London Major Trauma System

NHS
London
Operational Delivery Networks

London Major Trauma System: Management of elderly major trauma patients – Second Edition

December 2018

Abbreviations

AHP	Allied health professional
BOAST	British Orthopaedic Association Standards for Trauma
BP	Blood pressure
CXR	Chest X-ray
DNACPR	Do not activate cardiopulmonary resuscitation
DOAC	Direct oral anticoagulant
DoLS	Deprivation of liberty safeguards
ED	Emergency department
HCA	Healthcare assistant
IEP	Image exchange portal
INR	International normalised ratio
MTC	Major trauma centre
MDT	Multidisciplinary team
NICE	National Institute for Health and Care Excellence
NS	Neurosurgeon
ONS	Office for National Statistics
PCC	Prothrombin complex concentrate
PHC	Pre hospital care
SCI	Spinal cord injury
SLT	Speech and language therapy
TARN	Trauma audit research network
TBI	Traumatic brain injury
TQuINS	Trauma Quality Improvement Network System
TTL	Trauma team leader
TU	Trauma unit (hospital designation, not ward designation)
VTE	Venous thromboembolism
WBCT	Whole body CT scan

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Executive summary

There are 11.5 million people aged 65 or over living in the UK. This is the fastest growing age group, and the Office for National Statistics (ONS) estimates that by 2040 one in four people in the UK will be aged 65 or over[1]. The ageing of the population has meant that the incidence of traumatic injury in the elderly is rising in both absolute numbers and as a percentage of national trauma admissions annually. The 2017 Trauma Audit Research Network (TARN) report, *Major trauma in older people* highlights that the proportion of elderly trauma patients in England and Wales is increasing, and that low level falls are a leading cause of severe injury in older people[2].

Definitions

Published reports on the care of the older trauma patient lack consensus for the definition of which age may be considered 'elderly'.

For the purposes of this document, ***elderly*** is defined as a *patient aged 70 years or older*. We acknowledge that this may vary amongst clinical settings and patients.

Major trauma is defined as *serious and often multiple injuries where there is a strong possibility of death or disability*[6].

All elderly major trauma patients should receive the same standards of care, as for any adult major trauma patient. Trauma networks should ensure that geriatricians are involved in the development and/or review of local elderly trauma policies and guidance[3]. All staff working with elderly trauma should be trained to understand the effects of altered physiological reserve and increased comorbid diseases common in older patients. Trauma courses and orientation programmes at major trauma centres (MTCs) and trauma units (TUs) should include the principles of assessing and managing elderly injured patients.

This report updates the original pan London elderly trauma guidance first published in February 2017. Its primary aim continues to be improvements in the recognition of injury, clinical management, outcomes and experience for elderly trauma patients and their families. Admission pathways for MTCs and TUs are supplemented with ageing-specific suggestions for the clinical management of elderly major trauma. Guidance in this report should be used in conjunction with the existing local elderly-specific policies, NICE guidance NG39, *Major trauma: Assessment and initial management*[4] and Major Trauma Quality Indicators for trauma patients[5].

The pan London elderly trauma group recognises that elderly trauma patients with multiple injuries are often only identified retrospectively and that prospective recognition of multiple injuries is key to improving overall care and outcomes. To this end, an updated ED screening tool which has been validated at Croydon University Hospital and other Trauma Units throughout the London Major Trauma System, is attached as **Appendix 1** (*page 28*).

It is expected that, except for the suggested admission pathways, ED screening tool and delirium advice presented in this document, there should not be a requirement to develop multiple clinical guidelines specifically for elderly trauma. Given the identified and expected rise in proportion of elderly patients within the trauma system, it is more appropriate that all local and network guidelines relating to trauma should include elements which are specific to elderly and/or frail patients.

Key principles in the management of elderly trauma

- Ageing, comorbid disease, medications and frailty may all affect the expected physiological presentation of major trauma in elderly people.

- Elderly trauma patients may not present with an obviously significant mechanism, use of trauma teams to allow early identification of all injuries, preferably at the Emergency Department stage, will require early experienced clinician review or use of screening tools.

- Consider timely anticoagulant reversal during the initial assessment of all elderly trauma patients.

- All clinical, nursing and therapies assessment should identify the presence of pain. In elderly trauma patients with cognitive impairment, staff should look for the non-verbal manifestations of pain.

- Obtain a collateral history and medicines review as soon as possible after admission.

- Involve therapists early in the patient pathway. Specialised assessment and intervention with help to maximise recovery and minimise adverse outcomes.

- Prioritise early, appropriate repatriation to ensure elderly patients receive care closer to home.

- In cases of futility and for those requiring palliative care post injury, early discussion with the relatives is essential.

- Improving outcomes in elderly major trauma care in trauma units and major trauma centres will require multi-disciplinary working, site specific agreements must facilitate this.

Clinical guidance | Admission policy: MTCs

Who this applies to

This policy applies to adult patients aged 70 years and over (but this could be younger if frailty is deemed an issue in patients younger than 70) who are admitted to an MTC following traumatic injury. This policy also applies to the early identification of elderly trauma patients admitted to critical care.

Which clinical team is responsible?

It is presumed that an adult patient requiring care for their traumatic injuries in an MTC will be admitted under the general trauma service (this may be led by the weekly trauma surgical service or trauma and resuscitation anaesthetic service) or a speciality team who manage specific traumatic injuries (eg orthopaedics, general surgery, cardiothoracics, plastics, neurosurgery).

Elderly trauma patients should receive the same trauma care following admission as that given to younger adults (those under 70 years of age). Elderly patients should be admitted to a setting where staff have received training in the clinical, nursing and rehabilitation of elderly trauma patients.

