Trauma System Implementation Programme

Clinical Guidance Document

Management of Major Trauma in Older Adults

January 2023

Trauma Care Ireland

Seirbhís Sláinte Níos Fearr á Forbairt | Building a Better Health Service

HSE Policy/Document on Clinical Guidance Document, Management of Major Trauma in Older Adults

Document Reference		Document Developed by	The National Office for Trauma Services
Revision Number	1	Document Approved By	The National Trauma Programme Steering Group
Approval Date		Responsibility for Implementation	
Revision Date		Responsibility for Review and Audit	

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Abbreviations and Terminology

Abbreviation	Explanation
BOAST	British Orthopaedic Association Standards for Trauma
BMD	Bone Mineral Density
CPR	Cardiopulmonary Resuscitation
CGA	Comprehensive Geriatric Assessment
DOAC	Direct Oral AntiCoagulant
GCS	Glasgow Coma Scale
HSCP	Health and Social Care Professional
INR	International Normalised Ratio
ISS	Injury Severity Scale
MTA	Major Trauma Audit
MTC	Major Trauma Centre
MDT	Multidisciplinary Team
NICE	National Institute for Health and Care Excellence
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
NOGG	National Osteoporosis Guidelines Group
PCC	Prothrombin Complex Concentrate
RANP	Registered Advanced Nurse Practitioner
RNA	Rehabilitation Needs Assessment
RP	Rehabilitation Prescription
SCI	Spinal Cord Injury
TBI	Traumatic Brain Injury
TU	Trauma Unit (hospital designation, not ward designation)
TUSS	Trauma Unit with Specialist Services
UTI	Urinary Tract Infection
VTE	Venous Thromboembolism
WHO	World Health Organisation
WBCT	Whole Body Computerised Tomography

Trauma Network Terminology

Major trauma: Major trauma describes serious and often multiple injuries where there is a strong possibility of death or disability.

Major Trauma Centre (MTC): The most severely injured patients will be managed in two MTCs; Cork University Hospital and the Mater Misericordiae University Hospital. Each MTC will provide the highest level of specialist trauma care to the most severely injured patients on a single hospital site.

Trauma Unit (TU): As part of the trauma networks, a number of Trauma Units nationwide will deliver more general trauma care to the majority of patients who do not require the specialist trauma expertise of an MTC. Trauma Units will also be able to resuscitate and stabilise any injured patient and transfer to the MTC or Trauma Unit with Specialist Services when required.

Trauma Unit with Specialist Services (TUSS): The National Trauma Strategy recommends the development of University Hospital Galway as a Trauma Unit with Specialist Services, given the breadth and depth of services currently provided and travel distance from the nearest MTC. It will have additional resources and expertise above Trauma Unit status and be equipped to manage most major injuries.

1 Introduction

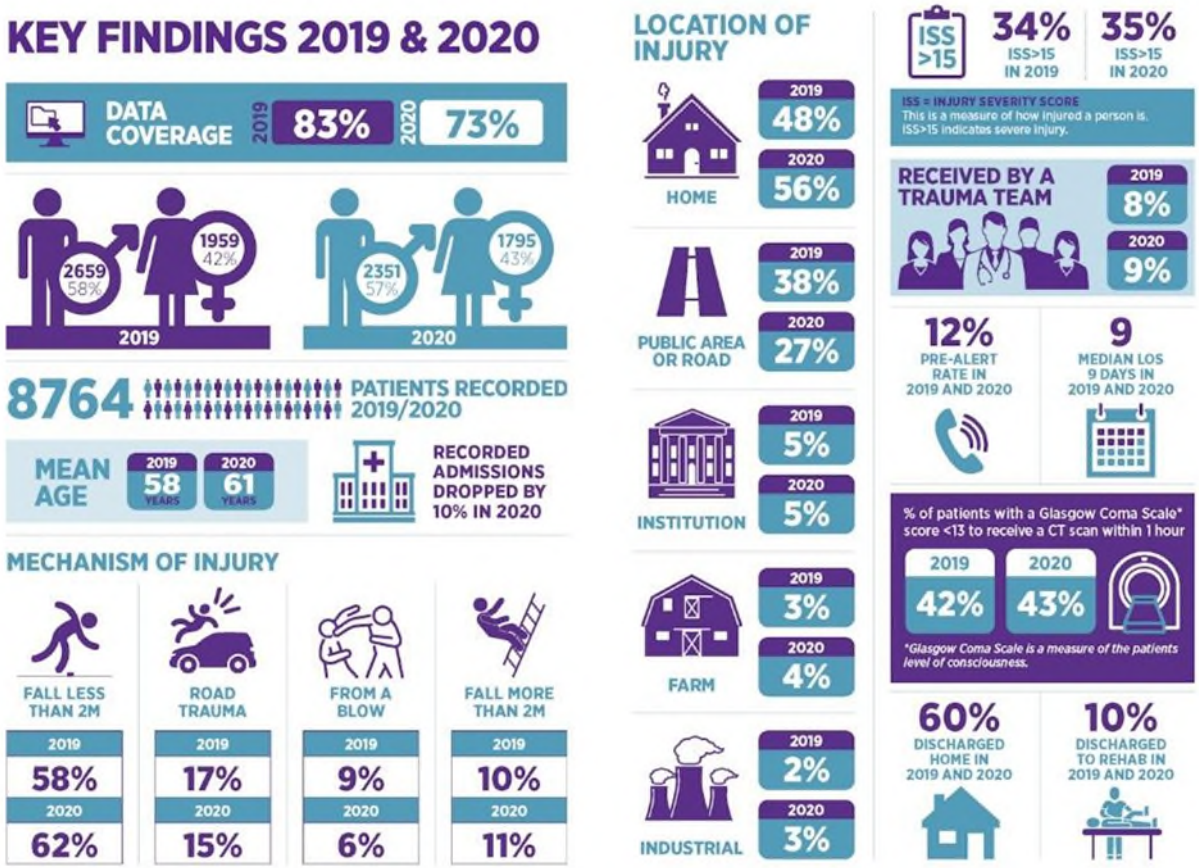
This Clinical Guidance Document describes core principles and guidance for the management of traumatic injuries in older adults. These aim to assist clinicians and patients to optimally care for older adults in the trauma system and to ensure continued improvements in the care, processes, outcomes, and experiences for older adult trauma patients and those important to them.

The need for a clinical guidance document for the management of major trauma in older adults is clear from the Major Trauma Audit (MTA) National Report 2019 and 2020 and older adult population projections.

We know that 49% of major trauma is in adults aged 65 years and older and the mean age of all major trauma patients is 61 years. All older adult major trauma patients should receive the same standards of care as younger major trauma patients.

Unfortunately, it is clear that the care and hospital experience of older adults with major trauma is often markedly different from that of younger adults; older adults are less likely to be pre-alerted to the receiving hospital, received by a dedicated trauma team, or to be seen by a consultant or registrar as the first point of contact, are more likely to have a prolonged admission to hospital (>10 days) and to die from their injuries.

Figure 1: Key Findings Irish Major Trauma Audit National Report 2019 and 2020



Findings in the Health in Ireland Key Trends report (Department of Health 2022), available here, show that the total population in Ireland has grown by 10.5% since 2013; the largest change was seen in the over 65 age group which increased by 35% between 2013 and 2022. The numbers of people in this age group are expected to almost double in the next 20 years, with the greatest proportional increase in the over 85 age group. This is, from every lens, a success story.

Figure 2: Cumulative Percentage Increase in Population, All Ages and 65+ for Ireland and EU-27, 2012 to 2021

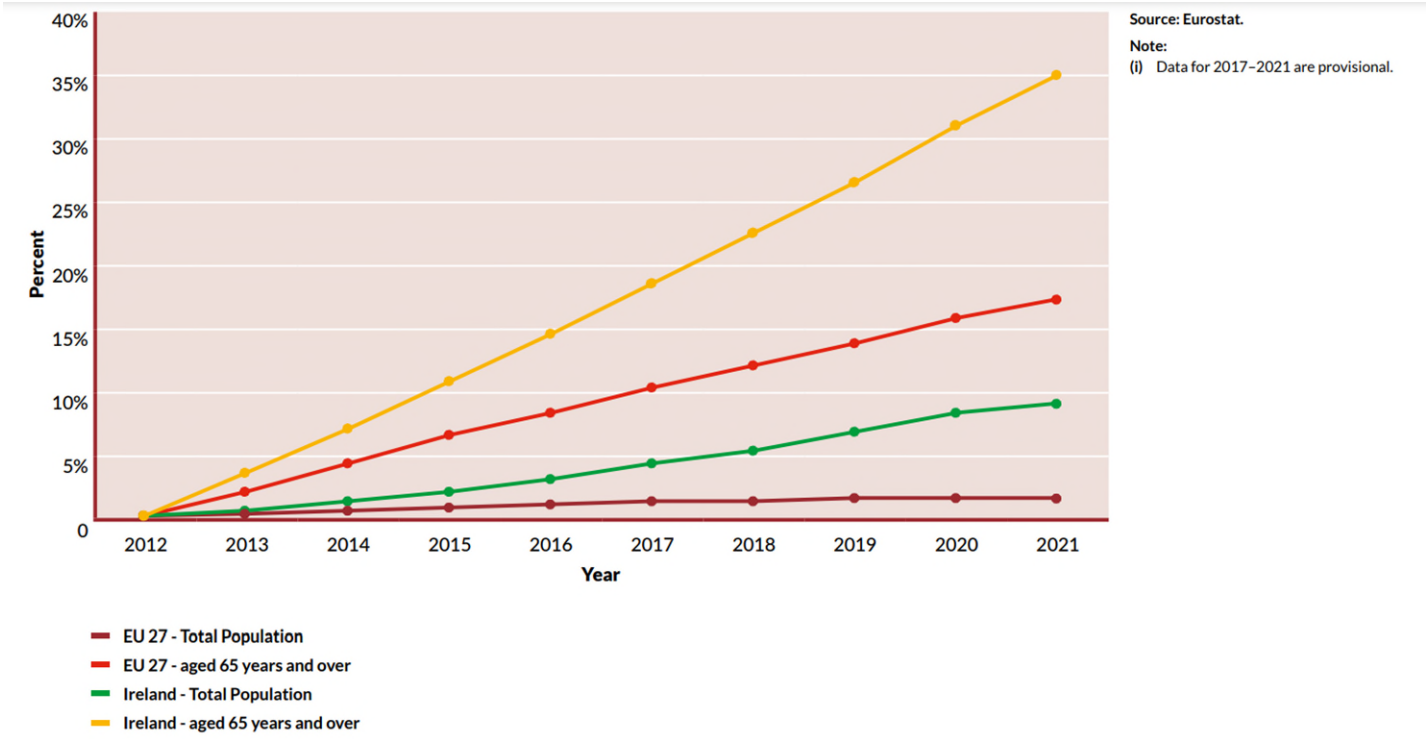
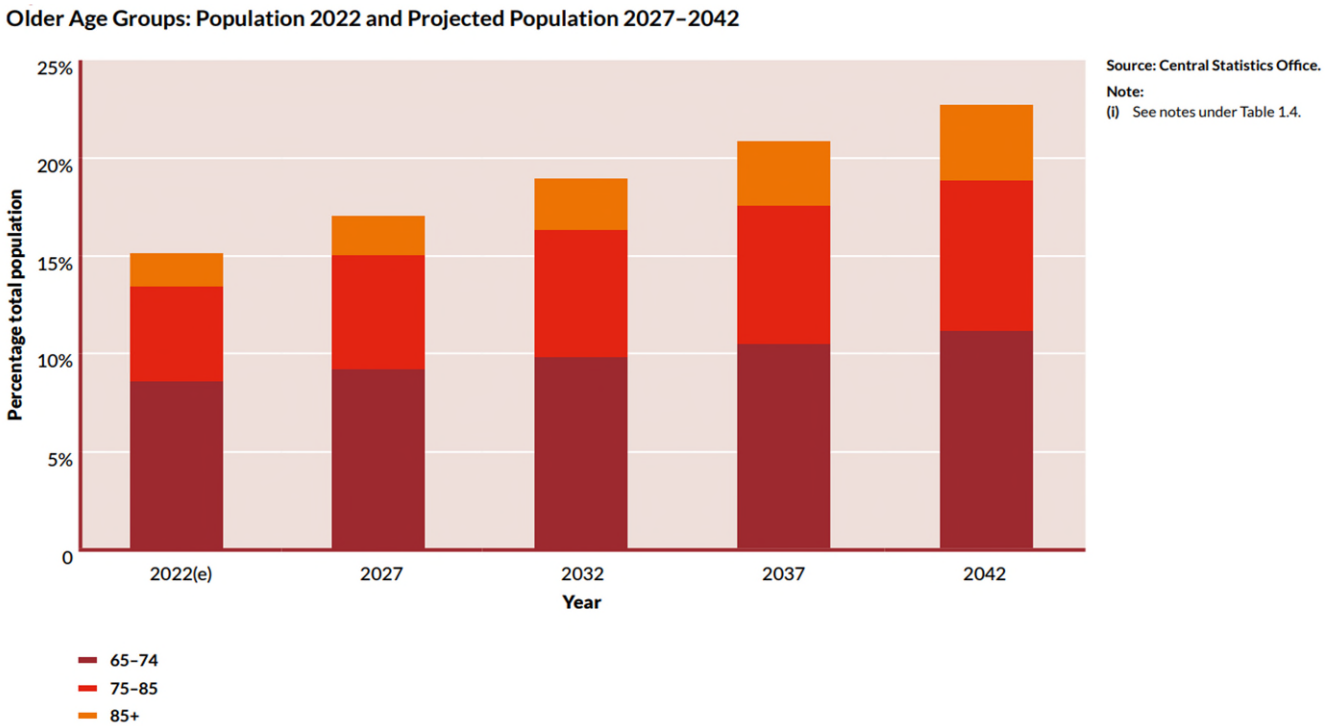


Figure 3: Older Age Groups: Population 2022 and Projected Population 2027–2042



There will be an absolute and relative increase in the number of older adults with traumatic injury and the trauma delivery systems must align organisationally and clinically to meet the needs of older adults in order to deliver optimal value to the patients and the system.

The National Trauma Strategy (2018) advises that there is a need for national standards, guidelines, and clinical practice guidance for trauma patients. To develop this clinical guidance document, a group was formed, chaired by the National Clinical Advisor and Group Lead for Older Persons, and included the National Clinical Lead for Trauma Services, national clinical experts from Geriatric Medicine, Trauma and Orthopaedics, Emergency Medicine, the National Office of Trauma Services, and the National Office for Clinical Audit. The London Major Trauma System document for Management of Older Major Trauma patients (Pan London Major Trauma System Management of Older Trauma, 2021) was used with permission as the exemplar for this document, and the group sought to incorporate the Irish Trauma System context and build on gaps in the literature through collaboration with Irish clinical experts in traumatic injury management; Spinal Surgery, Neurosurgery, Cardiothoracic Surgery, Rehabilitation Medicine, Anaesthesiology and Pain Medicine, amongst others.

While this serves as a guidance document, key areas for research remain. Recent analysis of gaps in the literature for trauma in older adults (Gibran et al., 2022) aimed to identify where further research is needed most. 24 subject matter experts identified gaps in the literature relating to pain management, frailty, and anti-coagulation-related interventions. The expert group also recommended that further research and guidance is needed for some specific injuries such as rib fractures, traumatic brain injury and lower extremity injuries. Further research via interventional clinical trials, comparative effectiveness studies, outcomes research, and health care systems research in these areas is recommended.

Older people are the focus of these standards. However, the project group sought not to provide a definitive age cut-off point; treatment and care will be determined by a range of considerations, including functional ability. It was not felt appropriate to state that these standards applied to all people aged over 65 or 75 years of age. Each patient will be assessed based on their individual needs, will and preferences, and not by age alone.

There are many terms used to describe expert doctors who manage the care of older adults, however for the purposes of this document the term "Geriatrician" is used.

1.1 Why focus on major trauma in older adults?

Older adults often differ from younger adults with the same injuries (mechanism of injury, recognition of injury, worse outcomes including mortality, etc.). This is due to biological ageing and accumulation of deficits over time in physical and mental health, as well as functional and social domains such as multimorbidity, polypharmacy, delirium, needing help to walk and carer burnout.

Conventional approaches to trauma care focus on the identification and management of specific injuries. This remains important but fails to identify and reverse the associated complexity and decline in functional ability of older adults who often get sicker rather than better. Failure to identify and treat the decline in health and functional ability with Comprehensive Geriatric Assessment (CGA) alongside treating the injury is at high cost to both the individual and the health service.

Specific injuries are often treated early, however treatment of the associated decline in health and functional ability needs time, collaboration with geriatric medicine and rehabilitation. Older adults need, in parallel, reliable delivery of evidence-based standards of care and bespoke pathways which

mitigate and reverse the higher risk of harm and worse outcomes. This is what differs older adults from younger adults with the same injuries.

1.2 Evidence base for early Geriatric Medicine comprehensive assessment

The value of collaboration with Geriatric Medicine in the management of injuries in older adults has been demonstrated across the literature.

