STN Minimum Requirements for Pre-Hospital Care

Each region of the trauma network must be capable of providing a tiered response that ensures the timely provision of sufficient pre-hospital care to maximise survival, prevent disability and distress, and contribute to the effectiveness of the regional trauma network as a whole.

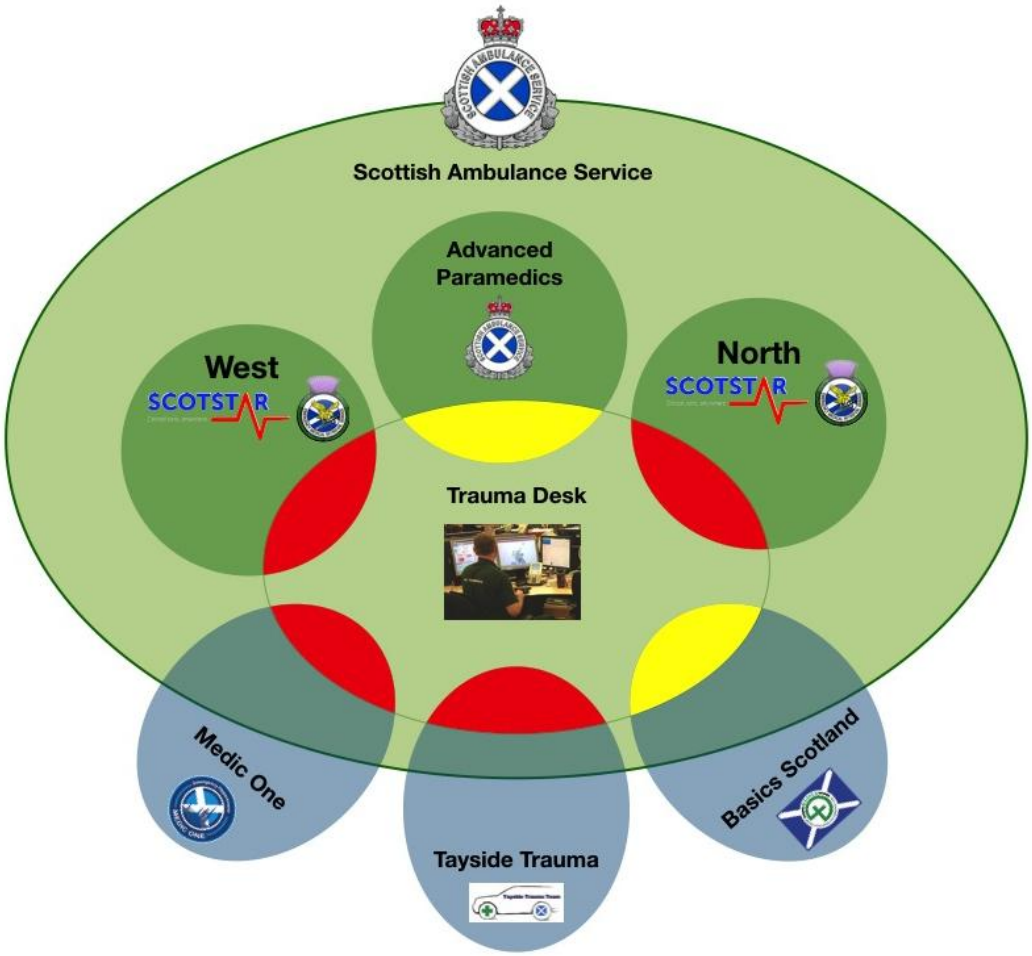
The key elements of this are:

