established in conjunction with Adult Retrieval Victoria (ARV).

7. Planning and communication
For a trauma team to run effectively there must be an identifiable leader who will direct the resuscitation, assess the priorities and make critical decisions. Good communication between the trauma team members is vital, as is ensuring that local senior staff are aware and can provide additional support if required.

Once the initial assessment and resuscitation is underway, it is important to plan the next steps in immediate management. Priorities for care must be based on sound clinical judgement, patient presentation and response to therapies. Awareness of limitations in resources as well as training in the emergency field is vital. If escalation of care to senior staff is warranted, then do so early in the patient care episode. Do not wait until the patient deteriorates to ask for assistance.

Front line clinical staff should initiate contact with ARV early in the patient care pathway or, more importantly, as soon as it is identified that the patient meets the major trauma transfer criteria. This is important as they may have sustained injuries beyond the clinical
skill set of the hospital or urgent care centre. ARV can be contacted at any time throughout the patient care episode to offer or coordinate clinical advice and consultation. ARV coordinators can facilitate a three-way conversation between the referral health service, specialist resources and ARV consultant to discuss the best, timely management of the patient.

The decision of when to transfer an unstable patient should ideally be made by the transferring and receiving clinicians in collaboration with the retrieval service. Clear communication is crucial; the transmission of vital information allows receiving clinicians to mobilise necessary resources while the inadvertent omission of such information can delay definitive care. Information should be conveyed in both verbal and written form (via the patient record) and should include the patient’s identifying information, relevant medical history, pre-hospital management, evaluation and treatment (including procedures performed and imaging obtained).

There are many different types of structured handover. ISBAR & IRMIST-AMBO being two of the most common. ARV recommends using the IRMIST model of clinical handover:

- **Identification**: Introduce / identify clinician/self & their role, intro of the patient – age, sex, name.
- **Retrieval**: Reason for retrieval, from which referrer.
- **Mechanism of Injury / presenting complaint**: Specific explanation of the patients presenting problem and history of presenting complaint.
- **Injuries / Interventions**: Information relating to injuries. Complete top to toe summary. Include what interventions have been performed to help stabilise the patient – e.g. Size 8 ETT.
- **Signs / Symptoms**: Looks at the assessment of the patient, requires details of the patient current vital signs and GCS.
- **Treatments / Trends**: Identifies the treatment that was required – e.g. sedation / paralysis & how the patient’s condition has changed. Point of transition of responsibility and accountability for patient care.
- **Allergies**: Include what type of reaction.
- **Medication**: Patients usual medication.
- **Background History**: Patients medical history.
- **Other information**: Relevant social information.  

It is important that **additional communication** with the ARV coordinator is initiated when there is:

1. **Significant deterioration in**: conscious state, blood pressure, heart rate, respiratory status, oxygenation.
2. **Major clinical developments** such as significantly abnormal diagnostic tests and new clinical signs.
3. **The need for major interventions prior to the retrieval team arriving** (for example, intubation or surgery). This will ensure the retrieval team is prepared, the patient receives the appropriate care en-route and the patient is referred to the correct facility.
8. Limitation of treatment orders

Admission to hospital is usually necessary even with apparently minor injuries. In treating the complex elderly trauma there may be instances where the appropriateness of treatment may be questioned. Factors such as age, hypotension, and injury severity can significantly increase the risk of mortality. Clinicians must consider the futility of such resuscitation and where possible discuss this with the patient or seek the assistance of any advanced care directives or similar legal documents. Age alone should not be the sole determinant of limitations of care. Age significantly increases mortality from injury and more aggressive care can improve survival where it is in the best interests of the patient.

An older person may have had a partner for decades, this person should be involved in decision making about their care. Concern for the wellbeing of an uninjured partner is valid as they may have been under the care of the trauma victim. There is the possibility that an elderly person may die in the ED or while being transported. Conversations and decisions about things such as resuscitation, advance care plans and patient’s wishes need to take place with sensitivity and compassion. An important discussion will be around the older person’s right to refuse active treatment of injuries and concentrate on palliative goals of comfort. This must be delicately handled but clearly communicated to all treating clinicians.

9. Early management

Determining the events surrounding the trauma and whether it was related to a neurologic or cardiac event is crucial to help guide management.

Diagnostic imaging

Cervical spine, chest and pelvic x-rays may be performed as part of the early assessment of a major trauma patient, where available and the patient condition allows. Use of plain films should be liberal as long bones easily fracture and older patients do not always have the same sensation of pain relative to the injury.

Where an elderly patient has suffered a low fall with possible TBI and is taking OAC’s, a lower threshold for CT scanning should be adopted. Any patient who is on OAC’s is at high risk of developing a significant intracranial haemorrhage from even minor head injury mechanisms. CT imaging of the brain should be performed on all elderly patients with a history of head injury.

