

# Key Performance Indicators for the Scottish Trauma Network

Publication date: 13 March 2024

Version 7.9



Translations and other formats are available on request at:



Public Health Scotland is Scotland's national agency for improving and protecting the health and wellbeing of Scotland's people.

© Public Health Scotland

OGL

This publication is licensed for re-use under the **Open Government Licence v3.0**.

For more information, visit www.publichealthscotland.scot/ogl

# www.publichealthscotland.scot

### Version history

Version	Date	Summary of changes
7.7	11/11/2022	Updated to PHS branded template
7.8	06/07/2023	Updates to KPIs 1.2, 1.3, 2.1, 2.4.3-2.4.6. Addition of KPIs 3.3 and 3.4.
7.9	12/03/2024	Updates to KPIs 1.2, 2.1 denominator. Updates to KPI 2.4.5 to exclude patients with baseline GCS 13 or 14. Other updates to various note sections on progress.

### Contents

Introduction	4
Background	4
Scottish Trauma Audit Group	4
Key performance indicators	6
1. Pre-hospital care	8
Pre-hospital triage.	8
Pre alert.	9
Diversion to lower level of care.	10
2. Early hospital Care	11
Consultant led reception.	11
Consultant review within one hour.	12
Time to MTC Care.	13
Time to secondary transfer.	14
Time to CT head - GCS <13 or intubated.	15
Time to CT head written report - GCS <13 or intubated.	15
Time to CT head - GCS 13-14.	17
Time to CT head - written report - GCS 13-14.	18
MTC care for patients with a severe head injury.	19
Management of open long bone fractures.	20
Administration of tranexamic acid in patients with severe haemorrhage.	21
Specialist care.	22
3. Ongoing hospital care	23
Assessment of rehabilitation needs.	23
Time to assessment of rehabilitation needs.	23
Functional outcome.	24
Timely transfer to specialist in-patient facilities.	25
Timely repatriation from MTC.	26

Summary	27
References	28
Glossary	32
Appendix one: Hospitals in Scotland with an ED	34
Appendix two: KPI subgroup members (2024)	36
Appendix three: Acknowledgements	37
Appendix four: Meetings and wider consultation	38
Appendix five: Archived KPIs	41
Time to CT Head (no longer included as part of SNAP governance process).	41
Time to CT head written report (no longer included in SNAP governance process).	41

### Introduction

### Background

In Scotland, injury was the commonest cause of death in 2014 for those under the age of 45 years and the third most common cause of death for those aged less than 55 years, after neoplasm and diseases of the circulatory system.<sup>1</sup> Major trauma describes serious and often multiple injuries where there is a strong possibility of death or disability.

To deliver safe, effective, and person-centred care for major trauma patients and achieve the best outcomes, we need to reduce death and disability and ensure patients continue to be supported to help maximise their quality of life.

In 2013, a report produced by the Major Trauma Subgroup of the National Planning Forum (NPF)<sup>2</sup>, outlined ways to enhance existing major trauma services for all ages in Scotland. Patients who sustain major trauma have a better outcome if they are quickly taken to a hospital where all the specialist services they will require are available, often referred to as definitive care. One of the significant changes in Scotland was the introduction of major trauma centres (MTCs), where patients with suspected major trauma are taken, either directly or after initial assessment and treatment in a trauma unit (TU) or local emergency hospital (LEH). The system relies on the right patients being taken to the right facility and the Scottish Ambulance Service (SAS), MTCs, TUs and LEHs play a key role in the whole service being effective for all trauma patients.

### **Scottish Trauma Audit Group**

The Scottish Trauma Audit Group (STAG) is one of the national audits within the Scottish National Audit Programme (SNAP) of Public Health Scotland (PHS).

STAG was set up in 1991 to audit the management of seriously injured patients in Scotland and audited trauma care until 2002. The current trauma audit was

recommenced in 2011 and includes patients who are seen in the emergency department (ED), in 29 hospitals (January 2024), throughout Scotland.