The Collaborative Geriatric Medicine models delivering CGA to reverse harm and improve outcomes after injury is best exemplified by the Orthogeriatric model of care. This began with pioneers in the 1940s operating on, rehabilitating, and discharging patients previously deemed “too old” for treatment. (Obituary: Lionel Cosin The Independent, 1994). The involvement of Geriatricians in hip fracture care reduces post-injury mortality, with increased Geriatrician time proportionally associated with reduced mortality. (Neuburger et al., 2017).

These models of care reduce time to fixation, time to mobilisation, length of stay, pressure ulcer rate and institutionalisation as reported by the Irish Hip Fracture Database (NOCA, 2021).

Braude et al. (2022) published a large multicentre prospective trial across 23 major trauma centres in the United Kingdom. In this study, the primary outcome of inpatient mortality was measured in days from the date of admission to the major trauma centre until discharge. 35,490 patients were included in the analysis, with a median Injury Severity Score (ISS) of 10, and a median age of 81.4 years. After adjustment for age, sex, and clinical characteristics, geriatrician assessment was associated with reduced inpatient mortality of approximately 57%. This effect appeared to increase in magnitude in patients with a more severe injury (measured by increasing ISS), which would suggest that while geriatric input improves mortality in all cohorts, older adults who have sustained more severe injury may benefit most. The improved mortality finding was also replicated in patients who were transferred from trauma units to major trauma centres.

The introduction of specific pathways of care for older trauma patients has been shown to decrease hospital length of stay and the overall rate of complications (Jarman et al., 2022). The gold standard Geriatric Medicine intervention is the CGA. A CGA may be defined as a multidisciplinary diagnostic process to identify the health, functional and social capabilities of an older adult living with frailty and develop a coordinated plan for treatment and follow-up. Research has shown that older adults are more likely to be alive and in their own homes at follow-up following CGA in hospital (Ellis et al., 2017).

At a Network, Major Trauma Centre (MTC), Trauma Unit (TU) and Trauma Unit with Specialist Services (TUSS) level, there is a need to develop specific older adult bundles of care and pathways. These should be developed in collaboration with Geriatric Medicine and the relevant specialties and professions and incorporate core principles in the management of trauma in older adults.

2 Core Principles in Management of Trauma in Older Persons

This section describes 12 core evidence-based principles which all healthcare workers should implement when managing major trauma in older adults.

1. **Early communication and Assisted Decision-Making**; Communicate early with the patient and those important to them about the patient's will and preferences for treatment and escalation of care plan (see pages 12-14 for further information).

2. Injury in older adults often presents differently to younger adults and major trauma commonly occurs from standing height falls (<2 metres) at home. Mechanism of injury is unreliable as an indicator of major trauma and assessment should be approached with a high index of suspicion. Due to the risk of under-triage in the pre-hospital phase of care, this group recommends the use of an **older adults major trauma screening tool** (see Appendix 7) regardless of mechanism of injury to reduce the risk of under-recognition of major injuries in the Emergency Department. The group also recommends that in the future, specific triage considerations for older adult traumatic injuries should be included in the pre-hospital triage tool.

3. **Early senior clinical decision-making** for management plan incorporating;

    - Reversal of anticoagulation: when needed it should be done as soon as possible in the ED. (See page 20 for more information)
    - Early decision regarding spinal injuries to avoid prolonged, unnecessary immobilisation.
    - All treatments and surgery should be planned with the aim for early mobility and full weight-bearing for recovery to pre-injury health and functional ability.

4. **Early collaboration with Geriatric Medicine** and Multidisciplinary Team (MDT) intervention with CGA has been shown to improve outcomes and mortality (see page 9 for further information). In the NHS the standard for assessment is within 72 hours.

5. **Multimodal pain management strategies** should be developed locally, and pain should be assessed throughout the admission. Assessment scales are listed in Appendix 1, including the Abbey Pain Scale for assessment of pain in people who cannot verbally communicate. Further information on pain management is available on pages 17-18.

6. Early assessment and management to **minimise 'fasting' and optimise hydration and nutrition** (for further information see pages 18-19 on nutrition). No patients should be made "nil by mouth" unless immediate surgery is planned. "SipTilSend" is an evidence-based intervention, developed in Scotland, which allows the patient to sip water or other clear fluids until they are sent for theatre (Checketts et al, 2022)

7. **Early identification and treatment of delirium.** Assessment for delirium should take place throughout the admission. (See Appendices 3 and 4 for delirium assessment tools. Further HSE delirium assessment information can be found on the Integrated Care Pathways and Delirium Algorithms website, available here). Further considerations for psychosocial elements of care can be found on page 20-21.

8. **Early medication reconciliation, identification of high-risk medicines and deprescribing.** Medication reconciliation is the process of generating and maintaining the most accurate list possible of all medications a person is taking in order to identify any discrepancies and to ensure any changes are documented and communicated.

9. **Early mobilisation:** Patients should be cared for to "Get up, Get Dressed, Get Moving" (Health Service Executive, 2022) as appropriate. Further information about this initiative is available here.

10. **Urinary catheters should be avoided** unless absolutely necessary (e.g., haemodynamic instability, acute urine retention, specific injury) due to the increase in UTI, delirium, and associated length of stay (Maurer et al., 2021).

11. **Early assessment of rehabilitation needs** by the MDT (within 48 hours). In line with recommendations from the National Trauma Strategy, patients admitted to MTCs, TUs and the TUSS with Specialist Services following trauma should have a Rehabilitation Needs Assessment (RNA) and Rehabilitation Prescription (RP) completed by the multidisciplinary team within 48 hours of admission (National Trauma Strategy, 2018). Prioritise early patient transfer of care closer to home when appropriate.

12. For older adults following trauma, the **prevention of future injury is a key priority** which has been identified in the National Trauma Strategy. This should be done through a comprehensive falls and bone health assessment (see pages 36-38) and starting treatment wherever indicated.

2.1 What is an Age 'Ready' Healthcare Delivery System?

Our healthcare system was not designed to care for people with complex health and rehabilitation care needs. It was designed to care for people with a specific illness or injury. It is now clear that the most frequent users of our healthcare system are older adults with complex needs, and this will continue to increase for the next 20 years or so. It is also clear the system needs to adapt to embed effective, efficient, and equitable care for older adults and to support the healthcare staff who find it challenging to do so. An Age 'Ready' Healthcare Delivery System requires routine and systemic implementation of core evidence-based standards to reduce harm and improve outcomes for older adults.

There is emerging and increasing evidence for health systems which adapt and deliver healthcare through the lens of an Age Friendly Health System (Fulmer et al., 2022, Church et al., 2022). Ultimately if we get it right for older adults, we will get it right for all.

3 Early communication, consent and Assisted-Decision making

This section outlines guidance relating to patient consent and prioritising patients will and preference.

3.1 Consent in emergency situations

In some serious emergency situations, the degree of urgency of providing an intervention may be such that there is no time to provide information to a person prior to the intervention immediately necessary to save the life or prevent a serious detriment to the health of the person. In these circumstances, the necessary intervention may be administered in the absence of the expressed consent of the person (unless the treating healthcare worker is aware of a valid and applicable advance statement refusing such treatment).

If a person lacks decision-making capacity in an emergency where the intervention is a matter of urgency and there is no valid advance refusal of treatment, the healthcare worker may treat the person provided the treatment is immediately necessary to:

- Save their life; and/or;
- To prevent a serious deterioration of their condition.

As described in the HSE National Consent policy, available here, the treatment provided in these circumstances should be the least restrictive of the person's future choices. While nobody else can consent on behalf of the person in this situation, it is good practice if practicable, to inform those close to the person. They may be able to provide insight into the person's likely preferences

3.2 Assisted Decision Making Act and Functional Test for Capacity

The Assisted Decision-Making (Capacity) Act was signed into law in 2015. It is about supporting decision-making and maximising a person's capacity to make decisions. It applies to everyone and is relevant to all health and social care services and professionals.

The Assisted Decision-Making (Capacity) Act (2015) reforms the law relating to persons who require or may require assistance in exercising their decision-making capacity. Key reforms include the establishment of the Decision Support Service (DSS), abolition of wardship, statutory functional test of capacity, statutory guiding principles, new decision supporters, and advance healthcare directives.

The Act recognises that as far as possible, all adults have the right to play an active role in decisions that affect them. Under the new law, everyone is presumed to have decision-making capacity at all times. Healthcare and social care professionals are expected to take all practical steps to help a person make a decision for themselves. If a person is found to lack decision-making capacity in one matter, this will not necessarily mean that the person also lacks capacity in another matter. The Act recognises that decision-making capacity can fluctuate, is decision-specific and time specific.

This means that the 'Functional Test' for capacity assessment refers to a specific decision that needs to be made at a specific time. A decision (intervention) is only made for a person when it is necessary, and considers the views of a health professional, the person's carer or other person who has a genuine interest in the person's welfare. If there is a valid reason to assess a person's decision-making capacity, a functional approach must be used. This capacity assessment can be done by any registered medical professional and/or health and social care professional (HSCP).

A person's capacity to make a specific decision is their ability to:

- Understand information and facts relevant to the decision;
- Retain that information long enough to make a voluntary choice;
- Use or weigh up that information as part of the process of making the decision, and;
- Communicate the decision by any means, including by assistive technology.

The Act describes three tiers of decision-making support:

- **Assisted decision-making:** a person can appoint a decision-making assistant through a formal decision-making assistance agreement to support them to access information or to understand, make and express decisions. Decision-making responsibility remains with the person. The decision-making assistant will be supervised by the Director of the Decision Support Service.

- **Co-decision-making:** a person can appoint a trusted person as a co-decision-maker to make decisions jointly with them under a co-decision-making agreement. Decision-making responsibility is shared jointly between the person and the co-decision-maker. The co-decision-maker cannot make a decision on behalf of the person. The co-decision-maker will be supervised by the Director of the Decision Support Service.

- **Decision-making representative:** for the small minority of people who are not able to make decisions even with help, the Act provides for the Circuit Court to appoint a decision-making representative. A decision-making representative will make decisions on behalf of the person but must abide by the guiding principles and must reflect the person's will and preferences where possible. The functions of decision-making representatives are as limited in scope and duration as is reasonably practicable. The decision-making representative will be supervised by the Director of the Decision Support Service.

3.3 Advance Healthcare Directives and Advance Healthcare Planning

3.3.1 Advance Healthcare Directives

An Advance Healthcare Directive is an advance expression of will and preferences made voluntarily by an adult (aged 18 or older) with capacity. The goal of an Advance Healthcare Directive is to enable a person's will and preferences to guide their healthcare treatment even when they no longer have the capacity to make treatment decisions for themselves. The person may have done this in writing or using a voice recording or a video recording option.

In an Advance Healthcare Directive, a relevant person is entitled to refuse treatment for any reason (including a reason based on his or her religious beliefs) even if the refusal:

a) appears to be an unwise decision,
b) appears not to be based on sound medical principles, or
c) may result in his or her death.

Advance Healthcare Directives are legally binding and the directive-maker, or the person signing on their behalf as outlined in the Assisted Decision Making Act, shall sign the Advance Healthcare Directive in the presence of each other (where applicable) and in the presence of two witnesses.

Advance Healthcare Directives are provided for in Part 8 of the Assisted Decision Making Act and further guidance relating to the making of advance healthcare directives, validity and applicability and other information can be found in the Assisted Decision Making Act here.

3.3.2 Advance Healthcare Planning

Advance Healthcare Planning is a distinctly different process to Advance Healthcare Directives, and it involves a person expressing their wishes about future care. It may involve discussion (advance healthcare planning) with healthcare workers about a person's condition and prognosis, elicit their goals, will and preferences about what interventions would be appropriate if there were a deterioration in the person's condition and record this in the person's healthcare record.

Advance Healthcare Planning does not require signatures from the patient, patient representative or witnesses. While an Advance Healthcare Plan does not have the same status as an Advance Healthcare Directive it often provides a helpful expression of the will and preference of the person and ought to be respected in appropriate cases.

3.4 Will and Preferences

If there is concern that someone lacks capacity to make a decision, it is essential that their past will and preferences are taken into consideration – therefore, what they would have wanted to happen before they lost capacity is of importance. The beliefs and values that that person held will have to influence any decision made.

Will incorporates a person's values, personal beliefs, and ultimate goals. 'Will' carries a stronger sense of determination or planning than 'preference'.

Preference means a greater liking for one alternative over another.

4 Early senior decision making and collaboration with Geriatric Medicine

This section outlines guidance relating to the priorities of senior decision making and considerations for collaboration with Geriatric Medicine.

4.1 Early senior clinical decision-making

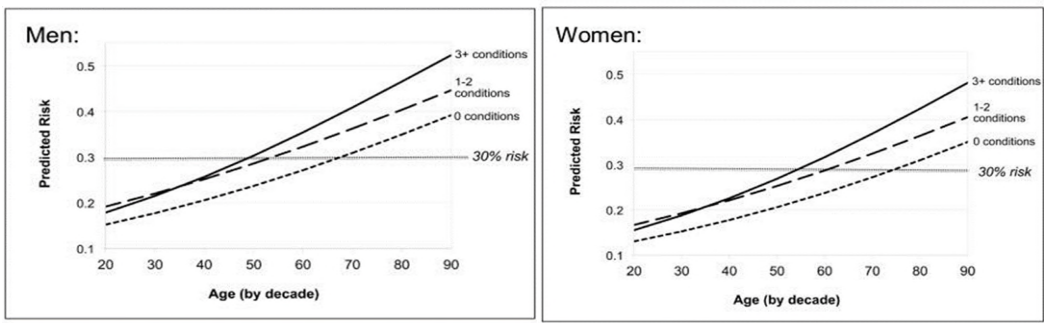
Early senior clinical decision making is a core principle for trauma management in older adults. An early management plan should incorporate:

- Reversal of anticoagulation: when needed it should be done as soon as possible in the Emergency Department (see page 20 for further information)
- Venous Thromboembolism (VTE) prophylaxis: all patients should be assessed and treated for risk of VTE.
- Spinal precautions plan when necessary: An early decision regarding precautions for spinal injuries to prevent unnecessary immobilisation.
- Planning for treatments and surgery with the aim of early mobility and full weight-bearing for recovery to pre-injury health and functional ability
- The principles of "SipTilSend": No patient should be made "nil by mouth" unless immediate surgery is planned. "SipTilSend" is an evidence-based intervention, developed in Scotland, which allows the patient to sip water or other clear fluids until they are sent for theatre. (Checketts et al., 2022)

4.2 Ageing and biological changes

As we age, biological changes occur that may affect presentation of and recovery from illness or injury. Mechanism of injury is a poor predictor of injury severity; a fall from standing height may cause major trauma in older and minimal or no injury in younger adults. Older adults are more susceptible to injury from low fall mechanisms and are less able to respond to and recover from the stressor. Older adults are also more likely to take multiple medications, some of which may impair their response to the biological stress of trauma and increase their risk for complications (Jacobs et al., 2003). Older patients with higher numbers of morbidities are also more likely to die from their injuries as demonstrated in the figure below.

Figure 4: Risk of Mortality-Associated Geriatric Complication (MGC) or Death, by Gender, Age and Number of Pre-existing conditions (Min L et al., 2013).



Some specific physiological and anatomical factors to consider in initial assessment of older adults are included below:

Table 1: Physiological and anatomical considerations in initial assessment of older adults

Airway	**Breathing**
• Arthritic changes may affect mouth opening and airway management. • Dentures may obstruct the airway during intubation and concurrently, poor dentition/lack of dentition may impair ventilation with bag mask ventilation. • Arthritic changes in cervical spine will make it difficult to fit a rigid collar.	• Reduced functional residual volume, decreased gas exchange, blunted cough reflex, and decreased mucociliary function can increase the risk of respiratory failure and risk of infection, as well as reduce adequate compensation from chest injuries. • Underlying comorbidities such as Chronic Obstructive Pulmonary Disease and chronic lung disease will further impair oxygenation.
Circulation	**Disability**
• Decreased muscle mass, increased systemic vascular resistance, increased cardiac afterload, and decreased responsiveness to catecholamines. • Medications such as Beta Blockers may affect a person's ability to respond to cardiovascular stress and alter the usual physiological response to shock in trauma. • There is evidence in the literature of normal vital signs being less reliable in older trauma patients (Heffernan et al., 2010). Consider testing base excess and serum lactate to identify hypoperfusion and occult shock.	• In some cases, brain tissue volume may decrease with age. In the context of a traumatic intracranial haemorrhage, blood may expand into atrophied areas and mask neurological findings. • Spinal cord injuries may occur in low-energy injuries. Assessment should be approached with a high degree of clinical suspicion and continuous assessment will help to identify neurological deficits. Secondary and tertiary surveys will further assist identification of occult injuries.

4.3 Early identification of frailty and MDT intervention with CGA

All older adults presenting with major trauma should be screened for frailty. Older adults with frailty should have early multidisciplinary Geriatric Medicine comprehensive assessment, intervention, and care planning.