1. Dispatch of sufficient appropriate resources to manage an incident based on information received and modified as the incident progresses via trauma desk.
2. Timely response by paramedic crews meeting local KPI, and initial treatment commenced using GREEN trauma skill set.
3. Support to paramedic crews in suitable incidents by advanced paramedics and/or BASICs providers using YELLOW trauma skill set.
4. Support to paramedic crews in presence of severe life threatening injuries from regional critical care team using RED trauma skill set.
5. Triage to most appropriate hospital using triage tool to optimise care and using most appropriate transport platform (air or road).
6. Clinical support for triage and treatment decisions of pre-hospital providers via trauma desk (including back-up from expert "top cover")
7. Arrangements for secondary transfer of severely injured patients taken initially to LEH or TU to an MTC when required, including as part of a "modified primary" co-activation
8. Integrated response to dispatch initial adequate ambulance resources including SORT and Site Medical Teams to major incidents supported by neighbouring regional networks as required.
9. Robust clinical governance processes at both regional and national level to review tasking, care provided on scene and triage decisions.

Intervention	Rationale
IV/IO access	Enable IV therapy
IV morphine	Pain relief
Compression dressings	Control external haemorrhage
Tourniquet	Control external haemorrhage
Supra-glottic airway	Maintain oxygenation
Seal open pneumothorax	Treat open pneumothorax
Oxygen therapy	Maintain oxygenation
BVM ventilation	Maintain ventilation
IV Tranexamic acid	Control haemorrhage
Splinting fractures/spine	Minimise pain, blood loss &disability
Splinting pelvis	Control internal haemorrhage
Needle decompression	Release tension pneumothorax
IV ketamine	Sedation / pain relief
IV antibiotics	Prevention complications
Reduction of fractures	Minimise pain & orthopaedic morbidity
Thoracostomy	Treat tension pneumothorax
Surgical airway	Maintain oxygenation
IV crush therapy	Prevention complications
Ultrasound	Detection major injury
Rapid sequence induction	Maintain ventilation
Blood administration	Maintain circulation
Amputation	Extrication
Thoracotomy	Cardiac tamponade
Central vein cannula	Maintain circulation
Chest drain insertion	Treat haemo-pneumo thorax
Special circumstances	Leadership, treatment & triage decisions

(see Appendix 1 for relevant NICE guidance)

Overall organisation of SAS pre-hospital elements



Characteristics of Teams in the Proposed Model

Red Teams

The hallmarks of pre-hospital critical care (PHECC) are pre-hospital anaesthesia, blood administration and surgical skills, together with high level experienced decision-making, triage, emergency department communication, and clinical leadership in complex scenarios.

The most commonly provided intervention is pre-hospital emergency anaesthesia (PHEA). Whilst there is considerable evidence of clinical benefit for this intervention, it also carries significant risk of harm when conducted by inadequately trained or supervised practitioners, or when operated within systems without standardised procedures and robust clinical governance. The AAGBI has recommended (AAGBI Guidelines: Safer pre-hospital anaesthesia 2017):

"Pre-hospital emergency anaesthesia with oral tracheal intubation is the technique of choice for trauma patients who cannot maintain their airway or achieve adequate ventilation. It should be carried out as soon as safely possible, and performed to the same standards as in-hospital emergency anaesthesia. It should only be conducted within organisations with comprehensive clinical governance arrangements. Techniques should be straightforward, reproducible, as simple as possible and supported by the use of checklists. Monitoring and equipment should meet in-hospital anaesthesia standards. Practitioners need to be competent in the provision of in-hospital emergency anaesthesia and have supervised pre-hospital experience before carrying out pre-hospital emergency anaesthesia. Training programmes allowing the safe delivery of pre-hospital emergency anaesthesia by non-physicians do not currently exist in the UK. Where pre-hospital emergency anaesthesia skills are not available, oxygenation and ventilation should be maintained with the use of second-generation supraglottic airways in patients without airway reflexes, or basic airway manoeuvres and basic airway adjuncts in patients with intact airway reflexes. "

For this reason, and the practicalities of organising equipment, drugs, PPE and blood storage, SAS wish to only commission pre-hospital critical care ("red skills") from four well organised and governed critical care services who can demonstrate adequate training, seniority, clinical exposure, standardisation, audit and governance standards. It would be anticipated that these teams would have very close links with the four MTC, with shared governance and personnel. Three such services already exist: ScotSTAR West (EMRS), Medic1 and Tayside Trauma team. The case has been made that for geographic equity there should be a new SAS team commissioned in the North of Scotland (ScotSTAR North) as soon as possible.