In the emergency department

MTCs should ensure that staff training includes awareness of trauma team activation for lower energy mechanisms, such as simple or low level falls in elderly patients (currently reflected in pre hospital care [PHC] triage tools). On arrival to hospital, elderly patients should have their injuries assessed by the trauma team, who have the necessary knowledge and skills to identify the patient's injuries, complete resuscitation and immediate management, and conduct an appropriate secondary survey.

Patients should also be assessed for any immediate concomitant issues or exacerbation of comorbidities – to include at least 12 lead ECG, blood tests, postural blood pressures (at a clinically appropriate time point), cognitive assessment and chest X-ray (CXR). Where appropriate, a *do not activate cardiopulmonary resuscitation* (DNACPR) form and/or review of advanced directives or wishes should be discussed with the patient and family. If possible this should trigger discussions about premorbid function and decisions about critical care suitability. (Further information may need to be gained by 72 hours.)

Immediate reversal of anticoagulation should take place in the ED prior to ward admission. (*See local network guidance and page 19 for further information.*)

Unless absolutely necessary (due to injury, haemodynamic instability or urinary retention), urinary catheters should be avoided in the older patient due to the increase in UTI, delirium and associated length of stay[6].

Prior to the patient leaving the ED, the status of movement allowed for the protection of spinal injuries or pelvic injuries should be documented and communicated with the care team.

Potential safeguarding issues should be considered and escalated as per the trust pathway.

On admission to hospital the elderly patient should receive the following

- Pain assessment and management plan. (Patients with altered cognition may not be able to verbally express pain. Therefore, nonverbal cues should be carefully monitored.)

  Pressure area assessment and plan.

- Venous thromboembolism (VTE) assessment and plan.

- Multifactorial falls assessment and intervention strategies based on individual risk (*see page 20*).

  Delirium, dementia and cognitive assessment (*see appendix 2, page 29*).

- Alcohol dependency screen.

- Frailty assessment (eg clinical frailty score or other validated score).

- Nutritional assessment.

- Check for any advanced directive/DNACPR (if not already ascertained).

Within 24 hours of admission the elderly patient should receive

- Tertiary survey of injuries.
- Daily consultant led multidisciplinary team (MDT) discussion.
- Medicines reconciliation.
- Check for any advanced directive / DNACPR (if not already ascertained).

Within 72 hours of admission the elderly patient should receive

A review and assessment by the consultant geriatric team for:

- Comprehensive Geriatric Assessment.
- Any need for mental health or psychology input (eg self harm, victim of violent crime, domestic abuse).
- Confirmed collateral history of premorbid level of function (ie further details added to admission information from primary care, Coordinate My Care, family, etc).
- Consideration of poor prognosis and pre injury baseline with 'watchful waiting' of the patient's progress. The lack of response to injury or treatment may take longer in elderly patients. This should include exclusion of reversible medical causes and decision about the optimum location for care.
- Advanced care/palliative planning.

During inpatient stay the elderly patient should receive

- Early physiotherapy / occupational therapy / social worker / speech and language therapy (SLT) / other allied health professional (AHP) reviews as indicated.
- Bone health and multifactorial falls prevention assessment.

Care pathway / Discharge planning

Discharge assessment, with estimated length of stay and identification of need for repatriation for rehabilitation, should occur within 24 hours of admission. Where clinically appropriate this should include those with expected poor prognosis.

Regular reviews of rehabilitation needs and early goal setting during admission to optimise the patient pathway.

Repatriation documentation to be prepared for transfer to trauma unit. This should include the rehabilitation prescription, image exchange portal (IEP) transfer of images and treatment summary for GP on transfer of care as per local network repatriation policy.

Each TU should have a trauma coordinator (or similar role) responsible for overseeing patient repatriations. The trauma coordinator should be made aware of the patient's age and any elderly specific needs prior to repatriation.

Pharmacy requirements to be addressed.

MTC follow up appointments should be booked and patient/relative informed.

Post discharge

TARN data should be completed within 28 days from admission.

Who this applies to

This policy applies to adult patients aged 70 years and over (could be younger if frailty deemed an issue in patients younger than 70) who are admitted to a TU following trauma. This policy also applies to the early identification of elderly trauma patients admitted to critical care.

Which clinical team is responsible?

Each TU which admits elderly trauma patients should determine which surgical speciality will lead the patient's care on their site specific guideline. In those who do not have injuries requiring surgical intervention (eg minor head injury or minor chest injury) the patient can be admitted under the care of the elderly team, except for those with specific orthopaedic injuries where orthogeriatric review should be provided. When admitted under surgical specialities, the patient should be reviewed daily by speciality team, with geriatric consultation or review as indicated.

A trauma coordinator (or similar role) will identify elderly trauma patients on repatriation from MTC to TU.

Elderly patients should be admitted to a setting where staff have received training in the clinical, nursing and rehabilitation of elderly trauma patients.

In the emergency department

TUs should ensure that staff training includes awareness of trauma team activation for lower energy mechanisms, such as simple or low level falls in elderly patients. Current prehospital triage tools screen for elderly trauma but have a low sensitivity for conveyance to an MTC. TUs should therefore be prepared for this and screen for elderly trauma at triage.

The presence of injury is not always apparent and it is recommended that TUs adopt a screening triage tool for use in the ED. Triage nurses should use the tool on patients that self-present or arrive by ambulance. Fulfilling a criterion on the tool prompts an immediate senior doctor (ST4+) review to assess for major trauma (see Appendix 1 page 28). This senior doctor review involves a primary survey, decision regarding trauma team activation, analgesia, appropriate imaging and management.

Ongoing clinical care can be provided by other members of the ED team if appropriate but initial assessment by a senior doctor has been shown to reduce the rate of missed injuries.

On arrival to hospital, elderly patients **with known or potential major injuries** should have a full trauma team assessment. This should be conducted by those with the necessary knowledge and skills to identify the patient's injuries, complete resuscitation and immediate management, and conduct an appropriate secondary survey.