Frailty is described as a distinctive health state related to the ageing process in which multiple body systems gradually lose their in-built reserves (TILDA, 2018). Older adults living with frailty are at an increased risk of unpredictable deterioration in their health following minor stressor events such as an infection, dehydration or adverse effects related to a new medication.

Frailty is a common condition in older adults although it is not an inevitable part of the ageing process. The prevalence of physical frailty increases with advancing age, from 11% in those aged 55 years and older, to 15% among those aged 65 years and older, to 19% among those aged 70 years and older. The highest prevalence of frailty is among those aged older than 75 years, 80 years, and 85 years at 25%, 35% and 46% respectively.

It is of value to specifically identify frailty in older adults with major trauma, as frailty has shown to be significantly associated with mortality and other disadvantageous outcomes such as inpatient delirium and increased care level at discharge (Rickard et al., 2011, FITR 1).

A task force of the International Conference of Frailty and Sarcopenia has developed international clinical practice guidelines for the identification and management of physical frailty (Dent et al., 2019).

Frailty should be identified early using a validated tool, e.g., the Clinical Frailty Scale (Appendix 2). A clinical frailty score between 1 (very fit) and 9 (terminally ill) is assigned based on clinical judgement. Patients with scores of five or more are identified as having a degree of frailty.

Frailty identification and frailty care pathways have been shown to reduce 20-day readmission and delirium rates (Bryant et al., 2019), reduce discharge to long term care (Lenartowicz et al., 2012) and improve advanced care planning (Olufajo et al., 2016).

Older adult care bundles or pathways incorporating evidence-based practice and standards to reduce harm and optimise health and functional outcomes can be implemented. These should include care bundles or pathways to support older adults will and preferences, cognitive and social engagement, identification and management of delirium, management of polypharmacy, optimisation of nutrition, hydration, continence and constipation, early mobilisation, falls and fracture prevention, assessment and management of pain and Advance Healthcare Planning.

4.4 Pain management in older adult trauma

Effective analgesia is a core principle in the management of trauma in older adults. Effective analgesia must be commenced at the earliest opportunity and continued throughout the clinical course of the trauma care episode. Uncontrolled pain can cause or prolong delirium, and a progressive analgesia strategy must be adopted upon presentation to the Emergency Department. When choosing an analgesic strategy, consideration should be given to minimising known pharmacological side effects and potential adverse effects on pre-existing comorbidities. Historically the World Health Organisation analgesic ladder (Anekar et al., 2022). has been used in reverse to manage pain in the context of major trauma irrespective of patient age and physiological status. The use of opioids (including morphine or alternatives) and atypical analgesics as first line treatment of acute severe pain has often been deemed appropriate.

“Regional anaesthesia” (nerve block) is a term used to describe procedures in which local anaesthetic agents provide pain relief by blocking pain signals in sensory nerves. Regional anaesthesia

techniques are particularly well-suited to trauma pain management in older adults. Local anaesthetic agents provide excellent rapid onset analgesia without the side effects encountered with opioids (nausea, respiratory depression, altered mental state, constipation, etc.). Extended analgesia can be achieved by continuous administration of local anaesthetic via an indwelling catheter placed adjacent to the target nerve(s).

Effective regional analgesia is the foundation upon which modern multimodal acute pain management strategies are built. In order to quickly and safely achieve adequate pain control, Emergency Department staff, anaesthesiology teams and others must be appropriately skilled and resourced to incorporate the optimal use of regional anaesthesia into a multi-modal treatment plan.

Although the older adult may present with injuries sustained from high-energy traumatic events, major trauma due to low energy events or falls from a low or standing height are common (fragility fractures). Fractures of the neck of femur, ribs, humerus, and distal radius are very common and frequently co-exist. This document proposes to create a paradigm shift in acute pain management for older adults with major trauma by:

- The rapid control of pain using regional anaesthesia as first line therapy
- The use of continuous, catheter-based, regional anaesthesia throughout the inpatient stay
- The use of multimodal systemic analgesics (e.g., regular paracetamol 1G six-hourly (weight >50kg, or dose adjusted if weight <50kg or liver impairment present) and judicious use of strong opioids e.g., Morphine Sulphate to supplement regional analgesia
- Minimising the use of synthetic opioids, specifically those with noradrenaline and serotonin transporter activity
- The avoidance of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs).

Any uncertainty around medication dosing or drug interactions should be discussed with a pharmacist. A worked example of analgesia for an older person with hip fracture is included below:

- Regional Anaesthesia: Continuous Femoral Nerve Block/Fascia Iliaca Block/Pericapsular Nerve Group (PENG) block administered in the Emergency Department
- Continuous infusion of L-Bupivacaine via regional anaesthesia catheter
- Regular Paracetamol prescribed at appropriate dose for weight/age (as above)
- Oramorph 2.5-5 mg prescribed as needed
- Regional and systemic multimodal analgesia continued throughout perioperative period
- Regional analgesia catheter removed after three days post-operatively
- Pain and analgesic efficacy assessment from admission to discharge.

4.5 Nutrition

Pre-injury malnutrition or poor nutritional support in hospital may contribute to delayed recovery and/or adverse outcomes in older patients.

Key nutritional principles for the older trauma patient include:

- Assessment of nutritional status on admission and weekly throughout admission. Identification of a patient at risk of malnutrition necessitates referral and involvement of the dietician.

- Dietitians play a valuable role in optimising nutritional management plans as part of the MDT. Local pathways may automatically generate a referral, or early input should be requested for older patients.
- If a patient is at risk of malnutrition, proper attention and management is critical to preventing further decline and improving outcomes.

  Supervise and provide assistance if necessary to optimise intake of meals, nutritious snacks, and adequate fluid intake; record intake where indicated.

Nutritional screening is required on admission and weekly thereafter

- A proactive approach to nutritional screening aims to prevent decline in nutritional status, which is particularly important on admission to hospital. Therefore, weekly screening should be performed.
- Nutritional status and frailty screening needs to be assessed on admission. There are a variety of local and national tools in existence. Validated tools should ideally include assessment of:
    - Weight
    - Height
    - Weight history
    - Body Mass Index
    - Current clinical / disease state
    - Current nutritional intake
- Mobility or mechanism of injury may compromise ability to take accurate weight/height, which may lead to unrecognised nutritional decline during hospital admission. Surrogate measurements may replace actual measurements, e.g., ulna length/ mid upper arm circumference, but it should be noted that these only provide an estimate of nutritional state.
- Older patients may be deemed to be at risk of other nutritional diagnoses rather than just being 'underweight' e.g., sarcopenia (low muscle mass to body mass ratio) which may be further exacerbated by inadequate nutritional intake alongside changes to mobility as a result of traumatic injury.
- Types of injuries with significant nutritional implications may include head, spinal cord, maxillofacial and gastrointestinal.
- Severity of injury could result in feeding difficulties as a consequence of injury site and type, significantly altered nutritional requirements or increased length of inpatient stay.
- It is important to realise nutritional barriers may be physical, psychological, social, and behavioural.
- Patients with cognitive impairment (dementia or delirium) need particular attention (Irish Nutrition and Dietetic Institute, 2016). Healthcare providers must ensure that glasses, dentures or hearing aids are worn during the meal, if needed. Assistance may be needed during mealtimes, as well as other nutritional support initiatives such as finger foods, evening/night-time snacks or contrasting-coloured plates.

4.6 Anticoagulation / reversal of DOAC effect

4.6.1 Reversal of the anticoagulant effect of DOACs in older trauma patients

Each MTC, TU and the TUSS should have a policy for the reversal of warfarin and other anticoagulants following major trauma. Prothrombin Complex Concentrate (PCC) should be immediately available for every major trauma patient with life threatening bleeding. Anticoagulant reversal should be administered on arrival in older trauma patients (no longer than within one hour of decision to reverse). Please consult local haematological guidelines on when to contact the on-call haematologist for cases of Direct Acting Oral Anticoagulant (DOAC) anticoagulation reversal.

4.6.2 Factor Xa inhibitors

Rivaroxaban, Apixaban and Edoxaban are factor Xa inhibitors, for which reversal agents are currently unavailable. Current consensus suggests that for older patients who are prescribed Rivaroxaban, Apixaban or Edoxaban (or another factor Xa inhibitor) and have a known or suspected life-threatening haemorrhage as a result of trauma:

- Administer 25-50u/kg four-factor prothrombin complex concentrate (e.g., Octaplex® or Beriplex®) and 5mg intravenous vitamin K as soon as possible after arrival at the Emergency Department. Vitamin K will not reverse the anticoagulant effect of a DOAC but may help correct any coagulopathy resulting from coexisting vitamin K deficiency.
- Ensure that intravenous Tranexamic Acid bolus has been administered
- If bleeding continues, the on-call haematologist should be consulted emergently as the patient may require further haemostatic agents.

4.6.3 Factor IIa inhibitors

Dabigatran is a direct thrombin (IIa) inhibitor which has an antidote called Idarucizumab. In older patients who have received dabigatran and have a known or suspected life-threatening haemorrhage as a result of trauma:

- Administer Idarucizumab 5g intravenously as soon as possible after arrival at the ED.
- If bleeding reoccurs and clotting times are prolonged, then a second dose of Idarucizumab 5g may be required.

VTE prophylaxis: all patients should be assessed and treated for risk of venous thromboembolism.

4.7 Psychosocial elements

Within one year of traumatic injury, close to one third of people meet the diagnostic criteria for Post-Traumatic Stress Disorder and depression, and approximately one in five have a clinically poor trajectory for psychological outcomes (Giummarra et al., 2018). Older trauma patients may be more likely to have additional needs that influence their ability to express their preferences and choices in a way; this should be taken into account when planning their acute and ongoing care. This may include cognitive and/or communicative impairments. In such cases it is essential to take every opportunity

to appropriately engage patients and their family members, carers and friends when making decisions about care and clinical management.

It is important to note that trauma patients' psychological recovery may not follow the same trajectory as physical and functional recovery. Psychological distress, such as increased anxiety, vigilance, and avoidant behaviour, may persist following a traumatic injury, therefore adversely impacting a person's functional rehabilitation and recovery (Schoene et al., 2019). Psychosocial factors and symptoms of depression can increase pain severity and emotional distress in major trauma and psychosocial support should form part of the rehabilitation strategy (Alexiou et al., 2018). Meeting the psychological needs of older trauma patients is a challenge for trauma networks. Close liaison with hospital-based and community specialist mental health teams is essential to ensure coordinated assessment and treatment of all sequelae of traumatic injury, both physical and psychological.

Pre-injury abilities, such as functional and cognitive impairment, may be exacerbated by the experience of a trauma and the resultant hospital stay. Adverse psychological outcomes for older trauma patients may be exacerbated by issues relating to isolation from those important to them, as would be true for a patient of any age who has experienced a trauma, particularly if the patient is not being cared for in their local hospital. It is important to consider the psychological impact of issues related to an older patient's longer-term rehabilitation, particularly if this requires a change in their living situation and any associated financial demands. Establishing psychological status, both pre- and post-injury, should be a priority when planning for rehabilitation, recovery, and discharge.

Currently, the psychological sequelae following major trauma are poorly understood in this cohort of patients, requiring further investigation and research to characterise the issues and to establish appropriate management approaches.

Following major emergencies, the overall recovery of individuals can be affected by how their psychosocial reactions are understood and managed. Directly addressing psychological sequelae such as emotional distress, maladaptive coping responses, and pre-morbid mental health difficulties, helps to enhance recovery following traumatic injury (van der Naalt et al., 2017). Thus, the Health Service recognises the need for, and is committed to working collaboratively with all relevant agencies to ensure the effective management of the psychosocial response (+HSE and A Vision for Change, 2014).

5 Clinical Guidance for Care of Older Trauma Patients

This section outlines key concepts and guidance that should be considered for older trauma patients following admission through to discharge in an MTC, the TUSS and TUs

1. **In all hospitals receiving trauma, regardless of the operating model, older adult trauma patients:**
    - Have the right to an active role in decisions that affect them.
    - Have equitable access to optimal trauma care and services.
    - Have equitable access to evidence-based older adult care bundles and pathways specifically designed to reduce harm and optimise outcomes for older adult trauma patients.
    - Should be treated in an Age-Friendly Environment where staff have received education and training in the assessment and management of older adult trauma patients with complex health and rehabilitation needs (e.g., Age-Friendly Health Systems, What Matters To You, Frailty, Delirium (See Appendices 3 and 4), Dementia, Polypharmacy, Falls, Continence, Rehabilitation, Bone health etc.). A non-exhaustive list of education and training resources is available in Appendix 9.

2. **In the Emergency Department, the following guidance applies:**
    - MTCs, the TUSS and TUs should ensure that staff training includes awareness of trauma team activation for low-energy mechanisms of injury, such as standing height falls in older adults. It is recognised from the findings of the MTA that current triage systems are inadequate at recognising low-energy major trauma. Along with considering an "Older adult trauma screening tool" (see Appendix 7), hospitals should also design and plan their trauma team activation protocols to respond to delayed recognition of major trauma in older adults in the Emergency Department or on inpatient wards.
    - Older adults should have their injuries assessed by the trauma team, who have the necessary knowledge and skills to identify the patient's injuries, complete resuscitation, carry out immediate management and conduct an appropriate primary and secondary survey.
    - Patients should also be assessed for any immediate co-existing health needs and include a 12- lead ECG, blood tests, postural blood pressures (at a clinically appropriate time point), frailty screening, delirium assessment, pain assessment and Chest X-Ray if not undergoing CT imaging. Assessment for delirium and pain should take place throughout the patients' admission.
    - Pre-injury physical and mental health, functional ability, medications, Advance Health Directives and patient's will, and preferences should be ascertained at the earliest opportunity and taken into account when developing care plans including escalation of care etc. People important to the older adult should be involved early if the patient agrees, or if the patient lacks capacity or is too unwell (e.g., state of coma).

- If reversal of anticoagulation is necessary, it should take place in the Emergency Department prior to ward admission or withholding anticoagulation should be considered if surgery is imminent (see local network guidance and page 20 for further information).
- Urinary catheters should be avoided unless absolutely necessary e.g., specific injuries, haemodynamic instability, or urinary retention due to the increases in rates of urinary tract infections (UTI), delirium, restriction of mobility, and associated length of stay (Maurer et al., 2021).
- No patients should be made 'nil by mouth' unless immediate surgery is planned. 'SipTilSend' is an evidence-based intervention, developed in Scotland, which allows the patient to sip water or other clear fluids until they are sent for theatre.
- Prior to the patient leaving the Emergency Department, and if appropriate, the status of movement allowed for the treatment of spinal injuries or pelvic injuries should be documented and communicated to the care team. Due consideration must be given for the potential development of pressure ulcers, constipation, and aspiration pneumonia with inappropriate spinal immobilisation in this patient group. Early involvement of senior clinical decision-makers is a priority where further clarity is needed to avoid prolonged unnecessary immobilisation.

3. On admission to the hospital the older patient should expect the following:

- Incorporation of patient's will and preferences and escalation of care plan.
- Frailty identification (e.g., using Clinical Frailty Scale or alternative validated score).
- Pain assessment and management plan (patients may not be able to verbally express pain. Therefore, nonverbal cues should be carefully monitored (see Appendix 1).
- Delirium assessment (see Appendices 3 and 4) and cognitive assessment when appropriate.
- If there is any suspicion of alcohol dependency, an alcohol dependency screen and assessment for alcohol withdrawal should be completed. The Clinical Institute Withdrawal Assessment for Alcohol Tool can be used to assess for alcohol withdrawal (See Appendix 5). Further guidance on management of acute alcohol withdrawal in the Emergency Department is available from the Irish Association of Emergency Medicine guideline (IAEM Clinical Guideline, 2019).
- Nutritional assessment using a validated nutrition screening tool.
- Pharmacist review - comprehensive person-centred medication review (with a special focus on medications at risk of increasing delirium, falls risk and the need for anti-osteoporosis medication). Assess the patient's ability to take medicines orally and consider other routes where necessary. Essential/time critical medication, e.g., Parkinsons, epilepsy, diabetes, to be identified and administered as soon as possible.
- Pressure area assessment and plan.
- VTE assessment and plan.

4. **Within 24 hours of admission the older patient should additionally expect:**
    - Tertiary survey of injuries.

5. **Within 48 hours of admission, the older adult should additionally expect:**
    - Rehabilitation Needs Assessment by MDT and agreed rehabilitation goals

6. **Within 72 hours of admission the older patient should receive:**
    - Assessment by a Geriatric Medicine Consultant, Registrar, or registered Advanced Nurse Practitioner (ANP).
    - Multidisciplinary CGA and implementation of care bundles and pathways e.g., pain, delirium, poly pharmacy, continence, nutrition, hydration, cognitive and social engagement, early mobility, falls and fracture prevention.
    - Assessment for mental health or psychological distress (e.g., self-harm, victim of violent crime, domestic abuse).
    - Consideration of advance-care planning and/or referral to specialist palliative care for those with advanced frailty in whom prognosis is poor and there has been a lack of response to treatment (older persons may take longer to respond to treatments or recover from their injuries, and reversible causes such as hypoactive delirium should be excluded before involving specialist palliative care services). National Palliative Care Needs Assessment Guidance can be found here and the national Specialist Palliative Care Services referral form can be found here.