The standard configuration of the "red teams" would be a senior doctor (consultant usually) with a fully trained advanced pre-hospital practitioner (APP) or senior PHECC trainee (combined with suitably qualified driver). This addresses the AAGBI recommendation of pre-hospital RSI being carried out with skilled assistance available. It is anticipated that the APP programme will be very closely integrated with the development of the advanced paramedic programme as it rolls out with maturation of the SAS trauma & critical care network.

It would be neither cost-effective nor clinically sustainable given the volume of appropriate pre-hospital trauma critical care work to support entirely stand-alone trauma teams with no other clinical duties. This however needs to be tempered by the need to have services that can respond to the majority of calls that require their skills in timely manner. The balance proposed is that pre-hospital work is integrated with either emergency department duties (Medic1 and Tayside Trauma Team) or retrieval service duties (ScotSTAR West and North); these to be organised in such a way within each service that ensures rapid availability of a team for tasking by the trauma desk most of the time. Such systems require robust cross cover and backfill arrangements for senior staff to be quickly freed up to perform their PHECC duties to avoid unintended consequences in service provision elsewhere, especially for the emergency department based teams. The two retrieval services would be expected to cross

cover each other with regard to requests for remote and rural secondary retrieval.

For the four PHECC services, SAS will provide the tasking platform, the trauma desk, which itself will be subjected to a strict governance framework that will allow detailed clinical review of tasking decisions. Teams would be expected to cross cover into each other's MTC area based on a "best endeavours" tasking decision to send the most appropriate and rapid resource to the incident, and to assist when a more local team are unavailable for any reason or during a major incident. The convergence of standard operating procedures, equipment, PPE and training will continue to be co-ordinating by the Scottish Pre-Hospital Emergency Critical Care (SPHECC) network to facilitate joint working and interoperability.

Yellow Teams

The pre-hospital skills within the yellow bracket represent a range of skills that lie within the provision of BASICS Scotland providers, both as highly organised teams such as PICT in Inverness and as solo responders. It is acknowledged that a small number of these practitioners are very active and have very considerable pre-hospital experience, especially in pain relief, extrication, fracture management and haemorrhage control.

As many of these practitioners operate in remote and rural settings, it is acknowledged that they may be the initial or perhaps only additional resource available locally, including for critically injured casualties that would normally mandate a primary "red response" elsewhere. In such cases, it would be anticipated that BASICS responders would assist at the scene, and a modified primary response would be organised from the nearest available "red team" to rendezvous perhaps at the LEH/TU prior to transport to the MTC (as per NICE guidelines for airway management).

In addition to BASICS providers, SAS have begun to train advanced paramedics to provide these skills, and PGDs have been drawn up to significantly extend their scope of practice into areas previously only undertaken by medical staff. Although similar schemes exist elsewhere, the additional responsibility is significant and carries potential risk if not operated within a very carefully controlled system utilising a very experienced and highly trained cadre of paramedics with formal additional postgraduate training and a supervised competency-based programme. The initial stages of this programme will be confined to working closely with the "red teams", with additional experience gained within the emergency departments and retrieval systems that those teams are associated with.

It is anticipated that once established, the advanced paramedics will play a key role that bridges the standard paramedic skills and the requirement for a critical care team. This is likely to provide not only resilience across the SAS response to

trauma (and medical emergencies), but also improved patient experience particularly during painful extrication scenarios such as RTCs and stairwell falls. The advanced paramedics will also play a significant role in staffing the trauma desk and providing education and expertise to the wider paramedic body. The initial one-year pilot has begun in West linked with ScotSTAR to scope the clinical protocols and tasking.