TUs should have a policy for trauma assessment of elderly inpatients who fall whilst a hospital inpatient or for those who deteriorate post trauma admission. This policy may include transferring the patient back to ED for trauma team activation and rapid access to imaging and/or transfer, depending on local resource availability.

Patients should also be assessed for any immediate concomitant issues or exacerbation of comorbidities – to include at least 12 lead ECG, blood tests, postural blood pressures (at a clinically appropriate time point), cognitive assessment and CXR. Where appropriate, a DNACPR form and/or review of advanced directives or wishes should be discussed with patient and family. If possible, this should trigger discussions about premorbid function and decisions about critical care suitability. (Further information may need to be gained by 72 hours.)

Additional imaging may be required before a decision about requirement for stepped up MTC level care is made.

Based on the injuries identified, a discussion with the MTC liaison (or speciality team, such as neurosurgery for isolated non-time-critical head injury) should take place so that a decision has been made whether the patient requires MTC admission. The result of this discussion should be clearly documented in the patient notes.

The MTC will provide clinical support for the patient if they are not transferred, in the form of ongoing management guidance or follow up by a specialist if required.

Immediate reversal of anticoagulation should take place in the ED prior to ward admission. (*See local network guidance and page 19 for further guidance.*).

Unless absolutely necessary (due to injury, haemodynamic instability or urinary retention), urinary catheters should be avoided in the older patient due to the increase in UTI, delirium and associated length of stay[6].

Prior to the patient leaving the ED, the status of movement allowed for the protection of spinal injuries or pelvic injuries should be documented and communicated with the care team. Status of clearance of cervical or other spinal injuries should be documented within one hour of imaging reporting.

Potential safeguarding issues should be considered and escalated as per the trust pathway.

On admission the elderly patient should receive

- Pain assessment and management plan. (Patients with altered cognition may not be able to verbally express pain. Therefore, nonverbal cues should be carefully monitored.)
- Pressure area review and plan.
- VTE review and plan.
- Multifactorial falls assessment and intervention strategies based on individual risk. (*See page 20*).
- Delirium, dementia and cognitive assessment. (*See appendix 2, page 29.*)
- Alcohol dependency screen.
- Frailty assessment (eg clinical frailty score or other validated score).
- Nutritional assessment.
- Check for any advanced directive / DNACPR (if not already ascertained).

Within 24 hours of admission the elderly patient should receive

- Tertiary survey of injuries.
- Daily consultant led MDT discussion.
- Medicines reconciliation.
- Check for any advanced directive / DNACPR (if not already ascertained).

Within 72 hours of admission the elderly patient should receive

A review and assessment by the consultant geriatric team for:

- Comprehensive Geriatric Assessment.
- Any need for mental health or psychology input (eg self harm, victim of violent crime, domestic abuse).
- Confirmed clear collateral history of premorbid level of function (ie further details added to admission information from primary care, Coordinate My Care, family, etc).
- Consideration of poor prognosis and pre injury baseline with 'watchful waiting' of the patient's progress. The lack of response to injury or treatment may take longer in elderly patients. This should include exclusion of reversible medical causes, and decision about the optimum location for care.
- Advanced care/palliative planning.

During inpatient stay

- If there is a change in clinical status due to progression of injury or identification of missed injury, staff should contact the MTC liaison (as per local guidance), or speciality team for isolated injuries. Consult local network policy for trauma
- in-patients requiring emergency onward transfer to MTC.
- Early physiotherapy / occupational therapy/ social worker / SLT / other AHP review as indicated.
- Bone health and multifactorial falls prevention assessment.

Care pathway / Discharge planning should include

- Discharge assessment with estimated length of stay within 24 hours of admission and where clinically appropriate incorporating those with expected poor prognosis.
- Regular reviews of rehabilitation needs and early goal setting during admission to optimise the pathway.
- Discharge summary for GP to ensure follow up reviews as indicated.
- Review of pharmacy requirements.
- Booked follow up appointments; patient/relative(s) informed.

Post discharge

TARN data should be completed within 28 days from admission.

This includes patients with suspected or confirmed brain injury.

Diagnosis of brain injury

Trauma clinicians require an increased awareness of potential neurological injury in all elderly trauma patients. There should be a low threshold for initiating a 'trauma call' and obtaining a head CT scan in the elderly especially in the following presentations:

- When known or suspected to have sustained head injury.
- Following a low level fall (eg from standing or sitting).
- When taking prescribed anticoagulant medication.
- When there is no clear medical cause of fall or unclear reason for ED attendance.

These suggestions are in light of the perceived number of elderly patients who present as a 'collapse' and who, after admission, are found to have an acute or chronic subdural haematoma.

In the emergency department

Where an elderly patient has clear external signs of head injury ***or*** has neck pain ***or*** has endured a fall, ***and*** if a decision has been made to CT the patient's head, this should include the cervical spine. (*See section on spinal immobilisation on page 13.*) Any injury with acute intracranial blood identified via the CT report should result in a discussion with the MTC team (ED/ trauma consultant or neurosurgeon, dependent on local policy), and such referrals should be logged and documented by the referrer and the advisor. As per the suggested ED screening /triage tool (*See appendix 1, page 28*) the presence of blood on CT head should trigger review of other potential traumatic injuries by 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 timeframe for this repeat CT, thus local policy or a senior clinician should decide based on mechanism, frailty, social support and degree of anticoagulation.

Anticoagulation reversal in traumatic brain injury (TBI)

Patients on warfarin with intracranial bleeding should receive prothrombin complex concentrate (PCC) in addition to vitamin K, unless the bleed is extremely small and risk of procoagulation 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.) **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 ED[7]. (*See page 19 for advice on patients prescribed direct oral anticoagulants, DOACS.*)

Administration of platelets should be considered if patient taking any antiplatelet therapy[8].