7. **When planning for discharge:**
    - Discharge assessment, with estimated length of stay and identification of need for transfer of care to another hospital/healthcare facility for ongoing care and rehabilitation should occur within 24 hours of admission. This should include those with expected poor prognosis where clinically appropriate.
    - Regular reviews of rehabilitation needs and early goal setting during admission to optimise the patient pathway are recommended.
    - Transfer of care documentation should be prepared for transfers to other hospitals/healthcare facilities. This should include the rehabilitation prescription, transfer of images and treatment summary for GP on transfer of care as per local network transfer of care policy. Any changes made to the patient's prescription, including any medicines stopped, started or dosages changed, along with the reasons and recommended duration of therapy should also be included.
    - Pharmacist involvement in discharge planning is recommended, including liaison with pharmacist/community pharmacy, to communicate medicines requirements and compliance measures to be addressed, if necessary (e.g., need for blister-pack on discharge). This should ensure seamless care, support improved patient medication adherence, and avoid any unnecessary interruptions to drug therapy.

- MTC follow-up appointments should be booked and patient/persons important to them informed.
- There should be early MDT discussions regarding appropriate discharge options depending on clinical needs and local commissioned services, e.g., transfer of care / home / home with care package / inpatient rehab / interim placement / non-weight bearing pathway / primary care team referral / charities and support groups. Consider dual plans where appropriate (i.e., transfer of care vs home).

8. Post-discharge:

- National Audit data should be completed and submitted to Irish Hip Fracture Database, MTA, Fracture Liaison Service Database etc.

6 Traumatic Injury Guidance

This section provides guidance on traumatic injury of specific body systems.

6.1 Whole Body CT Scanning for Older Adults

CT scanning is a valuable radiological tool in trauma assessment and consideration should be given to Whole Body CT (WBCT) in selected older adult trauma cases.

As per NICE Guideline 37 (NICE, 2017), in line with all adult patients, WBCT may be used in older adults who have sustained blunt major trauma with suspicion of multiple injuries. Consideration should also be given to completing WBCT in any high-velocity older adult trauma (e.g., road traffic accident without obvious injury).

However, most major trauma (62%) in older adults occurs from falls from a low height (<2m) and WBCT may also be appropriate in low-velocity trauma with suspicion of multiple injuries. Guidance for CT imaging of selected body regions is discussed in this document, namely, head, spine, thorax, and pelvis. Of note, there is a lower threshold for advanced CT imaging in older populations compared to younger trauma patients, due to the higher risk of occult injuries in this patient population.

With this risk of occult injury in mind, it is also recommended to conduct a WBCT for older trauma patients if there is suspicion of injury necessitating CT to two or more of the following three body areas:

- Head and neck
- Chest
- Abdomen and pelvis

6.2 Traumatic Brain Injury

This includes patients with suspected or confirmed traumatic brain injury (TBI).

6.2.1 Diagnosis of TBI

Clinicians who manage trauma require an increased awareness of potential neurological injury in all older trauma patients. There should be a low threshold for initiating a 'trauma call' and obtaining a head CT scan in the older patient, especially in the following presentations:

- When known or suspected to have sustained head injury.
- Following a fall from a low height (e.g., from standing or sitting).
- When taking prescribed anticoagulant medication.
- When there is no clear medical cause of fall or unclear reason for Emergency Department attendance

These suggestions are in light of the perceived number of older patients who present as a 'collapse' and who, after admission, are found to have an acute or chronic subdural haematoma. (Pan London Major Trauma System Management of Older Trauma, 2021)

The NICE guideline for selection of adults for CT Head scan is listed in Appendix 6.

6.2.2 In the Emergency Department

Where an older adult has clear external signs of head injury, has neck pain, or had a fall, and if a decision has been made to carry out a head CT, strong consideration should be given to inclusion of the cervical spine (see section on spinal injuries on pages 30-31). In neurologically intact patients, CT is sufficient in most cases to rule out cervical spine injuries without the need for Magnetic Resonance Imaging (MRI) (Tins et al., 2017). Any injury with acute intracranial blood identified via the CT report should result in a referral to the Neurosurgery team, and such referrals should be logged and documented by the referrer and the Neurosurgery team clinician. The presence of blood on a CT head report should trigger review of other potential traumatic injuries by an experienced trauma clinician or a delayed trauma call.

Anticoagulated patients with a head injury and normal initial CT head may require a repeat scan. There is no clear evidence for optimum time frame for this repeat CT, thus local policy or a senior clinician should decide based on clinical assessment.

6.2.3 Anticoagulation reversal in TBI

Patients on warfarin with intracranial bleeding should receive PCC in addition to vitamin K, unless the bleed is extremely small, and risk of pro-coagulation is considerable. In those patients known or suspected to be on anticoagulants, an INR test should be completed as soon as possible (point-of-care testing may be required and appropriate). Anticoagulant reversal should be carried out within one hour of the decision to reverse. However, it is suggested that PCC should be immediately available in the Emergency Department (See page 20 for advice on patients prescribed direct oral anticoagulants, DOACs).

6.2.4 Restarting anticoagulation after TBI

In the absence of robust evidence in this field, individualised treatment plans balancing risk of thrombosis and bleeding made in collaboration with the Geriatric medicine and neurosurgical teams are required. In minor TBI, early initiation of Low Molecular Weight Heparin may be appropriate after admission. Timing for restarting of anticoagulation should be clearly documented.

6.2.5 Holistic and ongoing care for older people with TBI

Senior staff in trauma units should be able to discuss management with the patients' relevant person(s) as advised by the MTC team (usually neurosurgical advice). These may be difficult discussions for inoperable or palliative care cases. Older persons' trauma education should include appropriate approaches to these discussions.

If the patient is not admitted directly under a neurosurgery specialist, they should also have a named neurosurgeon (or named neurosurgical team) jointly managing their care; this can be done remotely if in a TU.

If a patient is triaged to an MTC but does not require MTC-level care, the patient should be prioritised for early transfer of care back to their local Trauma Unit to reduce patient and family emotional stress.

Three pathways for isolated TBI in older patients categorise these patients into distinct groups:

1. **Unsurvivable**

   For discussion with the neurosurgical team by phone and/or remote medicine; the patient can remain at the admitting TU.

2. **No immediate neurosurgical intervention required**

   The patient can stay at the admitting TU and a repeat scan is to be performed as specified by the neurosurgical team (typically within 48 hours but the exact timing depends on factors such as timing and findings of the initial CT scan, coagulation status, etc). If the patient deteriorates within this time frame, with a reduction in Glasgow Coma Scale (GCS) or new neurological presentation, there should be a rapid discussion with the neurosurgical team with a view to critical transfer to the Emergency Department at the MTC or neurosurgical centre as appropriate (this is not dependent on bed status at the receiving hospital).

   A scan prior to transfer may enable necessary theatre preparation and prognosis in some cases. Such patients should also be part of a virtual head injury/TBI meeting at the MTC/neurosurgical centre, or virtual ward round approach in discussion with the responsible trauma unit teams.

3. **Immediate neurosurgical intervention required**

   The patient should be immediately transferred to the MTC Emergency Department or neurosurgical centre with a time-critical head injury pre-alert.

   A wider discussion and agreed consensus based on patient, next of kin and staff feedback should focus on how patients and families are able to access neurosurgical specialists for initial assessment decisions, ongoing inpatient care, and outpatient care. This may include the use of communication technology to facilitate remote or virtual consultations.

Key principles for starting post-TBI rehabilitation in older persons include:

- Vestibular assessment for all patients with a traumatic brain injury or those with significant skull fractures or facial fractures without intracranial bleeding to look for benign paroxysmal positional vertigo or other neuro vestibular disorders.
- Collateral history within 24 hours.
- Mobilisation out of bed as early as possible.
- Access to exercise programmes as early as possible.
- Rehabilitation Prescription up to date and given on the day of discharge.
- Where possible, minimise ward or bed transfers to prevent disorientation or delirium.
- HSCP team to contact the MTC for handover.
- Consider non-opioid based medications for isolated TBI if headaches are present.
- Ensure delirium/infection is considered as a cause for cognitive difficulties prior to standardised cognitive assessment.
- Early removal of urinary catheter if ongoing use is not clinically indicated.
- Patients with skull fractures or facial fractures without intracranial bleeding should have an Occupational Therapy assessment and be given education on managing mild TBI/concussion-type symptoms.
- People who are important to the patient should also be educated on mild TBI symptoms and provided with written head injury discharge advice.

6.3 Spinal injuries

6.3.1 Cervical spine immobilisation

Evidence for the benefits of prehospital cervical spine immobilisation in reducing secondary neurological injury in unstable injuries is poor. There are, however, well-documented cases of worsened neurological injury in patients with poorly fitting collars, hyperextended positions or lying flat (Maschmann et al., 2019; Asha et al., 2021). Presence of severe degenerative disease in older patients (including ankylosing spondylitis) puts them at particular risk of spinal injury and consideration should be given to pragmatic alternatives to hard collar stabilisation, including self-extrication, careful handling, and movement mitigation, with transport in a position of comfort using soft padding and tape if necessary.

- Older patients are at high risk of developing pressure ulcers, pneumonia and respiratory failure, dysphagia, constipation, delirium, incontinence and raised intracranial pressure with prolonged cervical immobilisation. Many find hard collars and lying flat uncomfortable, painful, and frightening. Prompt assessment, imaging, imaging reporting and early involvement of senior clinical decision-makers are essential to minimise morbidity and distress. Patients should be sat up at angles determined by senior clinical decision-makers at the earliest opportunity.
- Assessment, imaging, and radiological reporting should be completed within two hours of arrival and/or decision to immobilise. If continued immobilisation is required, rigid extrication collars should be switched to soft padded collars (such as Miami-J) at the earliest opportunity and movement restrictions should be clearly documented within one hour of imaging reporting.
- Interpretation of cervical imaging in the presence of severe degenerative disease can be challenging; escalation for specialist reporting should be included in local trauma protocols to prevent delays in decisions regarding immobilisation.

6.3.2 Patients unable to comply with spinal immobilisation for assessment and imaging

Some patients are extremely intolerant of immobilisation; particularly those with dementia, delirium, or coexistent traumatic brain injury, which can impede further clinical assessment and imaging. These patients should be reviewed by a senior clinician who should consider several aspects of management:

- Optimise comfort; verify that the prescribed collar is correctly sized/fitted, switch to soft padded collar, if necessary, ensure that the position of comfort is optimised, and appropriate analgesia has been offered.
- Delirium reduction strategies (see Appendix 4): provide reassurance and regular orientation, minimise sensory deprivation (ensure glasses/hearing aids are available), low stimulus environment, if possible, hydration, check for urine retention/constipation, 1:1 nursing if necessary.
- Balance of risk:benefit of immobilisation; consider mechanism of injury, comorbidities, clinical assessment, and risk of pneumonia/aspiration.
- Risk:benefit analysis of sedation to maintain immobilisation and facilitate safe imaging; sedation is not without risk and should not be considered standard practice in these situations. Local policies will be dependent on availability of training of staff, monitoring equipment, availability of sedation/anaesthetic agents and expected duration of immobilisation. Early

surgical stabilisation should be considered as a priority, in order to avoid prolonged unnecessary immobilisation.

- Sedation with pharmacological agents may occasionally be deemed appropriate if there is a safety risk to the patient/others and should be guided by senior clinicians (see appendix 4 on management of delirium, and local delirium guidelines).

6.3.3 Prolonged cervical immobilisation

- Patients being managed conservatively with prolonged cervical immobilisation who are poorly tolerant of collars or experiencing complications should have immobilisation decisions reviewed with senior clinical decision-makers. Documentation of best-interest decisions following consultation between neuro/spinal surgeons, geriatricians, HSCPs and the patient/ persons important to them are essential.

6.3.4 Network guidance for spinal injury

Each trauma network should have guidance on the management of spinal injury for older patients. There are four general pathways (Pan London Major Trauma System Management of Older Trauma, 2021):

- Stable fractures for analgesia
- Unstable fractures for brace therapy
- Unstable fracture requiring surgical intervention
- Highly unstable fracture for urgent intervention.

Fragility fractures in the thoracic region are relatively common in older patients and are often incidental findings on imaging. Physical examination and imaging beyond plain films (e.g., CT or MRI) should aid in the determination of the level of acuteness in these injuries. Network guidelines should acknowledge the special conditions relating to spinal injury in older patients, especially in relation to incidental findings and comorbidities. The guidelines should incorporate whether the benefit from patient transfer to a MTC is clear and how a discussion between local senior clinicians (Geriatric medicine or surgery) and the network spinal consultant can be facilitated – including how the patient and/or family are involved in this process.

6.3.5 Spinal cord injury

Incidence of spinal cord injury is highest in older people in Ireland due to degenerative disease and canal stenosis, with incomplete cord syndromes possible from relatively low-energy mechanisms (Smith et al, 2019). Network spinal injury pathways should include management of cord injury in older persons including the incomplete cord syndromes. Regardless of the occurrence of a fracture and the need for surgical intervention, all older people with traumatic Spinal Cord Injury should be referred to the National Spinal Injuries Unit for specialist assessment, physiological monitoring, and intervention as appropriate and determination of rehabilitation/longer-term needs (Spinal Cord Injury Rehabilitation Evidence, 2022)

6.4 Pelvic injuries

6.4.1 Pelvic Injuries

As per NICE Guideline 37, all adult patients with blunt major trauma and suspected multiple injuries should have a WBCT. If a pelvic fracture is identified on X-ray after a low energy fall, then activation of the trauma team for a full trauma assessment is recommended.

A pelvic or sacral insufficiency fracture which commonly accompanies a simple pubic ramus fracture will at least cause back pain and may render the pelvis unstable. Urgent CT should be requested in symptomatic - pain, reduced mobility - older patients.

6.4.2 Assessment of haemodynamic compromise

Older patients have poor resilience to haemodynamic instability following haemorrhage. Hypovolaemic shock may be difficult to detect in older persons due to pre-existing hypertension, altered and impaired cardiovascular reserve or beta-blocker therapy. Early assessment of lactate or base deficit/excess and haemoglobin on arrival to the Emergency Department may help to detect haemodynamic compromise following pelvic trauma, irrespective of mechanism of injury (Ojodu et al., 1998). All older patients who present to the Emergency Department with a suspected pelvic fracture should be assessed by the trauma team.

Major haemorrhage protocols should be activated for any adult patient with known or suspected haemorrhage. Pelvic binders should be applied as part of haemorrhage control. However, caution must be exercised for long-term application (>12 hours) in older patients with poor skin integrity.

Following the CT scan, a verbal report should be communicated to the treating emergency physician. If there is evidence of vascular injury, angiographic embolisation should be considered following consultation with interventional radiologists. These patients may require MDT input from orthopaedic surgeons and interventional radiologists or vascular surgeons.

6.4.3 Complex or unstable

Complex pelvic injuries should be referred to a pelvic surgeon, as for any adult trauma patient. Pelvic surgery (including minimally invasive techniques) may be indicated for any age group to restore mobility and function.

6.4.4 Acetabular fractures

All older patients with acetabular fractures should be referred to the MTC pelvic surgery service for expert advice and possible transfer. This referral should occur within 12 hours of radiological (CT) confirmation of the injury. The referral should include CT scan images and a documented lower limb neurological assessment.

6.4.5 Rehabilitation

Older adults may be less likely to be able to comply with an altered weight bearing status. Regular communication between orthopaedic teams and therapists should take place to ensure minimum restrictions to allow maximum function.

6.5 Complex limb injuries

Bony and soft tissue limb injuries in older persons have an increased risk of complications, even with mechanisms that are relatively low-energy due to pre-existing peripheral vascular disease or chronic venous disease, diabetes, steroid use, reduced bone density and skin/soft tissue fragility. Complex lower limb injuries in older trauma patients essentially constitute two groups:

6.5.1 Open fractures and/or severe soft tissue injuries

For older patients with open fractures, each network should have local triage and transfer guidelines to ensure early consultant-led decision making and management. This should be at an orthoplastic centre, typically the network MTC. Management should be based on the British Orthopaedic Association's Standards for Trauma (BOAST) Open Fractures standard and NICE Guideline 37.

For older persons with open fractures, it is preferable to avoid excision of skin and negative pressure dressings, and instead to primarily stabilise fractures and close wounds wherever possible.

The decision to proceed to amputation is especially challenging for older persons in comparison to younger patients, and early expert debridement and fixation with the aim of judicious limb salvage may be preferred, based on senior (consultant-grade) orthoplastic opinion. A decision to amputate should be made in the MDT setting wherever possible.

Trauma network policies for open fractures and degloving injuries should include specific management considerations for older patients.