The NPF made a series of recommendations for the future of trauma data collection provided by STAG in view of establishing a major trauma service, (now referred to as the Scottish Trauma Network (STN)):

- All hospitals with an ED should contribute to STAG (n=30).
- STAG should be extended to include data collection on the full patient journey including rehabilitation and patient reported outcomes.
- STAG and the SAS data should be linked to allow for more robust information on the early stages of care.
- STAG and hospital in-patient data (Scottish Morbidity Records (SMR) 01 data<sup>3</sup>) linkage should be progressed allowing valuable information to be explored in relation to outcomes and survival.
- The audit should expand to include paediatric trauma.
- National key performance indicators should be agreed and measured to help monitor the success of the major trauma service and drive improvements.

All these recommendations are either complete or being progressed. More information on the STAG audit can be found at www.stag.scot.nhs.uk

To achieve these recommendations STAG reviewed its current method of data collection (paper proforma) and after a robust review of options sought funds to build an electronic data collection system, now known as eSTAG. eSTAG went live in November 2017. Reporting of these data are in **Tableau**<sup>™</sup> which is now widely used in PHS.

### Key performance indicators

This document outlines the key performance indicators (KPIs) that were agreed by the Major Trauma Oversight Group at the Scottish Government on the 4th June 2015.

The KPI subgroup of the STAG steering group first met in September 2014. The indicators have been selected following a long consultation process and literature reviews for supporting evidence.

As part of the regionalisation of trauma care in England, the Trauma Audit and Research Network (TARN) <sup>4</sup> introduced a range of performance indicators. We acknowledge and are grateful for the work done by this group, which has informed the development of the Scottish KPIs.

A clinical governance policy has been developed (SNAP governance process) with a clear and robust process to ensure that hospitals are given direction and support to improve compliance with these indicators and to drive local improvement.

The KPIs are split into three sections:

- Pre-hospital care this includes the response from the call alerting the emergency services, to on-scene care, triage, and primary transfer.
- Early hospital care this includes the initial reception of the patient in the ED and inter-hospital transfer (if required), through to the patient being discharged to a rehabilitation service or home.
- Ongoing hospital care this includes rehabilitation of the patient and patient reported outcomes measures (PROMS) at various timeframes following discharge from hospital.

Each indicator has a description explaining the performance to be achieved and a rationale as to why it is important. There is also detail about how the indicator is reported with numerator and denominator details and the data source.

Scotland's geography differs from that of England and makes the provision of equitable trauma care inherently more challenging. The KPIs take cognisance of this fact, and are, in no small part, aimed at ensuring the correct functioning of the network, prior to patients' arrival at a hospital.

The linkage of data collected by the SAS and hospitals is essential to the success of the KPIs. The linkage work has been conducted by STAG, the SAS, and the Service Access Team of NHS National Services Scotland. This process now takes place within the functionality of eSTAG to ensure that data are available as soon as possible to clinical and management teams within NHS Boards.

### 1. Pre-hospital care

Pre-hospital care encompasses the response from the call alerting the emergency services, to on-scene care, triage, and primary transfer (if required).

### Pre-hospital triage.

1.1	
Description	Patients who have suffered significant trauma are assessed by the Scottish Ambulance Service (SAS) using the SAS Trauma Triage Tool (SASTTT).
Rationale	The trauma system relies on the need of the patient and the capacity of the service being matched and triage will help deliver this. <sup>5-13</sup>
Numerator	Number of major trauma patients who are assessed by the SAS, using the SASTTT.
Denominator	Number of major trauma patients who arrive by the SAS.
Note	May 2022 - the STAG steering group agreed that patients with pre-hospital medical team (PHMT) in attendance have already been triaged so SASTTT data are not required. KPI met if mode of arrival is PHMT - data updated from January 2023.

The triage tool will be reviewed by the SAS to ensure it is highlighting the right patients to go to the right hospitals. Although triage will be protocol-based, it is acknowledged that provider judgement ('up-triage', when a provider feels that the protocol underestimates the degree of injury; and 'down-triage' when a provider feels that the protocol overestimates the degree of injury) adds to the performance of triage. This information will be recorded, and it will be possible to assess the performance of the triage trauma tool as well as provider judgement. This will provide useful data for the further development and refinement of the triage tool in Scotland, with a view to optimising under and over triage rates.