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 geriatric and neurosurgical teams are required**. In minor TBI, early initiation of LMWH may be appropriate after admission. Timing of restarting anticoagulation should be clearly documented.

Holistic and ongoing care for elderly neurotrauma

Senior staff in trauma units should be able to discuss management with family/next of kin as advised by the MTC team (usually neurosurgical advice). These may be difficult discussions for inoperable or palliative care cases. Elderly trauma education should include approaches to these discussions.

If the patient is not admitted directly under a neurosurgeon, 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 a priority for early repatriation back to their local trauma unit to reduce patient and family emotional stress.

Three pathways for isolated TBI in elderly patients

1. Unsurvivable

Discussion with neurosurgeon by phone and/or remote medicine; patient can stay at TU.

2. No immediate neurosurgeon input

The patient can stay at TU and repeat scan performed in 48 hours (or as specified by neurosurgical team). If the patient deteriorates within this time frame, with a reduction in Glasgow coma score (GCS) or new neurological presentation, there should be a rapid discussion with the neurosurgical team with a view to critical transfer to ED at MTC (not dependent on bed status of MTC). A scan prior to transfer may enable necessary theatre preparation. Such patients should also be part of a virtual head injury / TBI meeting at the MTC, or virtual ward round approach in discussion with the responsible trauma unit teams.

3. Neurosurgeon intervention required

Patient should be immediately transferred to MTC ED with a time critical head injury pre alert.

A wider discussion and agreed consensus based on patient, family and staff feedback should focus 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 communication technology to facilitate remote or virtual consultations.

Pan London TBI in elderly patients: evidence update

The Traumatic Injury to Brain Across London (TrIBAL) audit (Wilson et al 2018 – in press) suggests that only 33% of elderly patients with TBI are under the care of a neurosurgical team at an MTC. Further, only 10% of patients admitted to a TU come under the care of specialists in elderly medicine. MTCs and TUs are therefore encouraged to develop links/liaison services with orthogeriatricians with interest/experience in the management of elderly TBI.

Cervical spine immobilisation

Evidence for the benefits of pre-hospital 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 or hyperextended positions. Presence of severe degenerative disease in elderly patients (including ankylosing spondylitis) puts them at particular risk and consideration should be given for 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.

- Elderly patients are at high risk of pressure ulcers, pneumonia and respiratory failure, dysphagia, delirium and raised intracranial pressure with prolonged cervical immobilisation. Many find hard collars and lying flat uncomfortable, painful and frightening. Prompt assessment, imaging and imaging reporting are essential to minimise morbidity and distress.

- Assessment, imaging and imaging reporting should be completed within two hours of arrival/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.

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: Ensure collar is correctly sized/fitted, switch to soft padded collar if necessary, position of comfort is optimised and appropriate analgesia has been offered.
- Delirium reduction strategies: reassurance and regular orientation, minimise sensory deprivation (glasses/hearing aids), 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
- Balance of risk/benefit of sedation to maintain immobilisation and facilitate safe imaging: sedation is not without risk and should not be considered normal practice in these situations. Local policies will be dependent on availability and training of staff, monitoring equipment, availability of sedation/anaesthetic agents and expected duration of immobilisation.
- Sedation with pharmacological agents may occasionally be deemed in the patient's best interests to facilitate safe ongoing assessment/management and should be guided by senior clinicians (see appendix 2, Management of delirium, page 29, and local delirium guidelines).

Prolonged cervical immobilization:

- Patients being managed conservatively with prolonged cervical immobilisation who are poorly tolerant of collars or experiencing complications should have immobilisation decisions reviewed with senior decision makers. Documentation of best interest decisions after consultation between neuro/spinal surgeons, elderly care specialists, allied health professionals and the patient/relatives are essential.

Network guidance for spinal injury

Each trauma network should have guidance on the management of spinal injury for elderly patients. There are four general pathways (adapted from South East London Kent and Medway network spine pathway):

- 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 elderly patients and are often incidental findings on imaging. Physical examination and imaging beyond plain films (CT or MRI) should aid in the determination of acuity in these injuries.

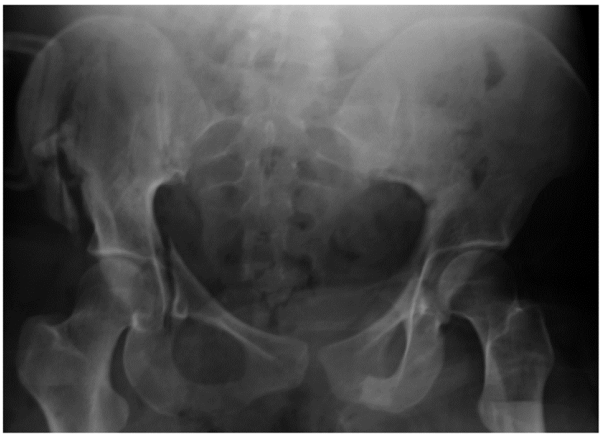
Network guidelines should acknowledge the special conditions relating to spinal injury in elderly patients, especially in relation to incidental findings and comorbidities. The guidelines should incorporate whether benefit from transfer to a major trauma centre is clear and how a discussion between local senior clinicians (geriatric or surgical) and the network spinal consultant can be facilitated – including how the patient and/or family are involved in this process.

Spinal cord injury

Although uncommon, there is increased risk of spinal cord injury (SCI) in the elderly due to degenerative disease and canal stenosis, with incomplete cord syndromes possible from relative low energy mechanisms. Network spinal injury pathways should include management of cord injury in the elderly including the incomplete cord syndromes. Elderly patients with SCI should be referred to spinal cord injury centres within four hours of identification of the injury as recommended in national guidance from MASCIP (Multidisciplinary Association of Spinal Cord Injury Professionals)[9].