In multi-system trauma, consideration should be given to whole body CT scanning, especially where there is a distracting injury. If likely transfer to a MTS, decisions regarding timing of CT scanning should be discussed with ARV so as to avoid it being repeated. Careful consideration of the risks versus benefits may need to occur prior to contrast-enhanced radiological investigations.

Patients who are unable to comply with immobilisation for assessment and imaging should be reviewed early by a senior clinician who will consider the following:

- Balancing the risk/benefit of immobilisation, considering the mechanism of injury, comorbidities and clinical assessment.
• Balancing the risk / benefit of sedation to maintain immobilisation and facilitate safe imaging.  

Consider the need for FAST (Focused Assessment with Sonography in Trauma) if available and if staff are trained in its use. FAST is used primarily to detect pericardial and intraperitoneal blood, and it is more accurate than any physical examination finding for detecting intra-abdominal injury. FAST should be performed in all elderly patients with trauma from moderate to severe mechanisms.

**ECG**

An electrocardiogram should be completed on all elderly trauma patients to identify any preexisting abnormalities or whether the trauma was related to a cardiac event. Hypotension in the context of trauma may exacerbate the potential for cardiac / cerebral ischaemia - chest pain may in fact be an anterior infarct as opposed to related to the insult of injury.

**Optimising oxygenation**

Due to a decreased respiratory reserve, it is vital to optimise the elderly patients’ oxygenation. Elderly patients are more prone to complications of hospitalisation such as pneumonia, so methods should be implemented early on in the course of treatment to improve oxygenation and ventilation. The goal of treatment should focus on maintaining adequate oxygenation levels while considering baseline function. Encouraging deep breathing and coughing to avoid atelactic regions and adequate pain control.

**Fluid resuscitation**

Avoidance of hypovolaemia in trauma is a cornerstone of management. A balanced approach to fluid replacement is important, especially in establishing early treatment goals. Close monitoring and caution should be taken with the elderly patients with a history of CCF on diuretics. 

Resuscitation goals:
• The main goal of fluid resuscitation in trauma is to preserve vital organ function until bleeding can be controlled.
• In immediate trauma care aim for adequate vital organ perfusion (especially heart and brain) or a blood pressure greater than 90 mmHg systolic.
• The assessment of hypovolemic shock is difficult during the early phase of major trauma care. The clearest signs of end-organ hypo perfusion include decreased urine output, acidosis, altered conscious state and elevated lactate level.
• If possible, all blood/fluid administered to a major trauma patient should be warmed with a fluid warmer.

**Insert**

• Consider a gastric tube- NB: contraindicated in suspected base of skull fracture.
• Urinary Indwelling catheter – measure 1/24, aim for 0.5 – 1.0 mL/kg/hr. Perform urinalysis
• Perform urinalysis to check for blood, discoloured, brown urine may indicate myoglobinuria, a sign of rhabdomyolysis.
Monitor

- HR / RR / BP / SPO2 / GCS / Temp.
- Reassess every 15/60 or more frequently if indicated.
- Fluid Balance Chart – keep an accurate record of input / output.

Administer

- Analgesia: Adequate pain control is an essential component of the initial management of trauma in the elderly population. In elderly trauma patients with cognitive impairment, staff should look for non-verbal clues related to pain. Ongoing pain decreases coughing, leads to shallow hyperventilation, reduced FRC and retention of sputum. This is of particular concern for the elderly trauma patient who is more prone to developing pneumonia leading to mortality. Effective pain management can be achieved with the use of opioid analgesia as well as consideration of intercostal nerve blocks, likely managed in the MTS.

- Medications may have profound adverse effects which are not evident in the younger trauma patient - always think carefully about appropriate doses and liaise with Pharmacy colleagues.

- Tetanus Prophylaxis: updated in the case of significant or contaminated wounds. Tetanus immunoglobulin should be given to patients who have not received a complete primary immunisation.18

Monitor blood results

- Serial blood gas assessment of pH and lactate levels provide good monitoring of tissue oxygenation, circulatory status and response to resuscitation. An elevated lactate on admission indicates occult hypoperfusion and leads to a greater risk of mortality in the elderly population.19 Serial lactate measurements can be used to guide response to fluid resuscitation.

- Hb levels at 10g/dL should be maintained to maximize oxygen carrying capacity and delivery, however indiscriminate blood transfusions should be avoided.7

- A WCC response may not be mounted yet. Evolving sepsis may need to remain a concern.

- INR / APTT / PT should be assessed early in the clinical course and reversal considered if haemorrhage is suspected, particularly in Intra Cerebral Haemorrhage (ICH). Early recognition and correction of coagulation defects is crucial, including the reversal of drug induced anticoagulation. Patients with an elevated INR may benefit from the use of Fresh Frozen Plasma (FFP) / Prothrombin Complex Concentrates (PCC) and Vitamin K. (See Oral Anticoagulants in Trauma guideline for detailed discussion).