6.5.2 Periarticular fractures and periprosthetic fractures

These are challenging injuries with a variety of surgical management options. Primarily the aim of treatment (operative or non-operative) should be to facilitate early/immediate weight bearing and rehabilitation (as with hip fractures) and to avoid prolonged bed rest and lengthy hospital stays. Internal fixation, external fixation and acute arthroplasty may all be viable surgical options. In contrast, non-operative management is rarely able to facilitate early rehabilitation in lower limb injuries. Acute arthroplasty or revision arthroplasty in some fractures may be preferable to internal fixation. Specialist advice should be made available from the MTC, and early communication is recommended.

6.5.3 Rehabilitation

For all older patients with significant orthopaedic limb trauma, MDT input from geriatricians, orthopaedic surgeons, nurses, physiotherapists, occupational therapists and other HSCPs is required, similar to the successful MDT model of hip fracture treatment.

Older adults can become rapidly deconditioned when early mobilisation is delayed or not prioritised. Prompt decisions regarding weight bearing status, including for upper limbs, facilitates early mobilisation.

Older adults may be less likely to comply with an altered weight bearing status. Regular communication between orthopaedic teams and therapists should take place to ensure minimum restrictions to allow maximum function.

6.6 Chest injuries

Chest wall injuries are common in older patients and are associated with significantly higher morbidity and mortality than in younger patients, whether they occur as part of isolated or multi- system trauma.

Contrast CT scan is the investigation of choice to define intrathoracic and chest wall injuries early in the older person trauma pathway. This is predominantly due to the poor recognition of fractures and lung contusions using X-ray and the prognostic influence of an accurate diagnosis in ensuring the correct treatment strategy.

In addition to the admission policies presented in this guidance document, chest injury guidelines should also include anaesthetic/critical care, pain management and physiotherapy team reviews. Severe chest wall injuries including radiological and clinical flail chests, injuries causing respiratory compromise or where pain control cannot be achieved should be discussed early with the MTC trauma or cardiothoracic surgeon. A small proportion of patients will benefit from early operative chest wall stabilisation (NICE Interventional Procedures Guidance 361, 2010).

6.6.1 Significant considerations for rib fractures in trauma in older persons

10% of older major trauma patients have rib fractures and up to 50% of fractures in this group are undetected by plain X-ray. A meta-analysis of 50,000 patients, including 15,000 people aged over 65 years indicated an odds ratio for mortality of 1.98 for those over 65 years with any rib fractures, and for all ages an odds ratio for mortality of 2.02 with three or more rib fractures. Associated pulmonary contusion or pre-existing chronic lung disease are also significant prognostic findings (Battle et al., 2012).

The type and number of affected ribs is an important consideration. Vertebrosternal ribs (ribs 1-7) have greater physiological significance than vertebrocostal ribs.

6.6.2 Key objectives in rib fracture management in older persons:

- Management on a specific older person's rib fracture/chest wall injury pathway
- Early recognition of injuries and complications – CT scan
- Early and regular pain assessment. This should include assessing pain at rest (static) and on deep breathing/coughing (dynamic) as well as neuropathic pain measures
- Timely analgesia and access to advanced pain management options e.g., regional anaesthetic techniques
- Reduced duration of invasive ventilation and lung protective ventilation strategies (if required)
- Decreased mortality
- Patient satisfaction and return to baseline function in their pre-trauma residence.

These objectives can be achieved by:

- Appropriate analgesia sufficient to allow normal breathing and coughing
- Early mobilisation and physiotherapy including breathing exercises, e.g., the active cycle breathing technique

- Targeted oxygen therapy, using the lowest fraction of inspired oxygen (FiO_2) to achieve adequate peripheral oxygen saturation
- Infection prevention
- In more severe cases, ventilatory support to prevent atelectasis and suction to remove mucus or secretions from the airways
- Surgical fixation within 48 hours (if required)
- Early consideration of video-assisted thoracic surgery to wash out haemothorax or empyema.

6.6.3 Analgesia considerations when managing chest injuries

Patients should be managed using a locally agreed pathway which includes guidance specifically tailored to older patients.

A specific analgesia protocol for older patients – including indications for neuraxial blocks, regional blocks (e.g., paravertebral, erector spinae plane or serratus anterior blocks) and opioid analgesia must be available (see pain management guidance pages 17-18). This may be a network guideline or local trauma unit guideline as appropriate.

To minimise the requirement for transfer between sites, hospitals should ensure that adequate facilities and expertise are available 24/7 onsite to provide rapid and effective analgesia (to maximise early treatment benefit including management of thoracic epidural) while also maintaining local expertise to manage simple pneumothoraces and haemothoraces associated with blunt trauma.

Incentive spirometry or vital capacity can be used to identify patients at risk of deterioration. Active Cycle Breathing Techniques are simple techniques that can aid expectoration and reduce pain scores (Nyland et al., 2016). Advanced respiratory positive pressure airway devices can be considered - either high flow nasal cannulae or Continuous Positive Airway Pressure (CPAP) although the evidence in the over 70 age group is limited (Kourouchea et al., 2018).

Other specific analgesia cautions in the older people are:

- NSAIDs should be used with extreme caution due to renal, cardiac, and Gastrointestinal system risks. They should be used for the shortest duration course possible, e.g., three to five days.
- Opioids should be used in lower doses and weaned down as possible.

6.6.4 Other considerations when managing chest injuries:

Other considerations when managing chest injuries in the older people are:

- Small pneumothoraces identified on CT should be considered for conservative management without chest drainage unless there are other clinical indications, or if the patient requires positive pressure ventilation.
- Persistent (lasting >48 hours) air leak, flail chest and patients with consequent respiratory compromise should be discussed with a thoracic or trauma surgeon.

Any national or network guidelines for chest trauma and rib fixation developed in the future must include special considerations relating to trauma in older patients and address the insertion, management (including transfer policy) and removal of intercostal drains in trauma (including site, technique, and prophylactic antibiotic use).

7 Future Injury Prevention

This section focuses on the prevention of future injuries by providing guidance on optimisation of bone health and falls prevention.

7.1 Falls prevention

All older adults presenting with major trauma from a fall should have a multifactorial falls risk assessment during hospital admission, and have a personalised, multicomponent falls risk prevention plan.

The WHO defines a fall as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level (WHO, 2021). The most common mechanism of injury in older patients presenting with serious injury in Ireland is a fall from standing height (<2m) (MTA, 2020). Many falls can be prevented; falls and injury prevention needs MDT management. Assessment and treatment should be conducted in line with the recently published World Falls Guidelines for older adults at high risk for falls (Montero-Odasso et al., 2022). Evidence-based balance, strength and exercise programmes combined with multifactorial assessment, intervention and education have been shown to decrease falls by 60% in people who are at high risk of falling. Patients appropriate for these programmes need to be able to follow simple instructions and consent to be contacted by a member of the community/local falls and bone health community prevention team.

The priority of initial assessments for anyone presenting with a fall should be to identify medical causes that may require urgent intervention. A multifactorial falls risk assessment should then be conducted to address the mechanism of the fall, the consequences of the fall and the identification of potentially contributing fall risk factors. Falls assessment, with a view to co-designing an intervention with the older adult, requires a broad approach and incorporating this assessment into a CGA may be useful. Assessment should consider the clinical characteristics of the older adult, the setting, and the resources available. In the setting of major trauma, final parts of the full assessment may need to take place on full recovery, but the basic safety elements of a cardiovascular assessment and medication review should be a priority in the inpatient setting.

Commonly included components of the multifactorial falls risk assessment include:

- Disease history (Including cardiovascular history, identification and consideration of contributing disease or geriatric syndrome, syncope assessment with further investigation as needed in line with European Society of Cardiology guidelines (Brignole et al., 2018) where syncope is suspected - e.g., in unexplained falls)
- Medication history
- Gait and mobility
- Sensory function (e.g., visual assessment)
- Activities of daily living
- Cognitive function
- Autonomic function
- Nutrition history
- Environmental risk

- Continence assessment
- Patient concerns about falling and falls.

Multidomain interventions should be developed using a patient-centred approach incorporating:

- Exercise and physical activity interventions; with programmes including balance and functional exercises
- Medication interventions; comprehensive person-centred medication review and deprescribing of Falls Risk Increasing Drugs as appropriate, including stopping culprit medicines where possible, reducing doses, or changing to safer alternatives
- Cardiovascular interventions; identification and management of orthostatic hypotension and other cardiovascular disorders
- Environmental interventions: including home hazard checklist, included in Appendix 8
- Vestibular interventions: managing vestibular issues should be considered as part of a multifactorial approach
- Pain interventions: adequate pain relief is likely to reduce the risk of falling while physically active. Consider pharmacological and non-pharmacological options
- Vision intervention: management of impaired vision should be considered as part of the multifactorial approach
- Evaluation of nutritional status and dietary intake with appropriate intervention as indicated.

All inpatient care services should have a falls prevention and management policy in place to reduce risk of falls and harm from falls (HSE 2018, HIQA 2012). This policy must describe procedures relating to falls and fracture risk management, such as:

- falls risk assessment
- management of the patient post-fall
- details of organisational infrastructure
- education and training, and measures and monitors relating to falls prevention and management.

7.2 Bone Health Assessment

All older adults presenting with major trauma should have a bone health review during the hospital admission, be investigated and promptly prescribed appropriate medication when indicated. A fracture that occurs in an older person as a result of a low-level fall is an indication for osteoporosis treatment due to high fracture risk, regardless of bone mineral density. Though BMD testing is certainly appropriate when able, it should not delay treatment. The earlier osteoporosis drug treatment starts, when indicated, the sooner a patient can benefit from fracture risk reduction which is highest in the 1-2 years following an index fracture.

Fragility fractures are defined as a fracture resulting from forces that would not normally result in fracture. The WHO defined this as forces equivalent to a fall from standing height or less (NICE,

2017). A third of survivors will have another fracture within five years, with the risk being highest in the early post-fracture period (Balasubramanian, 2019). All patients who sustain a fragility fracture should have access to a multidisciplinary, coordinator-based Fracture Liaison Service (NOGG guideline, 2021). Fracture liaison services have shown to be associated with an 18% reduction in major osteoporotic fracture (Axelsson et al., 2020) and a 37% reduction in hip fracture rates (Dell et al., 2008).

Based on the UK National Osteoporosis Guideline Group 2021 recommendations (NOGG, 2021), bone health assessment and intervention should include:

- Fracture risk assessment (FRAX tool)
- A clinical diagnosis of osteoporosis where applicable (Siris et al., 2014)
- Screening for secondary causes of osteoporosis
- Identification and treatment of vitamin D deficiency
- Patient education regarding diagnosis of osteoporosis and pharmacological and non-pharmacological management
- Optimisation of lifestyle factors including a healthy balanced diet with adequate calcium and protein intake, smoking cessation and moderation of alcohol consumption
- Referral to an exercise programme or education regarding appropriate exercise recommendations
- Drug treatment offered to older adults with a fragility fracture (and those at high and very high risk of fracture)
- The choice of drug treatment should be informed by the level of fracture risk, additional clinical risk factors, cost-effectiveness of treatment and patient preferences
- Antiresorptive therapy with oral bisphosphonates (alendronate or risedronate) or intravenous zoledronate should be offered, while also considering alternatives including denosumab, where these treatments are unsuitable or not tolerated (e.g., advanced renal impairment)
- Consider spine imaging to diagnose vertebral fractures and consider first line anabolic therapy especially in those with multiple vertebral fractures
- Consider bone mineral density measurement in patients with high and very high fracture risk to guide drug choices and provide a baseline for Bone Mineral Density (BMD) monitoring. However, if BMD measurement is unavailable, contraindicated, or impractical, then treatment with anti-osteoporosis medication should not be delayed.

8 References

Asha, S.E., Curtis, K., Healy, G., Neuhaus, L., Tzannes, A. and Wright, K., 2021. Neurologic outcomes following the introduction of a policy for using soft cervical collars in suspected traumatic cervical spine injury: A retrospective chart review. *Emergency Medicine Australasia*, *33*(1), pp.19-24.

Alexiou, K.I., Roushias, A., Varitimidis, S.E. and Malizos, K.N., 2018. Quality of life and psychological consequences in elderly patients after a hip fracture: a review. Clinical interventions in aging, 13, p.143.

Anekar AA, Cascella M. WHO Analgesic Ladder. [Updated 2022 Nov 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-.

Assisted Decision-Making (Capacity) Act 2015 - The Department of Justice, https://www.justice.ie/en/JELR/Pages/Assisted_Decision-Making_(Capacity)_Act_2015 [Accessed 11 Aug 2022]

Axelsson, K.F., Johansson, H., Lundh, D., Möller, M. and Lorentzon, M., 2020. Association between recurrent fracture risk and implementation of fracture liaison services in four Swedish hospitals: a cohort study. *Journal of Bone and Mineral Research*, *35*(7), pp.1216-1223.

Balasubramanian, A., Zhang, J., Chen, L., Wenkert, D., Daigle, S.G., Grauer, A. and Curtis, J.R., 2019. Risk of subsequent fracture after prior fracture among older women. *Osteoporosis international*, *30*(1), pp.79-92.

Battle, C.E., Hutchings, H. and Evans, P.A., 2012. Risk factors that predict mortality in patients with blunt chest wall trauma: a systematic review and meta-analysis. *Injury*, *43*(1), pp.8-17.

BOAST Open Fractures Standard: British Orthopaedic Association / British Association of Plastic, Reconstructive and Aesthetic Surgeons, BOAST: Open Fractures. https://www.boa.ac.uk/wp-content/uploads/2017/12/BOAST-Open-Fractures.pdf (2017)

Braude, P., Short, R., Bouamra, O., Shipway, D., Lecky, F., Carlton, E., Benger, J., Gordon, A. and Carter, B., 2022. A national study of 23 major trauma centres to investigate the effect of a geriatrician assessment on clinical outcomes in older people admitted with serious injury in England (FiTR 2): a multicentre observational cohort study. *The Lancet Healthy Longevity*.

Brignole, M., Moya, A., de Lange, F.J., Deharo, J.C., Elliott, P.M., Fanciulli, A., Fedorowski, A., Furlan, R., Kenny, R.A., Martín, A. and Probst, V., 2018. Practical Instructions for the 2018 ESC Guidelines for the diagnosis and management of syncope. *European heart journal*, *39*(21), pp.e43-e80.

British Orthopaedic Association Trauma Committee, 2020. British Orthopaedic Association's Standards for Trauma (BOAST): care of the older or frail patient with orthopaedic injuries. *Injury*, *51*(7), pp.1419-1421.

Bryant, E.A., Tulebaev, S., Castillo-Angeles, M., Moberg, E., Senglaub, S.S., O'Mara, L., McDonald, M., Salim, A. and Cooper, Z., 2019. Frailty identification and care pathway: an interdisciplinary approach to care for older trauma patients. *Journal of the American College of Surgeons*, *228*(6), pp.852-859.

Checketts, M.R., 2022. Fluid fasting before surgery: the ultimate example of medical sophistry?. Anaesthesia.

Church, K., Munro, S., Shaughnessy, M. and Clancy, C., 2022. Age-Friendly Health Systems: Improving Care for Older Adults in the Veterans Health Administration. Health Services Research.

Clinical Guideline 103 NICE, 2010. Delirium: prevention, diagnosis and management. *National Institute for Health and Care Excellence*.

Comprehensive Geriatric Assessment A Summary - Adapted from Specialist Geriatric Team Guidance on CGA, National Clinical Programme for Older People, 2016 https://www.hse.ie/eng/services/publications/clinical-strategy-and-programmes/comprehensive-geriatric-assessment-summary.pdf

Dell, R., Greene, D., Schelkun, S.R. and Williams, K., 2008. Osteoporosis disease management: the role of the orthopaedic surgeon. *JBJS*, *90*(Supplement_4), pp.188-194.

Dementia Pathways 2020, Integrated Care Pathways and Delirium Algorithms, viewed 16 Aug 2022 [https://dementiapathways.ie/care-pathways/acute-hospital-care/integrated-care-pathways-and-delirium-algorithms]

Ellis, G., Gardner, M., Tsiachristas, A., Langhorne, P., Burke, O., Harwood, R.H., Conroy, S.P., Kircher, T., Somme, D., Saltvedt, I. and Wald, H., 2017. Comprehensive geriatric assessment for older adults admitted to hospital. *Cochrane database of systematic reviews*, (9).

Fulmer, T. and Pelton, L., 2022. Age-friendly health systems: A guide to using the 4Ms while caring for older adults. Institute for Healthcare Improvement.

Gibran, N.S., Shipper, E., Phuong, J., Braverman, M., Bixby, P., Price, M.A. and Bulger, E.M., 2022. Developing a national trauma research action plan: Results from the Burn Research Gap Delphi Survey. *Journal of Trauma and Acute Care Surgery*, *92*(1), pp.201-212.

Giummarra, M.J., Lennox, A., Dali, G., Costa, B. and Gabbe, B.J., 2018. Early psychological interventions for posttraumatic stress, depression and anxiety after traumatic injury: A systematic review and meta-analysis. Clinical psychology review, 62, pp.11-36.