NHS referral information can be found at www.spinalcordinjury.nhs.uk/home.htm.

This guidance should be read in conjunction with: The British Orthopaedic Association Standards for Trauma "BOAST: Management of Patients With Pelvic Fractures"[10], and the NICE major trauma guideline NG37 "Fractures (complex): Assessment and management"[11].



Assessment of haemodynamic compromise

Elderly patients have poor resilience to haemodynamic instability following haemorrhage. Hypovolaemic shock may be difficult to detect in the elderly due to such things as pre-existing hypertension, altered cardiovascular reserve or beta-blocker therapy. Early assessment of lactate or base deficit (excess) and haemoglobin on arrival to the ED may help to detect haemodynamic compromise following pelvic trauma, irrespective of mechanism of injury[12]. All elderly patients who present to the ED with a suspected pelvic fracture should be assessed by the trauma team.

Code red or major haemorrhage protocols should be activated as for any adult patient with known or suspected haemorrhage. Vasoconstrictors should be avoided. Pelvic binders should be applied as part of haemorrhage control. However, caution must be exercised for long term application (more than 12 hours) in elderly patients with poor skin integrity.

Pelvic Injuries

As per NICE NG37[11] (section 1.2.8, *below*), all adult patients with blunt major trauma and suspected multiple injuries should have a whole body CT (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 elderly patients (pain, reduced mobility).

NICE NG37, Whole-body CT of multiple injuries
1.2.8 | *Use whole-body CT (consisting of a vertex-to-toes scanogram followed by CT from vertex to mid-thigh) in adults (16 or over) with blunt major trauma and suspected multiple injuries. Patients should not be repositioned during whole-body CT.*

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.

Acetabular fractures

All elderly 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 IEP CT scan images and a documented lower limb neurological assessment.

Complex limb injuries

Bony and soft tissue limb injuries in the elderly have an increased risk of complications, even with relatively low energy mechanisms, due to pre-existing peripheral vascular disease or chronic venous disease, diabetes, steroid, reduced bone density and skin/soft tissue fragility.

Complex lower limb injuries in elderly trauma patients essentially constitute two groups:

Open fractures and / or severe soft tissue injuries *(degloving, tissue loss)*

For elderly 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 center, typically the MTC. Management should be based on the BOAST Open Fractures standard[13] and NICE NG 37[11].

For elderly open fractures, avoiding excision of skin and negative pressure dressings, and instead primarily stabilizing fractures and closing wounds is preferable wherever possible.

The decision to proceed to amputation is challenging for the elderly in comparison to younger patients, and early expert debridement and fixation with the aim of judicious limb salvage maybe preferred, based on senior (consultant grade) orthoplastic opinion. Decision to amputate should only be made in the multidisciplinary setting wherever possible.

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 tools. Non operative management is rarely able to facilitate early rehabilitation in lower limb injuries. Acute arthroplasty / Revision arthroplasty in some fractures may be preferable to internal fixation. Specialist advice is available from the MTC and early communication is recommended.

For all elderly patients with significant orthopaedic limb trauma, multidisciplinary input from orthogeriatricians, orthopaedics, nursing and therapies is required, similar to the successful multidisciplinary model of hip fracture treatment.

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

Elderly patients with chest wall injuries often have polysystem trauma, and even isolated chest injuries have high associated mortality and morbidity, compared to younger patients.

Early identification with contrast CT scan as the investigation of choice to define chest and chest wall injuries is recommended in elderly trauma. This is predominantly due to the poor recognition of fractures and lung contusions with X-ray and their prognostic influence on ensuring the correct treatment strategy.

In addition to the admission policies presented in these guidelines, chest injury guidelines should also include anaesthetic / critical care, pain management and physiotherapy team reviews. Severe chest wall injuries including flail chests (radiological or clinical flail), injuries causing respiratory compromise or where pain control cannot be achieved should be discussed early with the MTC general or thoracic surgeon.

A small proportion of patients will benefit from early, operative chest wall stabilisation[14].

Significant considerations for rib fractures in elderly trauma

Ten per cent of elderly trauma patients have rib fractures, and up to 50 per cent of fractures in this group are undetected with X-ray. A meta-analysis of 50,000 patients, including 15,000 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 3+ rib fractures. Associated pulmonary contusion or pre-existing chronic lung disease are also significant prognostic findings[15].

The type and number of affected ribs is an important consideration. Vertebrosternal ribs (ribs 1-7) have a greater physiological significance than vertebrocostal ribs (ribs 8-10).

Key objectives in elderly rib fracture management

- Early recognition of injury.
- Assessment and management of pain.
- Reduced duration of ventilation (if required).
- Long term stabilisation.
- Decreased mortality.
- Patient satisfaction and return to baseline function.

These can be achieved by:

- Appropriate analgesia sufficient to allow normal respiration and coughing.
- Protection of the underlying lung.
- Adequate ventilation and oxygenation.
- Infection prevention.
- In more severe cases, ventilatory support and suction to remove mucus or secretions from the airways to prevent atelectasis.
- Surgical fixation within 48 hours (if required).

Network considerations

An agreed analgesia protocol incorporating provisions for older patients - including indications for neuraxial blocks, regional blocks (paravertebral or serratus blocks) and opioid analgesia must be available from presentation and diagnosis. This may be a network guideline or local trauma unit guideline, as appropriate. It is acknowledged that a higher proportion of elderly trauma patients will have contraindications to thoracic epidural placement.

Hospitals should ensure that adequate facilities and expertise are available 24/7 onsite to provide rapid and effective analgesia (including management of thoracic epidural) to maximise early treatment benefit and minimise the requirement for transfer between centres. This should also include the local expertise to manage simple pneumothorax and haemothorax. Incentive spirometry should be used with co-operative patients, although probably there is no reduction in mortality or pneumonia compared with standard chest physiotherapy but it

may reduce pain scores and identify patients at risk of deterioration [16]. Positive-airway devices can be considered (either high flow nasal cannulae or CPAP) although the evidence in the over 70 age group is limited [17].