### Pre alert.

1.2	
Description	Patients with major trauma (injury severity score (ISS) >15) are notified to the receiving hospital (pre-alert).
Rationale	Pre alerts allow trauma teams to be assembled prior to arrival of the patient, improving the care they receive in the initial stages of their hospital journey. <sup>6,14</sup>
Numerator	Number of patients with major trauma for whom a pre alert is recorded.
Denominator	Number of patients with major trauma.
Note	November 2023 - Change to denominator from MTC care to ISS >15 now ratified by the STN core group (June 2023) and Scottish Government National Audit Programme Board (Health) (SGNAPB(H)) (November 2023). This change will be updated in eSTAG in early 2024.

### Diversion to lower level of care.

1.3	
Description	Patients who are triaged as requiring MTC care are taken directly to an MTC if they are within 45 minutes' travel time.
Rationale	The aim of the trauma system is to deliver patients to definitive care, whenever possible; to provide safer care, decrease mortality and improve functional outcome. <sup>2,15-17</sup>
Numerator	Number of patients triaged to MTC care that are within 45 minutes travel time of an MTC and are taken directly to a MTC.
Denominator	Number of patients triaged to MTC care that are within 45 minutes' travel time of an MTC.
Note	November 2023 - STAG steering group agreed to change denominator to ISS >15. This was ratified by the STN core group in June 2023. January 2024 - Discussions with SAS required on how to determine 45-minute timeframe.

# 2. Early hospital Care

Early hospital care includes initial reception of the patient in the ED through to the patient being discharged to a rehabilitation service or home.

2.1.1	
Description	Patients with major trauma (ISS >15) that are taken to an MTC are received by a consultant led trauma team.
Rationale	A consultant will have the necessary expertise and experience to effectively coordinate the initial assessment and treatment of a major trauma patient. <sup>7,18</sup>
Numerator	Number of patients with major trauma who are taken to an MTC and are received by a consultant led trauma team.
Denominator	Number of patients with major trauma who are taken to an MTC.
Paediatrics	Paediatric emergency medicine consultant: - Same definition as adult from 08.00-23.59. - Seen by a consultant within 30mins from 00.00 to 07.59. <sup>19</sup>
Paediatric numerator	Number of patients with major trauma who are taken to paediatric MTC (PMTC) care with time of admission between 08.00 and 23.59 that are received by a consultant led trauma team.
	Number of patients with major trauma who are taken to PMTC care with time of admission between 00.00 and 07.59 that are seen by a consultant within 30 minutes of arrival.
Paediatric denominator	Number of patients with major trauma who are taken to PMTC care with time of admission between 08.00 and 23.59.
	Number of patients with major trauma who are taken to PMTC care with time of admission between 00.00 and 7.59.
Note	November 2023 - change to denominator from MTC care to ISS >15 now ratified by the STN core group (June 2023) and SGNAPB(H) (November 2023). This will be updated in eSTAG in early 2024.

### Consultant led reception.

### Consultant review within one hour.

2.1.2	
Description	Patients with major trauma (ISS >15) that are taken to a TU should be seen by a consultant within 60 minutes of arrival.
Rationale	A consultant will have the necessary expertise and experience to effectively coordinate the initial assessment and treatment of a major trauma patient. <sup>7,18</sup>
Numerator	Number of patients with major trauma that are taken to a TU and are seen by a consultant within 60 minutes of arrival.
Denominator	Number of patients with major trauma that are taken to a TU.
Note	November 2023 - change to denominator from MTC care to ISS >15 now ratified by the STN core group (June 2023) and SGNAPB(H) (November 2023). This will be updated in eSTAG in early 2024.

### Time to MTC Care.

2.2	
Description	Major trauma patients who are not taken directly to a MTC and are later transferred to a MTC are transferred within 24 hours.
Rationale	Some patients with major trauma will not be taken directly to a MTC due to several reasons including prolonged distance to a MTC, unstable clinical condition, under triage and patients having been taken to hospital by private transport. It is essential that these patients are transferred to definitive care, i.e., a MTC as soon as possible, improving the patient experience and outcome. <sup>2</sup>
Numerator	Number of major trauma patients, who are admitted to a MTC within 24 hours of arrival in the first ED.
Denominator	Number of major trauma patients who are transferred from a TU or LEH to a MTC.