Harari, D., Hopper, A., Dhesi, J., Babic-Illman, G., Lockwood, L. and Martin, F., 2007. Proactive care of older people undergoing surgery ('POPS'): designing, embedding, evaluating and funding a comprehensive geriatric assessment service for older elective surgical patients. *Age and ageing*, *36*(2), pp.190-196.

Health Information and Quality Authority. (2012). General Guidance on the National Standards for Safer Better Healthcare. [Online]. . Available at: https://www.hiqa.ie/sites/default/files/2017-01/Safer-Better-Healthcare-General-Guidance.pdf [Accessed 19 October 2022].

Health Service Executive and A Vision for Change, (2014), Psychosocial and Mental Health Needs Following Major Emergencies, A Guidance Document, Available at : https://www.hse.ie/eng/services/publications/mentalhealth/emer.pdf [Accessed 6 November 2022]

Health Service Executive (2022) Get up, Get dressed, Get moving, HSE.ie, available:https://www.hse.ie/eng/services/list/4/olderpeople/get-up-get-dressed-get-moving/ [accessed 21 November 2022]

Health Service Executive National Consent Policy (2022) available: https://www.hse.ie/eng/about/who/national-office-human-rights-equality-policy/consent/documents/hse-national-consent-policy.pdf [accessed 6 January 2023]

Health Service Executive (2018). *Service User Falls A Practical Guide for Review*. [Online]. . Available at: https://www.hse.ie/eng/about/who/nqpsd/qps-incident-management/incident-management/service-user-fall [Accessed 19 October 2022].

Heffernan, D.S., Thakkar, R.K., Monaghan, S.F., Ravindran, R., Adams Jr, C.A., Kozloff, M.S., Gregg, S.C., Connolly, M.D., Machan, J.T. and Cioffi, W.G., 2010. Normal presenting vital signs are unreliable in geriatric blunt trauma victims. *Journal of Trauma and Acute Care Surgery*, *69*(4), pp.813-820.

Irish Association for Emergency Medicine, 2019 - Management of Acute Alcohol Withdrawal Syndrome in the Emergency Department, viewed 12 Sept 2022 https://iaem.ie/wp-content/uploads/2019/12/IAEM-AWS.pdf

Irish Nutrition and Dietetic Institute (2016) Nutrition and Dementia- A practical guide when caring for a person with dementia, Dementiapathways.ie, available: https://www.indi.ie/images/Dementia_Booklet__.pdf [accessed 21 November 2022]

Irish Osteoporosis Society, 2022 www.irishosteoporosis.ie/information-support/about-osteoporosis [Accessed 26 Jul. 2022]

Jacobs, D.G., 2003. Special considerations in geriatric injury. *Current opinion in critical care*, *9*(6), pp.535-539.

Jarman, H., Crouch, R., Halter, M., Peck, G. and Cole, E., 2022. Provision of acute care pathways for older major trauma patients in the UK. BMC geriatrics, 22(1), pp.1-11.

Kourouche, S., Buckley, T., Munroe, B. and Curtis, K., 2018. Development of a blunt chest injury care bundle: an integrative review. *Injury*, *49*(6), pp.1008-1023.

Lenartowicz, M., Parkovnick, M., McFarlan, A., Haas, B., Straus, S.E., Nathens, A.B. and Wong, C.L., 2012. An evaluation of a proactive geriatric trauma consultation service. *Annals of surgery*, *256*(6), pp.1098-1101.

Maschmann, C., Jeppesen, E., Rubin, M.A. and Barfod, C., 2019. New clinical guidelines on the spinal stabilisation of adult trauma patients–consensus and evidence based. *Scandinavian journal of trauma, resuscitation and emergency medicine*, *27*(1), pp.1-10.

Maurer, L.R., Sakran, J.V. and Kaafarani, H.M., 2021. Predicting and Communicating Geriatric Trauma Outcomes. *Current Trauma Reports*, *7*(1), pp.1-7.

Min, L., Burruss, S., Morley, E., Mody, L., Hiatt, J.R., Cryer, H., Ha, J.K. and Tillou, A., 2013. A simple clinical risk nomogram to predict mortality-associated geriatric complications in severely-injured geriatric patients. *The journal of trauma and acute care surgery*, *74*(4), p.1125.

Montero-Odasso, M., van der Velde, N., Martin, F.C., Petrovic, M., Tan, M.P., Ryg, J., Aguilar-Navarro, S., Alexander, N.B., Becker, C., Blain, H. and Bourke, R., 2022. World guidelines for falls prevention and management for older adults: a global initiative. *Age and Ageing*, *51*(9).

National Institute for Health and Clinical Excellence (Great Britain), 2010. Insertion of metal rib reinforcements to stabilise a flail chest wall. National Institute for Health and Clinical Excellence.

National Institute for Health and Care Excellence (Great Britain), 2017. *Osteoporosis: assessing the risk of fragility fracture*. National Institute for Health and Care Excellence (NICE).

National Office of Clinical Audit (2022) Major Trauma Audit National Report 2019 and 2020. Dublin: National Office of Clinical Audit

National Osteoporosis Guideline Group UK, 2021 - Clinical guideline for the prevention and treatment of osteoporosis

National Trauma Strategy - A Trauma System for Ireland 2018, Department of Health, Ireland

Neuburger, J., Currie, C., Wakeman, R., Johansen, A., Tsang, C., Plant, F., Wilson, H., Cromwell, D.A., van der Meulen, J. and De Stavola, B., 2017. Increased orthogeriatrician involvement in hip fracture care and its impact on mortality in England. Age and ageing, 46(2), pp.187-192.

NICE Guideline 37, 2017, Fractures (complex): assessment and management, *National Institute for Health and Care Excellence*.

NICE Guideline 197, 2021, Shared decision Making, *National Institute for Health and Care Excellence*.

Nutrition and Dementia: A practical guide when caring for a person with dementia - Irish Nutrition and Dietetic Institute | Older Persons + Dementia 2016

Nyland, B.A., Spilman, S.K., Halub, M.E., Lamb, K.D., Jackson, J.A., Oetting, T.W. and Sahr, S.M., 2016. A preventative respiratory protocol to identify trauma subjects at risk for respiratory compromise on a general in-patient ward. *Respiratory care*, *61*(12), pp.1580-1587.

Obituary: Lionel Cosin. The Independent, April 13, 1994. Available at https://www.independent.co.uk/news/people/obituary-lionelcosin-1369765.html [Accessed 6 Jan 2023]

Ojodu, I., Pohlemann, T., Hopp, S., Rollmann, M.F., Holstein, J.H. and Herath, S.C., 2015. Predictors of mortality for complex fractures of the pelvic ring in the elderly: a twelve-year review from a German level I trauma center. *Injury*, *46*(10), pp.1996-1998.

Olufajo, O.A., Tulebaev, S., Javedan, H., Gates, J., Wang, J., Duarte, M., Kelly, E., Lilley, E., Salim, A. and Cooper, Z., 2016. Integrating geriatric consults into routine care of older trauma patients: one-year experience of a level I trauma center. Journal of the American College of Surgeons, 222(6), pp.1029-1035.

Pan London Major Trauma System Management of Older Trauma. Third Edition, April 2021. https://www.c4ts.qmul.ac.uk/downloads/london-major-trauma-system-older-traumaguidance_third-editionApril2021.pdf [Accessed 6 January 2022]

Quality Standard 136, NICE., 2016. Transition between inpatient hospital settings and community or care home settings for adults with social care needs. *National Institute for Health and Care Excellence*.

Schoene, D., Heller, C., Aung, Y.N., Sieber, C.C., Kemmler, W. and Freiberger, E., 2019. A systematic review on the influence of fear of falling on quality of life in older people: is there a role for falls?. Clinical interventions in aging, 14, p.701.

SIGN Guidelines 2019 SIGN 157 Risk Reduction and Management of Delirium, viewed 21 Aug 2022 [https://www.sign.ac.uk/media/1423/sign157.pdf]

Siris, E.S., Adler, R., Bilezikian, J., Bolognese, M., Dawson-Hughes, B., Favus, M.J., Harris, S.T., Jan de Beur, S.M., Khosla, S., Lane, N.E. and Lindsay, R., 2014. The clinical diagnosis of osteoporosis: a position statement from the National Bone Health Alliance Working Group. *Osteoporosis international*, *25*(5), pp.1439-1443.

Smith, É., Fitzpatrick, P., Lyons, F., Morris, S. and Synnott, K., 2019. Prospective epidemiological update on traumatic spinal cord injury in Ireland. Spinal cord series and cases, 5(1), pp.1-4.

Spinal Cord Injury Rehabilitation Evidence – Specialized vs General SCI Units (Acute Care). Available https://scireproject.com/evidence/rehabilitation-practices/specialized-vs-general-sci-units-acute-care [Accessed 20 Dec. 2022

The Irish Longitudinal Study on Ageing (TILDA) O'Halloran, A. and O'Shea, M., 2018. 7Frailty. *Wave*, p.117.

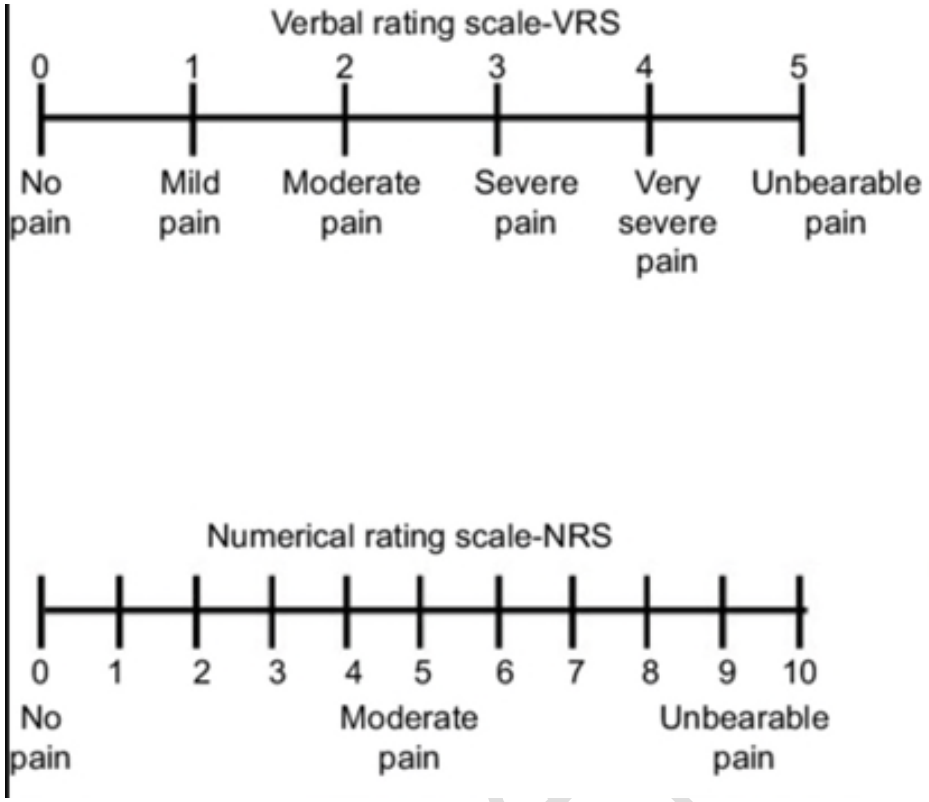
Tins, B.J., 2017. Imaging investigations in spine trauma: the value of commonly used imaging modalities and emerging imaging modalities. *Journal of clinical orthopaedics and trauma*, *8*(2), pp.107-115.

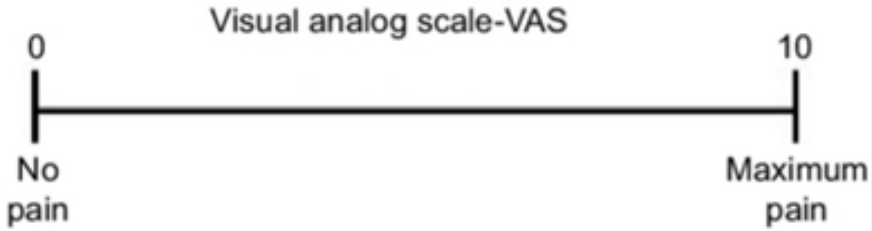
van der Naalt, J., Timmerman, M.E., de Koning, M.E., van der Horn, H.J., Scheenen, M.E., Jacobs, B., Hageman, G., Yilmaz, T., Roks, G. and Spikman, J.M., 2017. Early predictors of outcome after mild traumatic brain injury (UPFRONT): an observational cohort study. The Lancet Neurology, 16(7), pp.532-540.

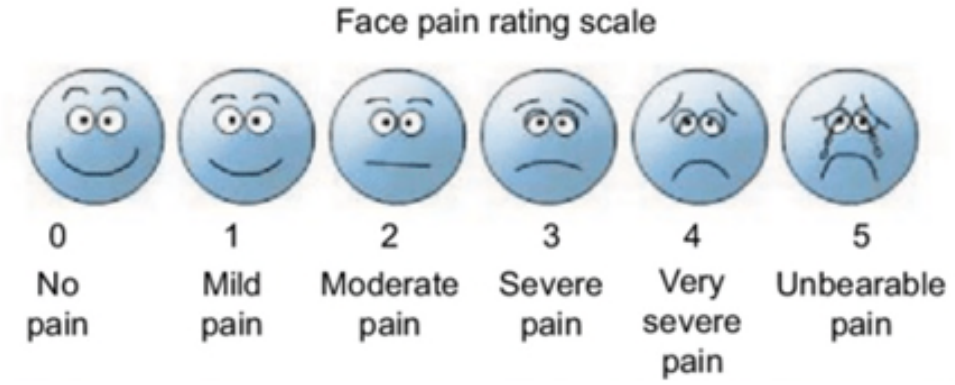
World Health Organization, 2021. Step safely: strategies for preventing and managing falls across the life-course.

9 Appendices

Appendix 1 - Pain rating scales







Appendix 1 continued: Pain rating scales - Abbey Pain scale - for assessment of pain in people with dementia who cannot verbalise

The Abbey Pain Scale

For measurement of pain in people with dementia who cannot verbalise

How to use scale: While observing the resident, score questions 1 to 6.

Name of resident: .....

Name and designation of person completing the scale: .....

Date: ..... Time: .....

Latest pain relief given was ..... at .....hrs.

Q1. Vocalisation
eg whimpering, groaning, crying
Absent 0 *Mild 1* *Moderate 2* *Severe 3*
Q1 ☐

Q2. Facial expression
eg looking tense, frowning, grimacing, looking frightened
Absent 0 *Mild 1* *Moderate 2* *Severe 3*
Q2 ☐

Q3. Change in body language
eg fidgeting, rocking, guarding part of body, withdrawn
Absent 0 *Mild 1* *Moderate 2* *Severe 3*
Q3 ☐

Q4. Behavioural change
eg increased confusion, refusing to eat, alteration in usual patterns
Absent 0 *Mild 1* *Moderate 2* *Severe 3*
Q4 ☐

Q5. Physiological change
eg temperature, pulse or blood pressure outside normal limits, perspiring, flushing or pallor
Absent 0 *Mild 1* *Moderate 2* *Severe 3*
Q5 ☐

Q6. Physical changes
eg skin tears, pressure areas, arthritis, contractures, previous injuries
Absent 0 *Mild 1* *Moderate 2* *Severe 3*
Q6 ☐

Add scores for Q1 to Q6 and record here ⇒ Total pain score ☐

Now tick the box that matches the Total pain score ⇒

0–2 No pain	3–7 Mild	8–13 Moderate	14+ Severe

Finally, tick the box which matches the type of pain ⇒

Chronic	Acute	Acute on chronic

Abbey J, De Bellis A, Piller N, Esterman A, Giles L, Parker D, Lowcay B. The Abbey Pain Scale. Funded by the JH & JD Gunn Medical Research Foundation 1998–2002.
(This document may be reproduced with this reference retained.)

Appendix 2 - Clinical Frailty Scale

CLINICAL FRAILTY SCALE

1 VERY FIT — People who are robust, active, energetic and motivated. They tend to exercise regularly and are among the fittest for their age.

2 FIT — People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g., seasonally.

3 MANAGING WELL — People whose **medical problems are well controlled**, even if occasionally symptomatic, but often are **not regularly active** beyond routine walking.

4 LIVING WITH VERY MILD FRAILTY — Previously "vulnerable," this category marks early transition from complete independence. While **not dependent** on others for daily help, often **symptoms limit activities.** A common complaint is being "slowed up" and/or being tired during the day.

5 LIVING WITH MILD FRAILTY — People who often have **more evident slowing**, and need help with **high order instrumental activities of daily living** (finances, transportation, heavy housework). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation, medications and begins to restrict light housework.

6 LIVING WITH MODERATE FRAILTY — People who need help with **all outside activities** and with **keeping house.** Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 LIVING WITH SEVERE FRAILTY — **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~6 months).

8 LIVING WITH VERY SEVERE FRAILTY — Completely dependent for personal care and approaching end of life. Typically, they could not recover even from a minor illness.

9 TERMINALLY ILL — Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise living with severe frailty.** (Many terminally ill people can still exercise until very close to death.)