Other specific cautions in the elderly are:

- Cautious use of NSAIDs – either contra-indicated due to renal, cardiac or GI risk or use very short course e.g. 3-5 days.
- Start with lower doses of morphine and consider use of oxycodone (to reduce side effect profile).

Network agreed guidelines for the insertion, management (including transfer policy) and removal of intercostal drains in trauma, including site, technique and the use of prophylactic antibiotics, **must be available**. Persistent (more than 48 hours) air leak, flail chest and patients with consequent respiratory compromise should be discussed with a thoracic surgeon.

Small pneumothoraces identified on CT should be considered for conservative management without chest drainage unless indicated otherwise clinically or the patient requires positive pressure ventilation. Network guidelines for chest trauma and rib fixation must include special considerations relating to elderly trauma patient.

Reversal of the anticoagulant effect of DOACS in elderly trauma patients

Each MTC and TU should have a policy for the reversal of warfarin and other anticoagulants following major trauma. PCC should be immediately available for every major trauma patient with life threatening bleeding. Anticoagulant reversal should be administered on arrival in elderly 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 DOAC anticoagulation reversal.

Factor Xa inhibitors

Rivaroxaban, **Apixaban** and **Edoxaban** are factor Xa inhibitors, for which reversal agents are currently unavailable. **Andexanet, a reversal agent for Rivaroxaban and Apixaban, has FDA approval in the USA and may be available in the UK in 2019.**

Current consensus suggests that for elderly 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 25-50 u/kg four-factor prothrombin complex concentrate (e.g Octaplex® or Beriplex®) and 5 mg intravenous vitamin K as soon as possible after arrival at the ED. Vitamin K will not reverse the anticoagulant effect of a DOAC, but may help to correct any coagulopathy resulting from a co-existent vitamin K deficiency.

- If bleeding continues, the on call haematologist should be consulted emergently as the patient may require further haemostatic agents.

Factor IIa inhibitors

Dabigatran is a direct thrombin (IIa) inhibitor which has an antidote called **Idarucizumab**.
In elderly 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[18]. For more information on the administration see the electronic medicines compendium, www.medicines.org.uk/emc/medicine/31243#POSOLOGY

Preventing falls in older people during a hospital stay

All elderly trauma patients are at high risk of falls. Therefore assessment, intervention and prevention are essential.

Multifactorial assessment and intervention of inpatients must include:

- Cognitive impairment.
- Continence.
- Falls history (including injury and fear of falling).
- Feet (eg long toenails) and footwear.
- Medical conditions (including syncope).
- Medication.
- Balance impairment.
- Hearing impairment and use of hearing aids
- Visual impairment, including use of vari or bifocals.

Effective falls prevention care plan for an older patient at risk of falls should consider

- Prompt and early / timely assessment and use of a walking aid (and a symbol by the patient to indicate the type of walking aid to the nurses and healthcare assistants).
- A visible *high risk falls* symbol near the bed.
- Medication review and adjustment of medication after measuring the erect blood pressure (BP).
- Patient is wearing spectacles if prescribed.
- Patients hearing aids are working and properly fitted.
- Anti-slip socks (or safe footwear).
- Anti-slip mats on seats and pressure cushions.
- De-cluttered / tidy environment, especially the patient's pathway to the toilet.
- Walking aid within the patients reach.
- Call bell in reach (and remind patient to use it).
- Patient education leaflet.

For patients with cognitive impairment (dementia, delirium or following TBI), add:

- Fall alarms connected to bed and chair, with **prompt response** when the alarm goes off.
- Regular toileting (and/or bottle within reach); treatment of UTI if present. Do not leave patients at risk of falls alone in the bathroom.
- Use of a *high visibility* bay for the patient where staff are vigilant and there is preferably at least one person working in the bay at all times.
- One-to-one or close monitoring if the healthcare team still feel that the patient is at very high risk of falls despite the measures above (Discussions should be held with senior nurse.)
- Excellent dementia care (according to local dementia protocols).

Falls in the elderly | Context

» Major injury results from 5 to 6 per cent of all falls.
» The risk of falls -- and thus, risk of injuries increases with increasing age. With our ageing population, this means that the incidence of falls is increasing.
» Each year there are 300,000 fragility fractures in the UK.
» There are 88,000 hip fractures annually, from which 80 per cent of people do not return to baseline function or mobility post-operatively.
» Bed occupancy: Falls and related injuries account for more NHS bed days than heart failure, myocardial infarction and stroke combined.
» The reduction and prevention of falls and fractures involves comprehensive multifactorial assessment and intervention, coupled with effective bone health prevention and treatment.

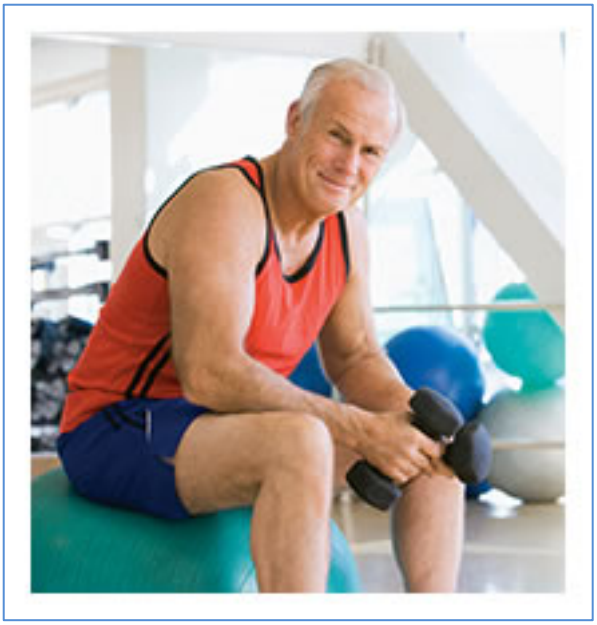
Prevention of readmission to hospital after another fall

At the point of discharge of the patient from hospital ensure that patients who have fallen or are at risk of falls are referred to community based falls prevention, appropriate bone health services and integrated care service.