Wound Care

In a major trauma patient, early wound closure (pre-transfer) is not a priority. Elderly patients can have delicate, thinner skin that tears easily combined with poorer healing ability which can lead to infection. It is important to gain haemostasis through pressure and elevation where possible and remove any gross contamination by irrigation of the wound.
Simple dressings with saline, gauze, combine and moderate compression bandages are generally adequate. Suture simple wounds if time allows.

**Psychological health**

In the older patient the psychological impact may be under-appreciated and the patient may harbour terrible fears and concerns - these must be acknowledged and explored. They may also develop feelings of isolation and abject fear. Learn to talk with the elderly patient rather than at them. Ask them about their lives and about their past experiences - it takes five minutes of your time yet can be so important for the patient.

Liaise with inter-generational family members and remember the primary carer may also be quite elderly and in need of help - engage Nursing Staff and Social Work.

The priorities for further investigation and treatment may now be considered and a plan for definitive care established.

**10. Transfer and retrieval**

It is important to note that an exhaustive clinical workup and intervention is not always necessary or appropriate prior to transfer. Stabilisation and ensuring life-threatening problems are addressed, as well as taking measures to prevent deterioration en-route, are essential aspects of early care. Delaying transfer to obtain laboratory results or imaging studies may delay access to definitive treatment. Often such studies must be repeated at the receiving facility regardless.

In liaison with ARV clinicians, interventions to stabilise the patient prior to retrieval personnel arriving should be commenced. ARV will coordinate the retrieval and will evaluate the practical and clinical needs involved in transferring the patient from the referral hospital. Once retrieval staff arrive on scene, be prepared to give a thorough handover. Retrieval staff will assess the patient prior to transfer and may make changes to care in order to ensure the patient is safe during transfer.

The use of a transfer checklist can help to ensure that important information is not omitted and the patient is packaged accordingly.

At any time ARV coordination centre can facilitate a three way discussion with consultants from the Major Trauma Services (MTS) in order to determine management plans and ensure the patient is receiving the best care.

If a patient is triaged to an MTS but does not require MTS care, the patient should be a priority for early repatriation back to their local trauma unit as being closer to home will reduce patient and family emotional stress.
# AGREE II Score Sheet: Older person trauma guideline

<table>
<thead>
<tr>
<th>Domain</th>
<th>Item</th>
<th>AGREE II Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope and purpose</td>
<td>1. The overall objective(s) of the guideline is (are) specifically described.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. The health question(s) covered by the guideline is (are) specifically described.</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.</td>
<td>X</td>
</tr>
<tr>
<td>Stakeholder involvement</td>
<td>4. The guideline development group includes individuals from all the relevant professional groups</td>
<td></td>
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<tr>
<td></td>
<td>5. The views and preferences of the target population (patients, public, etc.) have been sought.</td>
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<tr>
<td></td>
<td>6. The target users of the guideline are clearly defined.</td>
<td>X</td>
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<tr>
<td>Rigor of development</td>
<td>7. Systematic methods were used to search for evidence.</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>8. The criteria for selecting the evidence are clearly described.</td>
<td>X</td>
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<tr>
<td></td>
<td>9. The strengths and limitations of the body of evidence are clearly described.</td>
<td>X</td>
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<tr>
<td></td>
<td>10. The methods for formulating the recommendations are clearly described.</td>
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<tr>
<td></td>
<td>11. The health benefits, side effects and risks have been considered in formulating the recommendations.</td>
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</tr>
<tr>
<td></td>
<td>12. There is an explicit link between the recommendations and the supporting evidence.</td>
<td>X</td>
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<tr>
<td></td>
<td>13. The guideline has been externally reviewed by experts prior to its publication.</td>
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<tr>
<td></td>
<td>14. A procedure for updating the guideline is provided.</td>
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</tr>
<tr>
<td>Clarity of presentation</td>
<td>15. The recommendations are specific and unambiguous.</td>
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<tr>
<td></td>
<td>16. The different options for management of the condition or health issue are clearly presented.</td>
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<tr>
<td></td>
<td>17. Key recommendations are easily identifiable.</td>
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<td>Domain</td>
<td>Item</td>
<td>AGREE II Rating</td>
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<tr>
<td>Editorial</td>
<td>22. The views of the funding body have not influenced the content of the guideline.</td>
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<tr>
<td>Overall</td>
<td>1. Rate the overall quality of this guideline.</td>
<td>2</td>
</tr>
<tr>
<td>Overall</td>
<td>2. I would recommend this guideline for use.</td>
<td>2</td>
</tr>
</tbody>
</table>

Legend:
- 1: Strongly disagree
- 2: Disagree
- 3: Somewhat disagree
- 4: Somewhat agree
- 5: Agree
- 6: Strongly agree

Note: Yes, with modifications.
12. References