Green teams

Whatever the nature of the incident, it is highly likely that the first response on scene will be a SAS paramedic crew. In suitable incidents the trauma desk may well have co-tasked additional red and/or yellow resources, but it is well recognised that much trauma will continue to be dealt with by paramedic crews alone, and that in critical injury their initial actions may be life saving prior to arrival of support.

In addition to the longstanding skills of direct haemorrhage control, IV access, fracture splintage, spinal immobilisation, morphine administration and basic airway and ventilation skills, the new trauma packs have enhanced the capability of responding crews. In particular, the universal introduction of pelvic binders, tourniquets, intra-osseous devices and tranexamic acid will play a major role in initial stabilisation. Where additional resources are allocated, the first responding crew will maintain their clinical input and often provide the transporting resource.

A key role for paramedic within the network will be the use of the triage tool to identify those patients in whom transport to the MTC is justified (see Appendix 2). Some of these decisions will be difficult and support from the trauma desk backed up by medical "top cover" will be a key facet of safely operating the network. A programme of on-going education, feedback and governance to crews is planned as the network "goes live" within each region.

Dr Tim Parke
Associate Medical Director (Emergency Care) Scottish Ambulance Service
29th November 2017

Appendix 1: NICE Guidelines Relating to Pre-hospital Care

1. Rapid sequence intubation:

Use drug-assisted RSI of anaesthesia and intubation as the definitive method of securing the airway in patients with major trauma who cannot maintain their airway and/or ventilation.
If RSI fails, use basic airway manoeuvres and adjuncts and/or a supraglottic device until a surgical airway or assisted tracheal placement is performed.
Aim to perform RSI as soon as possible and within 45 minutes of the initial call to the emergency services, preferably at the scene of the incident.
If RSI cannot be performed at the scene:

- consider using a supraglottic device if the patient's airway reflexes are absent
- use basic airway manoeuvres and adjuncts if the patient's airway reflexes are present or supraglottic device placement is not possible
- transport the patient to an MTC for RSI provided the journey time is 60 minutes or less otherwise divert to a trauma unit for RSI before onward transfer if a patent airway cannot be maintained or the journey time to an MTC is more than 60 minutes

2. Tranexamic Acid

Use intravenous tranexamic acid as soon as possible in patients with major trauma and active or suspected active bleeding.

3. Chest Trauma

Use clinical assessment to diagnose pneumothorax for the purpose of triage or intervention.
Consider using eFAST to augment clinical assessment only if a specialist team equipped with ultrasound is immediately available and onward transfer will not be delayed.
Be aware that a negative eFAST of the chest does not exclude a pneumothorax.
Only perform chest decompression in a patient with suspected tension pneumothorax if there is haemodynamic instability or severe respiratory compromise.
Use open thoracostomy instead of needle decompression if the expertise is available, followed by a chest drain via the thoracostomy in patients who are breathing spontaneously.
Observe patients after chest decompression for signs of recurrence of the tension pneumothorax.
In patients with an open pneumothorax:

- cover the open pneumothorax with a simple occlusive dressing and
- observe for the development of a tension pneumothorax.

4. Pain Management

Offer medications to control pain in the acute phase after spinal injury.
For people with major trauma or spinal injury, use intravenous morphine as the first-line analgesic and adjust the dose as needed to achieve adequate pain relief.
If intravenous access has not been established, consider the intranasal route for atomised delivery of diamorphine or ketamine[1].
Consider ketamine in analgesic doses as a second-line agent.

5. Circulatory Management

For circulatory access in patients with major trauma:

- use peripheral intravenous access or
- if peripheral intravenous access fails, consider intra-osseous access.