Evidence based balance, strength and exercise programmes, combined with multifactorial assessment, intervention and education, have been shown to decrease falls by 60 per cent people who are at high risk of falling[19].

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.

Patients aged 50 or over with a diagnoses of osteoporosis and / or fragility fracture should have a bone health assessment and be given appropriate advice and treatment.



Further information

For more details, please see:

» NICE CG61, *Falls in older people: Assessing risk and prevention* | Link: www.nice.org.uk/guidance/cg161

» NICE Clinical Knowledge Summary, *Osteoporosis - prevention of fragility fractures* | Link: https://cks.nice.org.uk/osteoporosis-prevention-of-fragility-fractures

Clinical guidance | Psychosocial elements

Elderly trauma patients may be more likely to have additional needs that influence their ability to express their preferences and choices in a way that can 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.

Meeting the psychological needs of elderly trauma patients is a challenge for trauma networks. Pre-morbid factors, such as functional and cognitive impairment, may be exacerbated by the experience of a trauma, and the resultant hospital stay. For example, a patient with a significant cognitive impairment may have continued to function well within their usual routine and surroundings, however taking them outside of familiar environments can lead to an increased loss of independence, which may adversely affect quality of life and other psychological sequelae[19].

Adverse psychological outcomes may be exacerbated by issues relating to isolation from family and friends, as would be true for a patient of any age who has experienced a trauma, particularly if the patient is not in their local hospital. It is important to consider the psychological impact of issues related to an elderly 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 is poorly understood in this cohort of patients, requiring further investigation and research to characterise the issues and to establish appropriate management approaches.

Clinical commissioning standards

Proposed commissioning standards for elderly trauma for Pan London Trauma System peer review

Standard	*Measure*
The suggested admission policy for elderly trauma patients is jointly agreed between surgical specialties and geriatricians in every MTC and TU.	Evidence of joint policy agreed between clinical specialties and signed by the trust board.
Within 72 hours of admission each elderly major trauma patient should be seen by a consultant geriatrician (as per suggested MTC and TU admission policies).	Audit of clinical documentation and rotas.
Each MTC and TU reverses anticoagulation in the injured elderly patient within one hour of reversal decision.	Evidence of process and reversal agent availability in local policy. Audit of decision to reversal and drug administration times.
In patients with suspected spinal injury, spinal precautions must be documented in the clinical notes within ONE HOUR of image reporting and prior to leaving the ED.	Audit of clinical documentation and radiology report
Multidisciplinary trauma education or training includes the principles of assessing and managing elderly injured patients.	Evidence of elderly specific content included within trauma education and training programmes.

London elderly trauma group | membership

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Appendix1 | Elderly trauma screening tool for TUs, MTCs, and Local Emergency Hospitals

Inclusion criteria: All patients ≥ 65 who self-present or arrive by ambulance with an obvious injury, mechanism of injury, or who have fallen < 2m

ANATOMY OF INJURY
Significant injury to ≥ 2 body regions
Suspected pelvic injury
Suspected head or spinal injury
Suspected chest injury

PHYSIOLOGY
Systolic BP <110mmHg
Heart Rate >90bpm
GCS <15 (even if baseline)
Lactate >2 or BE <-2

OTHER
Patient on anticoagulant medication or has a bleeding disorder
Severe pain
Acutely short of breath
Uncontrollable major haemorrhage

→ Immediate EM Consultant or Registrar (ST4+ or equivalent) review.
Trauma Call - (document if decision not to activate).

← **In the absence of mechanism – but identification of injury on <u>any</u> imaging then re-screen patient**

The purpose of the trauma call (& clinical priority for the patient) is adequate examination, early and adequate imaging and reporting, and <u>early identification of all injuries</u>

History of unconsciousness
Significant medical history, co-morbidities
Inappropriate or inadequate history
Inappropriate awareness of symptoms / injury

→ EM Consultant or Registrar (ST4+ or equivalent) review within 15 mins.
Repeat screen post examination / imaging.

* Triage screening tool adapted from HECTOR elderly trauma triage criteria and pre-hospital tools (by D Peel, A Osmond, H Tucker 2018)
**Red criteria are independently and significantly associated with the identification of trauma in a retrospective multivariate analysis

Appendix 2 | Management of delirium in elderly trauma patients

Delirium is a clinical condition characterised by

- Disturbed consciousness (reduced awareness of the external environment).
- Disturbed cognitive functioning (disorientation and short term memory loss).
- Acute onset and fluctuating course.
- Due to an underlying cause (or causes) that is (are) possibly reversible.
- Other features include:
    - Disturbance in perception (visual hallucinations)
    - Disturbance in sleep
    - Psychomotor disturbance (hyperactive or hypoactive).

Up to 50 per cent of patients having surgery / trauma develop delirium.

It is associated with poor outcomes and increased risk of:

- Death.
- Functional decline and institutional long term care.
- Longer length of stay in hospital.
- Hospital acquired complications, including: infection, falls, pressure sores, dehydration, malnutrition.

The prevention and treatment of delirium is possible if dealt with urgently.