# Time to secondary transfer.

2.3	
Description	Time to secondary transfer to a MTC for patients who have suffered major trauma (ISS >15) is minimised to $\leq$ four hours from time of call (to arrange transfer) to SAS to departure.
Rationale	Major trauma patients who are not taken directly to a MTC should be transferred without delay to definitive care after initial assessment and optimisation in the receiving hospital. <sup>2</sup>
Numerator	Number of major trauma patients who depart their receiving hospital to a MTC in $\leq$ four hours from call to SAS.
Denominator	Number of major trauma patients who are transferred from a non-MTC to a MTC.
Paediatric patients transfer by ScotSTAR Paediatric Retrieval Service	Decision to mobilisation time <60 minutes. Decision to team arrival with patient <3 hours (road/ mainland). Decision to team arrival with patient <4 hours (island/ air). Note – these are standards set by ScotSTAR Paediatric Retrieval Service. <sup>20</sup>
Paediatric numerator	Number of patients where time from decision to mobilisation is less than 60 minutes.
	Number of patients where time from decision to team arrival with patient is <3 hours (road/ mainland).
	Number of patients where time from decision to team arrival is <4 hours (island/ air).
Paediatric denominator	Number of major trauma patients who are transferred from a non- MTC to a MTC (by ScotSTAR) and age on admission in first hospital is <16 years.
	Number of major trauma patients who are transferred from a non- MTC to a MTC (by ScotSTAR) and age on admission in first hospital is <16 years, AND team arrived by road/ mainland.
	Number of major trauma patients who are transferred from a non- MTC to a MTC (by ScotSTAR) and age on admission in first hospital is <16 years, AND team arrived by air.

### Time to CT head - GCS <13 or intubated.

2.4.3	
Description	Patients who have sustained a head injury with a GCS <13 (or are intubated) have a computerised tomography (CT) scan within one hour of arrival in first hospital with an ED.
Rationale	The National Institute for Health and Care Excellence (NICE) recommend that adults who have sustained a head injury and have a Glasgow coma scale (GCS) of <13 on initial assessment in the ED should have a CT head scan within one hour to quickly determine clinically important brain injuries. <b>NICE Pathways</b>
Numerator	Number of patients with a GCS <13 (or are intubated) who undergo a CT head within one hour of arrival in hospital.
Denominator	Number of patients with a GCS <13 (or are intubated) who have a CT head within 12 hours of arrival in hospital.
Notes	Included in SNAP governance from January 2021. Exclusions: patients who die or go to theatre within one hour. May 2023 - decision to change the denominator to 12 hours of arrival in hospital. eSTAG will be updated in early 2024.

### Time to CT head written report - GCS <13 or intubated.

2.4.4	
Description	Patients who have sustained a head injury with a GCS <13 have a CT scan written report available within one hour of the CT scan.
Rationale	All patients with a severe head injury following trauma to the head should have a CT scan with a written report as soon as possible to determine treatment required to reduce mortality and improve functional outcome. <b>Royal college of radiologists</b>
Numerator	Number of patients who have a CT head written report by a radiologist within one hour of the CT scan.
Denominator	Number of patients with a GCS <13 (or are intubated) who have a CT head within 12 hours of arrival in hospital.

2.4.4	
Notes	Included in SNAP governance from January 2021.
	May 2023 - decision to change the denominator to 12 hours of
	arrival in hospital. eSTAG will be updated later in early 2024.

### Time to CT head - GCS 13-14.

2.4.5	
Description	Patients who have sustained a head injury with a GCS 13-14 have a CT scan within 1 hour of arrival in first hospital with an ED or within 3 hours of injury.
Rationale	NICE recommend that adults who have sustained a head injury and have a GCS <15 at 2 hours after injury should have a CT head scan within 1 hour of this finding to quickly determine clinically important brain injuries.
	To measure this, STAG agreed to allow either 3 hours from injury time or one hour after arriving in the ED. The first option allows for observation time in ED (patients GCS may improve and CT is not required) and option 2 allows for patients whose journey to hospital is delayed. <b>Investigation for clinically important brain</b> <b>injuries in patients with head injury - NICE Pathways</b>
Numerator	Number of patients with a GCS 13-14 (and not intubated) who undergo a CT head within 60 minutes of arrival in hospital or 3 hours of injury.
Denominator	Number of patients with a GCS 13-14 (and not intubated) who have a CT head within 12 hours of arrival in hospital.
Notes	Exclusions: patients that die or go to theatre within one hour or patients with a baseline GCS of 13 or 14. Included in SNAP governance from January 2021. May 2023 - decision to change the denominator to 12 hours of arrival in hospital. February 2024 - decision to exclude patients with a GCS 13 or 14 that is unchanged from baseline due to dementia etc. eSTAG will be updated later in early 2024. Ratification by SG NAPB on 6th March 2024.