For circulatory access in people under 16 with major trauma, consider intra-osseous access as first-line access if peripheral access is anticipated to be difficult.
For patients with active bleeding use a restrictive approach to volume resuscitation until definitive early control of bleeding has been achieved.
Titrate volume resuscitation to maintain a palpable central pulse (carotid or femoral).
For patients who have haemorrhagic shock and a traumatic brain injury:

- if haemorrhagic shock is the dominant condition, continue restrictive volume resuscitation or
- if traumatic brain injury is the dominant condition, use a less restrictive volume resuscitation approach to maintain cerebral perfusion.

Only use crystalloids to replace fluid volume in patients with active bleeding if blood components are not available.

6. Wounds and Fractures

Splint fractures, pelvic binders, spinal immobilization
IV antibiotics for compound fractures
Dressings for haemorrhage control and wound care
Tourniquet for exsanguinating limb trauma

Appendix 2: Triage Tool

Scottish Ambulance Service Trauma Triage Tool

Use this tool to triage all significantly injured patients or patients involved in a high mechanism incident

TRIAGE QUESTIONS

Step 1: Assess your patient's physiology

Does your patient have any of the following:

- Systolic blood pressure <90 mmHg, or no radial pulse
- Glasgow Coma Scale < 14
- Respiratory rate < 10 or > 29 breaths/min (or < 20 breaths/min in infants less than one year)

(Ref JRCALC age per page for paediatric parameters)

Yes → MAJOR TRAUMA CENTRE CARE

No ↓

Step 2: Assess your patient's injuries

Does your patient have any of the following:

- Penetrating injury to head, neck, torso, or extremities proximal to elbow or knee
- Chest wall instability or deformity
- Two or more proximal limb fractures
- Crushed, degloved, mangled, or pulseless extremity
- Amputation proximal to wrist or ankle
- Suspected pelvic fracture
- Open or depressed skull fracture
- Paralysis

Yes → MAJOR TRAUMA CENTRE CARE

No ↓

Step 3: Assess the mechanism of injury

Did any of the following occur:

- Fall > 20 feet
- High risk vehicle accident
  - With> 12" intrusion
  - Ejection (partial or complete)
  - Death in same passenger compartment
- Vehicle striking pedestrian/cyclist at > 20 mph
- Motorcycle accident at > 20 mph

Yes → TRAUMA UNIT CARE

No ↓

Step 4: Special considerations

Are any of the following present:

- Age > 55 years
- Bleeding disorder or anticoagulant treatment
- Isolated burns (liaise with trauma desk)
- Pregnancy> 20 weeks
- Morbid obesity

Yes → TRAUMA UNIT CARE

No → LOCAL

RESPONSE CATEGORY

MAJOR TRAUMA CENTRE CARE

Your patient requires Major Trauma Centre (MTC) care

Your patient should, if possible, be taken to an MTC, bypassing other hospitals en route. If you think that it will take more than 45 mins to reach the nearest MTC, contact the Trauma Desk to discuss helicopter retrieval, pre-hospital trauma team rendezvous, or diversion to a lower level facility.

If you think that your patient does not require MTC care (despite the physiological abnormalities or injuries listed), contact the Trauma Desk.

Remember to pre-alert the receiving hospital via airwave if you are managing a patient triaged to MTC care.

TRAUMA UNIT CARE

Your patient requires Trauma Unit (TU) care

Your patient should, if at all possible, be taken to a Trauma Unit (or, if nearer, a Major Trauma Centre).

If you think that it will take more than 45 mins to reach the nearest Trauma Unit (or Major Trauma Centre), contact the Trauma Desk to discuss helicopter retrieval, or diversion to a lower level facility.

If you think that your patient does not require Traume Unit care (despite the criteria listed), contact the Trauma Desk.

LOCAL

Your patient can be taken to the nearest hospital with an Emergency Department, regardless of designation

CLINICAL JUDGEMENT is important, and valued. If you are concerned that your patient's triage category does not reflect their needs, you require clinical or logistic advice, or other resources, contact the Trauma Desk: 0141 * ****.**

Based on NCS/CDC Held Triage Decision Scheme/National Trauma Triage Protocol. Design by Jan Jansen.