Risk factor assessment, prevention and detection

The main risk factors are

- Patients aged 65 or over.
- Those with cognitive impairment (past or present) and/or a history of dementia.
- Current hip fracture or severe trauma, including head trauma.
- Severe illness.
- Prior history of delirium

Other risk factors include

- Visual / hearing impairment
- Severe illness
- Fever / hypothermia
- Hypotension
- Pain
- Polypharmacy
- Psychoactive medications
- Malnutrition
- Metabolic disorders (e.g hyper/hypoglycaemia)
- Renal impairment
- Depression
- Alcohol and/or smoking (and withdrawal)

Types of delirium include

- **Hyperactive** - Restless, agitated and aggressive, sometimes with delusions and paranoid ideation
- **Hypoactive** - Withdrawn, quiet and sleepy
  Mixed - Restlessness and distress interspersed with drowsiness. Mixed delirium can be a result of pharmacological sedation.

If the patient exhibits an acute change in behaviour, treat this as delirium.

Formal, validated assessment tools include

- **SQID** – Single question in delirium*: “Do you think [*insert patient name*] has been more confused lately?”
- **4AT Test** – Screening instrument for delirium and cognitive impairment

Short cognitive assessment method (Short CAM)

* Sands, M.B., et al., *Single Question in Delirium* (SQiD): testing its efficacy against psychiatrist interview, the Confusion Assessment Method and the Memorial Delirium Assessment Scale. Palliat Med, 2010. 24(6): p. 561-5.

Appendix 2 | Management of delirium in elderly trauma patients

Management of delirium

Make the diagnosis of delirium. Collateral history is essential.

Assess thoroughly, investigate and treat any identified underlying cause. A review of the patient's medication is essential.

De-escalation, effective communication, reorientation and reassurance. Restless, hallucinating and agitated patients are easily terrified or bewildered. Use a calm approach with the patient, try and find out what is frightening or threatening him/her and reassure accordingly. Explain to the patient where he/she is, who he/she is and what your role is. Ask for help from family and friends if they are available. Try not to sedate or restrain the patient – sedation often leads to fall(s) and restraint often makes the patient more aggressive.

ABC: Quick guide to assessing and treating delirious patients on the ward

*Adapted from Guy's and St Thomas' **Clinical guideline for the prevention, recognition and management of delirium in adult inpatients***.*

Airway and breathing	- Check and correct hypoxia. - Remember to consider pulmonary embolism, pneumonia, hypercapnia.
Circulation	- Check and correct hypotension. - Urgent blood tests to check and treat for post-operative anaemia. - Consider organ/tissue ischemia including MI.
Disability	- Identify and treat pain. - Any evidence of neurological change e.g. stroke, seizure.
Drugs	- Review drug chart, note any anti-cholinergics and discuss stopping them. - Only consider medication if conservative measures have failed and if patient at risk to self or others – general rule is little and often. - Don't give haloperidol to patients with a prolonged QT, with parkinsonism or with Lewy body dementia - use lorazepam instead. Use anti-psychotics very sparingly, ensure de-escalation measures are in place, and discuss with consultant first. - Consult local guidelines.
Exposure	- Specifically examine to exclude urinary retention and constipation.
Fluids and electrolytes	- Check fluid balance and treat dehydration. - If not already catheterised, do not catheterise unnecessarily. - Urgent bloods for electrolyte disturbance – correct as needed.
Glucose	- Consider hypoglycaemia.
Infection	- Consider chest, urine, skin, wounds. (Check wound dressing, but do not remove it to look underneath unless there is significant ooze or pus. Check with a senior doctor or nurse first.) - All inflammatory markers will be raised post-operatively, but are very useful in the longer term, to monitor the level of inflammation.
Helpful tips	- Be calm and polite, even if they're not. - Regularly orientate the patient to who you are, who and where they are. - Try not to disturb sleep with medication rounds or investigations. - Document patient's capacity if absent and how you acted in their best interests.

* Guy's and St Thomas' NHS Foundation Trust, *Clinical guideline for the prevention, recognition and management of delirium in adult inpatients*, | www.guysandstthomas.nhs.uk/resources/our-services/acute-medicine-gi-surgery/elderly-care/delirium-adult-inpatients.pdf Link: (2013)

Appendix 2 | Management of delirium in elderly trauma patients

Sedation for elderly trauma patients with delirium

Keep the use of sedatives and major tranquilisers in the treatment of delirium to a minimum; the use of sedation needs to be proportional and reasonable. It should be considered only after verbal and non-verbal de-escalation has failed. Sedation may be necessary in the following circumstances:

- To carry out essential investigations or treatment.
- To prevent the patient endangering himself / herself or others.
- To relieve distress in a highly agitated or hallucinating patient.

Key principles

Use one drug only (Haloperidol – see local guidance and NICE CG103). ***Use of more than one drug should be rare, and only under the direction of an experienced clinician.***

Do not use antipsychotic drugs for people with conditions such as dementia with Lewy bodies or Parkinson's disease.

Close respiratory and cardiovascular monitoring after sedation is essential. *One to one care is often required.*

Review all anti-psychotic medication at least every 24 hours.

If the delirium does not resolve:

- Re-evaluate underlying causes.
- Follow up and assess for possible dementia.
- Refer to a liaison psychiatrist and / or consultant geriatrician.

About the London Operational Delivery Networks

The London Operational Delivery Networks brings together the individual ODNs operating across London to provide a capital wide system for governance and oversight, ensuring a collaborative pan London approach to implementing changes to care pathways and service improvements.

Major trauma

Trauma ODNs are responsible for all aspects of trauma care, from a patient's point of injury to rehabilitation and a return to socio-economic functioning. Fostering a culture of collaboration across the network, Trauma ODNs work to ensure there are effective pathways of care for patients between providers in the network, making sure people receive the right care at the right place. This approach means people are taken to the appropriate hospital for their level of injury, not necessarily to their closest A&E.

Each Trauma ODN has a major trauma centre for treating the most seriously injured patients and link to a number of local trauma units for those with less serious injuries. Local networks also include ambulance and rehabilitation services, and have appropriate links to the social care and community sector.