SCORING FRAILTY IN PEOPLE WITH DEMENTIA

The degree of frailty generally corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

In **very severe dementia** they are often bedfast. Many are virtually mute.

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Rockwood K et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489–495.

Appendix 3 - 4AT Screening tool for delirium

4AT

Assessment test for delirium & cognitive impairment

(label)

Patient name:

Date of birth:

Patient number:

Date: **Time:**

Tester:

		CIRCLE
[1] ALERTNESS *This includes patients who may be markedly drowsy (eg. difficult to rouse and/or obviously sleepy during assessment) or agitated/hyperactive. Observe the patient. If asleep, attempt to wake with speech or gentle touch on shoulder. Ask the patient to state their name and address to assist rating.*		
	Normal (fully alert, but not agitated, throughout assessment)	**0**
	Mild sleepiness for <10 seconds after waking, then normal	**0**
	Clearly abnormal	**4**
[2] AMT4 *Age, date of birth, place (name of the hospital or building), current year.*		
	No mistakes	**0**
	1 mistake	**1**
	2 or more mistakes/untestable	**2**
[3] ATTENTION *Ask the patient: "Please tell me the months of the year in backwards order, starting at December." To assist initial understanding one prompt of "what is the month before December?" is permitted.*		
Months of the year backwards	Achieves 7 months or more correctly	**0**
	Starts but scores <7 months / refuses to start	**1**
	Untestable (cannot start because unwell, drowsy, inattentive)	**2**
[4] ACUTE CHANGE OR FLUCTUATING COURSE *Evidence of significant change or fluctuation in: alertness, cognition, other mental function (eg. paranoia, hallucinations) arising over the last 2 weeks and still evident in last 24hrs*		
	No	**0**
	Yes	**4**

4 or above: possible delirium +/- cognitive impairment
1-3: possible cognitive impairment
0: delirium or severe cognitive impairment unlikely (but delirium still possible if [4] information incomplete)

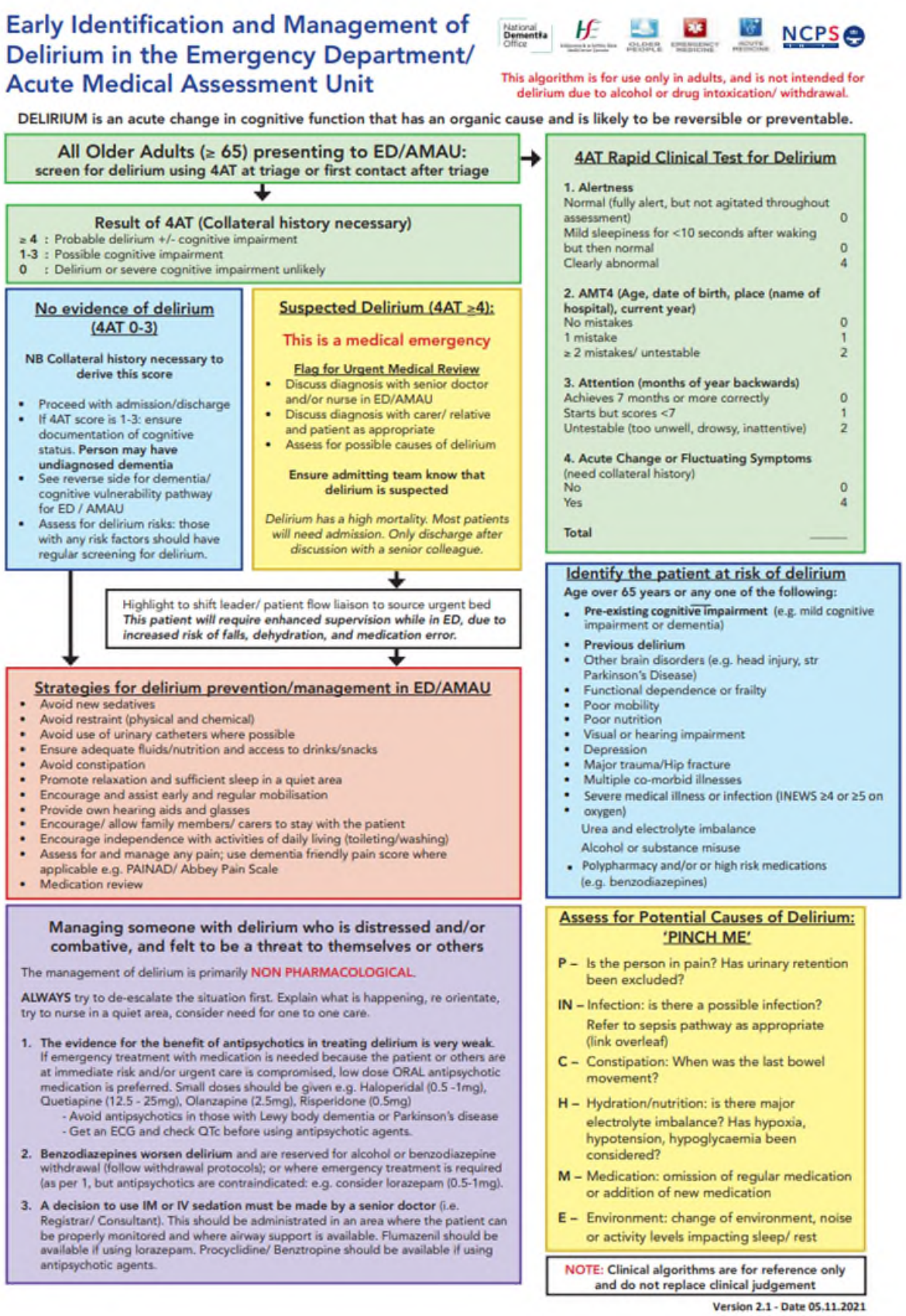
4AT SCORE ☐

GUIDANCE NOTES Version 1.2. Information and download: www.the4AT.com

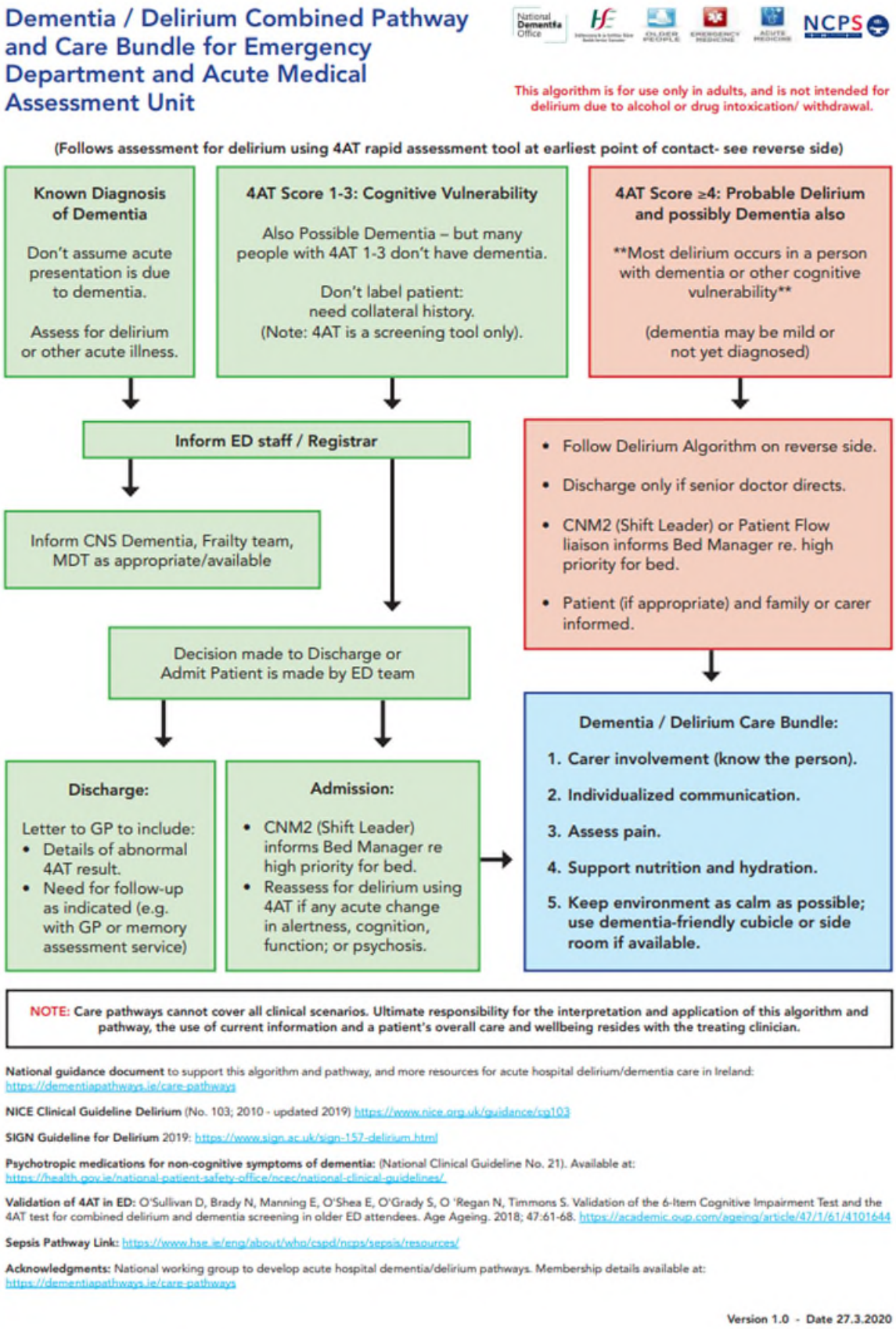
The 4AT is a screening instrument designed for rapid initial assessment of delirium and cognitive impairment. A score of 4 or more *suggests* delirium but is not diagnostic: more detailed assessment of mental status may be required to reach a diagnosis. A score of 1-3 suggests cognitive impairment and more detailed cognitive testing and informant history-taking are required. A score of 0 does not definitively exclude delirium or cognitive impairment: more detailed testing may be required depending on the clinical context. Items 1-3 are rated *solely on observation of the patient at the time of assessment*. Item 4 requires information from one or more source(s), eg. your own knowledge of the patient, other staff who know the patient (eg. ward nurses), GP letter, case notes, carers. The tester should take account of communication difficulties (hearing impairment, dysphasia, lack of common language) when carrying out the test and interpreting the score.

Alertness: Altered level of alertness is very likely to be delirium in general hospital settings. If the patient shows significant altered alertness during the bedside assessment, score 4 for this item. **AMT4 (Abbreviated Mental Test - 4):** This score can be extracted from items in the AMT10 if the latter is done immediately before. **Acute Change or Fluctuating Course:** Fluctuation can occur without delirium in some cases of dementia, but marked fluctuation usually indicates delirium. To help elicit any hallucinations and/or paranoid thoughts ask the patient questions such as, "Are you concerned about anything going on here?"; "Do you feel frightened by anything or anyone?"; "Have you been seeing or hearing anything unusual?"

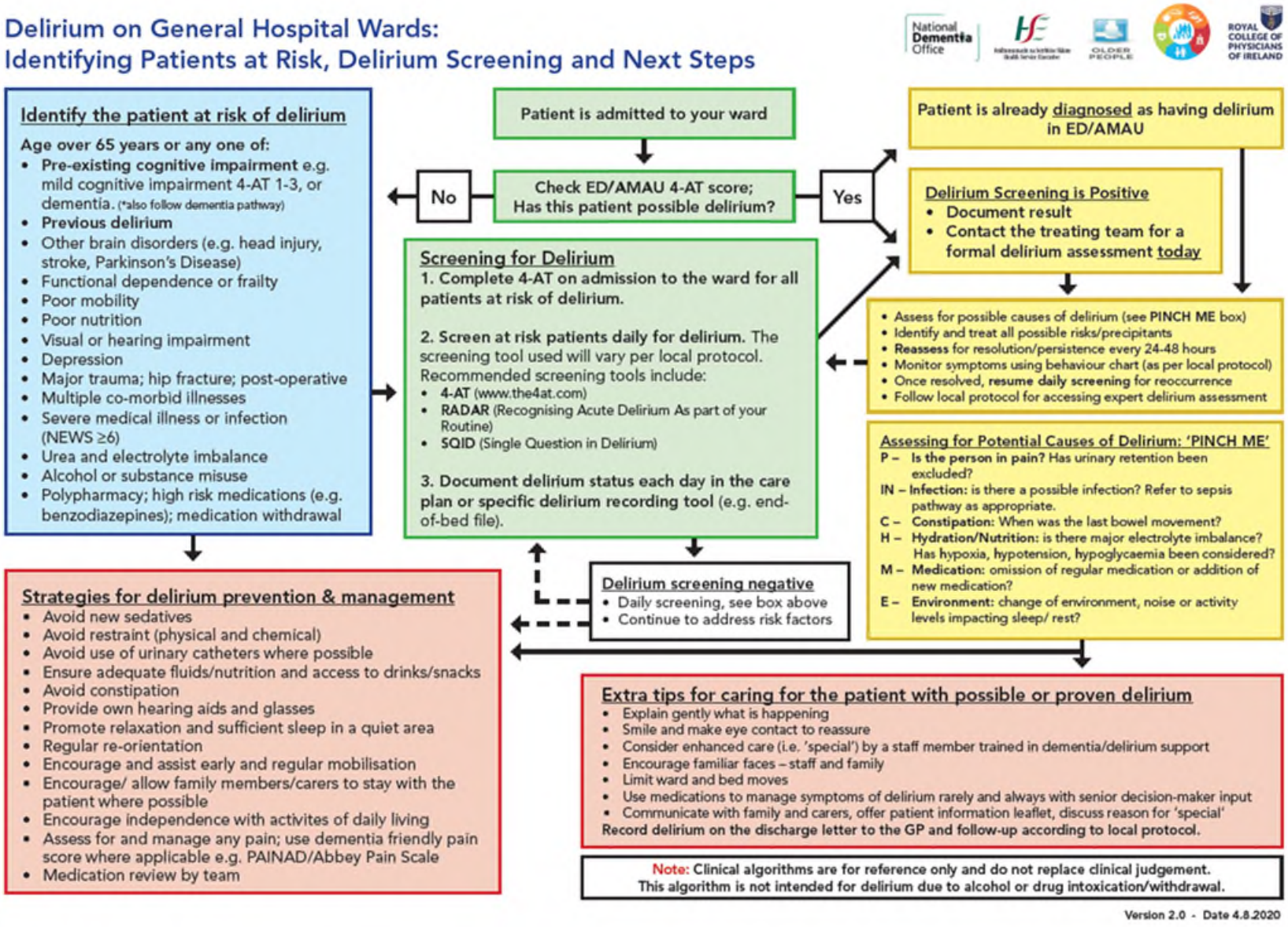
Appendix 4 - Early Identification and Management of Delirium in the ED/AMAU



Appendix 4 continued: Early Identification and Management of Delirium in the Emergency Department/Acute Medical Assessment Unit



Appendix 4 continued: Early Identification and Management of Delirium in the Emergency Department/Acute Medical Assessment Unit



Trauma Care Ireland

Appendix 5 - Alcohol Withdrawal Assessment Scoring Guidelines

Alcohol Withdrawal Assessment Scoring Guidelines (CIWA - Ar)

Nausea/Vomiting - Rate on scale 0 - 7

0 - None
1 - Mild nausea with no vomiting
2
3
4 - Intermittent nausea
5
6
7 - Constant nausea and frequent dry heaves and vomiting

Tremors - have patient extend arms & spread fingers. Rate on scale 0 - 7.
0 - No tremor
1 - Not visible, but can be felt fingertip to fingertip
2
3
4 - Moderate, with patient's arms extended
5
6
7 - severe, even w/ arms not extended

Anxiety - Rate on scale 0 - 7
0 - no anxiety, patient at ease
1 - mildly anxious
2
3
4 - moderately anxious or guarded, so anxiety is inferred
5
6
7 - equivalent to acute panic states seen in severe delirium or acute schizophrenic reactions.

Agitation - Rate on scale 0 - 7
0 - normal activity
1 - somewhat normal activity
2
3
4 - moderately fidgety and restless
5
6
7 - paces back and forth, or constantly thrashes about

Paroxysmal Sweats - Rate on Scale 0 - 7.
0 - no sweats
1- barely perceptible sweating, palms moist
2
3
4 - beads of sweat obvious on forehead
5
6
7 - drenching sweats

Orientation and clouding of sensorium - Ask, "What day is this? Where are you? Who am I?" Rate scale 0 - 4
0 - Oriented
1 – cannot do serial additions or is uncertain about date

2 - disoriented to date by no more than 2 calendar days

3 - disoriented to date by more than 2 calendar days
4 - Disoriented to place and / or person

Tactile disturbances - Ask, "Have you experienced any itching, pins & needles sensation, burning or numbness, or a feeling of bugs crawling on or under your skin?"
0 - none
1 - very mild itching, pins & needles, burning, or numbness
2 - mild itching, pins & needles, burning, or numbness
3 - moderate itching, pins & needles, burning, or numbness
4 - moderate hallucinations
5 - severe hallucinations
6 - extremely severe hallucinations
7 - continuous hallucinations

Auditory Disturbances - Ask, "Are you more aware of sounds around you? Are they harsh? Do they startle you? Do you hear anything that disturbs you or that you know isn't there?"
0 - not present
1 - Very mild harshness or ability to startle
2 - mild harshness or ability to startle
3 - moderate harshness or ability to startle
4 - moderate hallucinations
5 - severe hallucinations
6 - extremely severe hallucinations
7 - continuous hallucinations

Visual disturbances - Ask, "Does the light appear to be too bright? Is its color different than normal? Does it hurt your eyes? Are you seeing anything that disturbs you or that you know isn't there?"
0 - not present
1 - very mild sensitivity
2 - mild sensitivity
3 - moderate sensitivity
4 - moderate hallucinations
5 - severe hallucinations
6 - extremely severe hallucinations
7 - continuous hallucinations

Headache - Ask, "Does your head feel different than usual? Does it feel like there is a band around your head?" Do not rate dizziness or lightheadedness.

0 - not present
1 - very mild
2 - mild
3 - moderate
4 - moderately severe
5 - severe
6 - very severe
7 - extremely severe

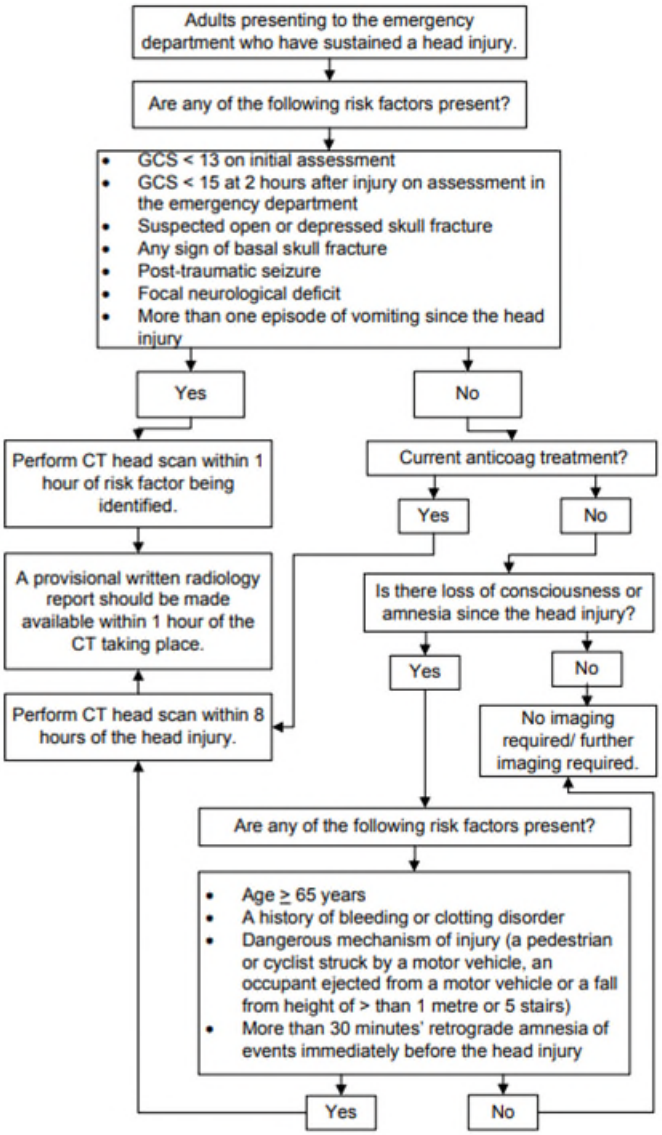
Procedure:

1. Assess and rate each of the 10 criteria of the CIWA scale. Each criterion is rated on a scale from 0 to 7, except for "Orientation and clouding of sensorium" which is rated on scale 0 to 4. Add up the scores for all ten criteria. This is the total CIWA-Ar score for the patient at that time. Prophylactic medication should be started for any patient with a total CIWA-Ar score of 8 or greater (ie. start on withdrawal medication). If started on scheduled medication, additional PRN medication should be given for a total CIWA-Ar score of 15 or greater.
2. Document vitals and CIWA-Ar assessment on the Withdrawal Assessment Sheet. Document administration of PRN medications on the assessment sheet as well.
3. The CIWA-Ar scale is the most sensitive tool for assessment of the patient experiencing alcohol withdrawal. Nursing assessment is vitally important. Early intervention for CIWA-Ar score of 8 or greater provides the best means to prevent the progression of withdrawal.

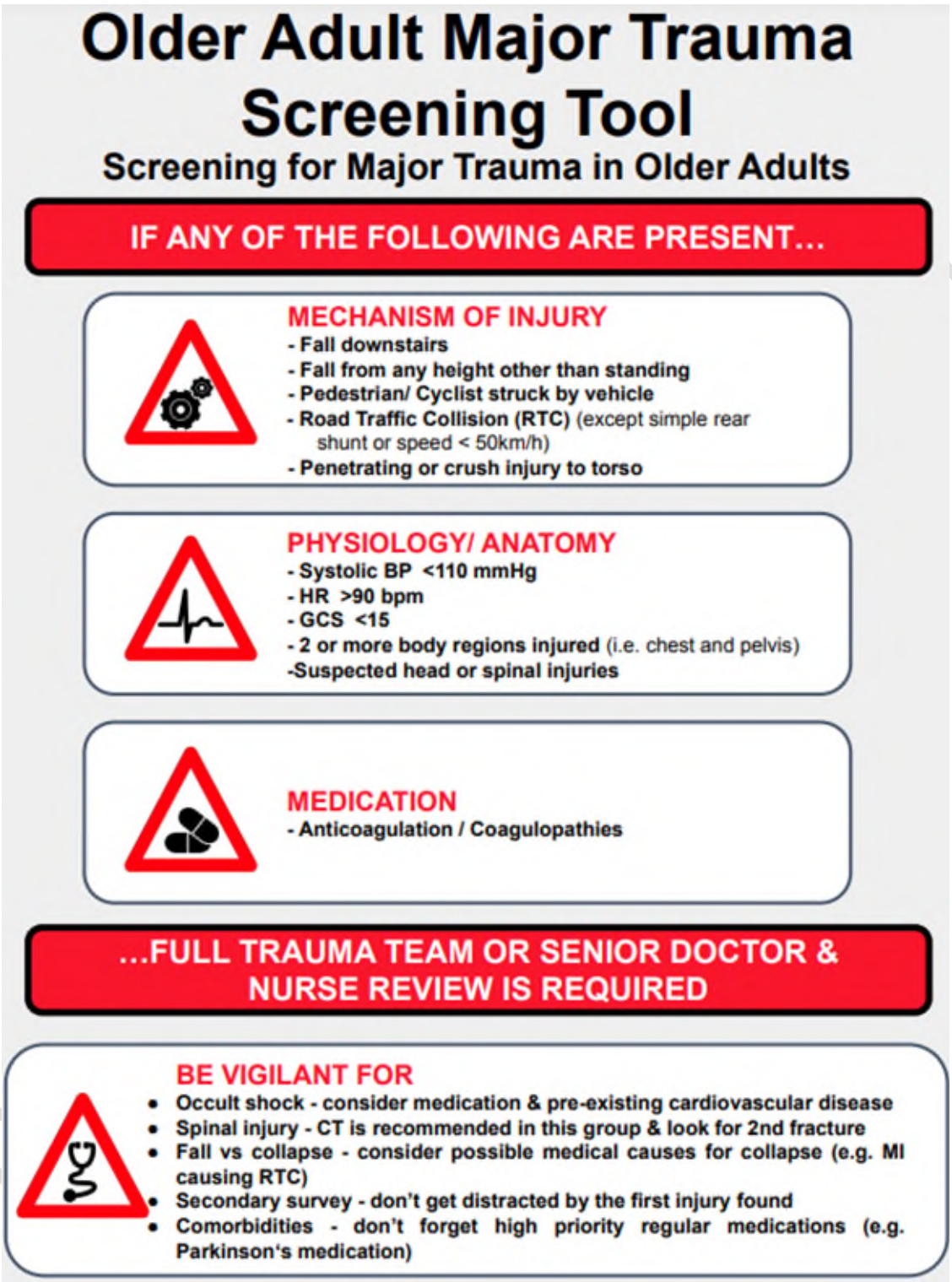
Appendix 6 - Algorithm for selection of adults for CT Head scan

NICE National Institute for Health and Care Excellence

Algorithm 1: Selection of adults for CT head scan



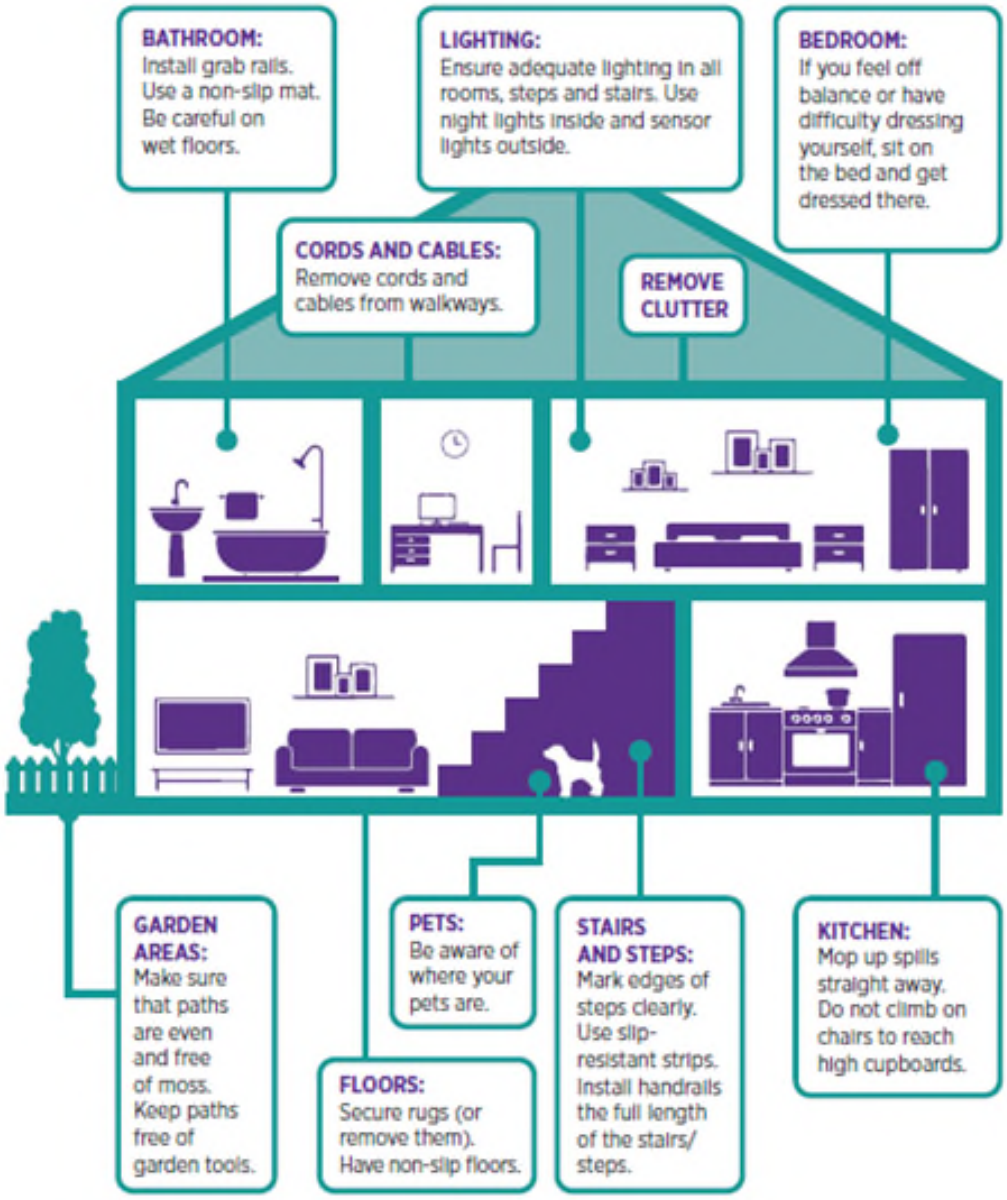
Appendix 7 - Older Adult Major Trauma Screening Tool



Appendix 8 - Home safety and Falls prevention graphics

Adapted from the work of Vanda Cummins, Primary Care Physiotherapist, HSE

Appendix 8 continued: Home safety and Falls prevention graphics



Appendix 8 continued: Home safety and Falls prevention graphics

HOME SAFETY CHECKLIST FOR FALLS PREVENTION

Falls in the home continue to be the leading cause of Major Trauma in Ireland. Attention to the following details in the home could reduce these accidents and prevent injuries.

IS THE ENTRANCE TO THE HOME SAFE?

✔ **YES:** NO ACTION.

✗ **NO:** If the footpath is uneven or slippery, or has loose paving stones or trip hazards, it should be fixed or removed.

CAN YOU WALK AROUND THE HOME EASILY?

✔ **YES:** NO ACTION.

✗ **NO:** Ask someone to move furniture or clutter in order to make the rooms/walkways accessible and safe.

ARE THERE RUGS OR TRIP HAZARDS?

✗ **NO:** NO ACTION.

✔ **YES:** Remove rugs or use double-sided tape to make them safe; remove trip hazards.

IS THERE ADEQUATE LIGHTING IN THE WALKWAYS AND ROOMS?

✔ **YES:** NO ACTION.

✗ **NO:** Replace bulbs; suggest placing a lamp in darker areas in order to increase brightness.

ARE THE STAIRS OR STEPS SAFE?

✔ **YES:** NO ACTION.

✗ **NO:** Remove any items on stairs/steps; make sure handrails are safe; fix any loose steps or loose carpet; and make sure lighting is adequate on the stairs.

IS THE KITCHEN SAFE?

✔ **YES:** NO ACTION.

✗ **NO:** Make sure key items are within easy reach; if using a ~~stool,~~ make sure that it is in good working order.

IS THE BATHROOM SAFE?

✔ **YES:** NO ACTION.

✗ **NO:** Make sure non-slip mats are available in the bath or shower. If there is difficulty getting into the bath/shower, ensure that grab rails are placed where appropriate.

IS THE BEDROOM SAFE?

✔ **YES:** NO ACTION.

✗ **NO:** Ensure that a lamp or light is within easy reach of the bed. Ensure that the route to the bathroom is clear and easily visible. Remove clutter. Ensure that a walking aid is within easy reach if required.

ARE THERE PETS IN THE HOUSE?

✗ **NO:** NO ACTION.

✔ **YES:** Make sure the pet has a bell on its collar, so as to ensure that its whereabouts are known at all times.

Appendix 9 - Further educational resources

1. Age Friendly Health Systems - https://www.ihi.org/Engage/Initiatives/Age-Friendly-Health-Systems/Pages/default.aspx

2. HSE What Matters to You - Person and Family Engagement - https://www.hse.ie/eng/about/who/qid/person-family-engagement/resourcesqid/what-matters-to-you-person-and-family-engagement.html

3. National Frailty Education Programme - https://www.icpop.org/nationalfrailityeducation#gref

4. HSELand Educational resources - https://www.hseland.ie

5. National Palliative Care Needs Assessment Guidance - https://www.hse.ie/eng/about/who/cspd/ncps/palliative-care/resources/needs-assessment-guidance

Appendix 10 - List of working group members

The table below sets out the membership of the working group for the working group for the Clinical Guidance Document for the Management of Major Trauma in Older Adults.

Further input was included from national clinical experts in Spinal Surgery, Neurosurgery, Cardiothoracic Surgery, Rehabilitation Medicine, Anaesthesiology, Pain Medicine, Health and Social Care Professionals, amongst others.

Name	Role
Dr Emer Ahern	Chair, National Clinical Advisor and Group Lead for Older Persons and Consultant Trauma and Orthogeriatrician, Cork University Hospital
Dr Áine Mitchell	Consultant in Emergency Medicine, Sligo University Hospital
Ms Bríd Diggin	Registered Advanced Nurse Practitioner in Orthogeriatrics, University Hospital Kerry
Mr Damian McGovern	Programme Manager, National Office for Trauma Services
Dr Deirdre Breslin	Clinical Fellow in Geriatric Emergency Medicine, Mater Misericordiae University Hospital
Ms Helen Whitty	Programme Manager for the National Clinical Programme for Older Persons
Mr Keith Synnott	National Clinical Lead for Trauma Services and Consultant Orthopaedic & Spinal Surgeon, Mater Misericordiae University Hospital
Ms Louise Brent	Irish Hip Fracture Database and Major Trauma Audit Manager, National Office of Clinical Audit
Dr Máire Rafferty	Consultant Trauma and Orthogeriatrician, Cork University Hospital
Dr Niamh O'Regan	Consultant Physician in General and Geriatric Medicine, University Hospital Waterford
Ms Pamela Hickey	Irish Hip Fracture Database & Major Trauma Assistant Audit Manager, National Office of Clinical Audit