# Time to CT head - written report - GCS 13-14.

2.4.6	
Description	Patients who have sustained a head injury with a GCS 13-14 have a CT scan written report available within one hour of the CT scan.
Rationale	All patients with a severe head injury following trauma to the head should have a CT scan with a written report as soon as possible to determine treatment required to reduce mortality and improve functional outcome. <b>Standards of practice and</b> <b>guidance for trauma radiology in severely injured patients</b> (rcr.ac.uk)
Numerator	Number of patients where a CT head written report by a radiologist is available within one hour of the time the CT scan.
Denominator	Number of patients with a GCS 13-14 (and not intubated) who have a CT head within 12 hours of arrival in hospital.
Notes	Included in SNAP governance from January 2021. May 2023 - decision to change the denominator to 12 hours of arrival in hospital. February 2024 - decision to exclude patients with a GCS 13 or 14 that is unchanged from normal due to dementia etc. eSTAG will be updated later in early 2024. Ratification by SG NAPB on 6th March 2024.

# MTC care for patients with a severe head injury.

2.5	
Description	Patients who have suffered a severe head injury are managed in a MTC.
Rationale	Severe head injury (for this KPI) is defined as a patient with an abbreviated injury scale (AIS) (Head) ≥3.
	Patients who have suffered severe head injury should be managed in a MTC with specialist facilities to reduce mortality and improve functional outcome. <sup>2,16</sup>
Numerator	Number of patients who have suffered a severe head injury and are managed in a MTC.
Denominator	Number of patients with who have suffered a severe head injury.
Notes	May 2023 - agreed to exclude patients with end-of-life care decisions made in ED from January 2022.

# Management of open long bone fractures.

2.6	
Description	Patients with an open long bone fracture will receive intravenous (IV) antibiotics within 3 hours of first contact with emergency services.
Rationale	Evidence recommends that IV antibiotics are given to patients with open long bone fractures as soon as possible (ideally within 3 hours). <sup>22</sup>
	contact with emergency services" as a surrogate. This will be the first applicable option from - date/ time SAS were called; date/ time the patient enters a minor injury unit (MIU) or the date/ time the patient enters an ED.
Numerator	Number of patients with a severe open long bone fracture who received IV antibiotics within 3 hours.
Denominator	Number of patients with a severe open long bone fracture.

# Administration of tranexamic acid in patients with severe haemorrhage.

2.7	
Description	Trauma patients with severe haemorrhage should be given tranexamic acid (TXA) within 3 hours of first contact with emergency services.
Rationale	Trauma patients with severe haemorrhage are defined as having received at least one unit of red blood cells (RCC) within 6 hours of injury for the purpose of this indicator.
	TXA has been shown to reduce death by bleeding if given within three hours of injury to bleeding trauma patients. <sup>23,24</sup>
	As injury time data are poorly collected, STAG will use 'first
	contact with emergency services' as a surrogate. This will be the
	time the patient enters a MIU or the date/ time the patient enters an ED.
Numerator	Number of trauma patients with severe haemorrhage that start the administration of TXA within 3 hours of first contact with emergency services.
Denominator	Number of trauma patients with severe haemorrhage (RCC given within first 6 hours).
Notes	Denominator was changed to RCC only in July 2020 eSTAG update.

### Specialist care.

2.8	
Description	Patients who have suffered major trauma and are taken to a MTC, are admitted under the care of a major trauma service (MTS)*.
Rationale	The MTS coordinates patient care, from the acute phase through to rehabilitation; ensuring patients receive all necessary care in a timely manner. <sup>2</sup>
Numerator	Number of major trauma patients who are admitted to a MTC (primarily or secondarily) who are under the care of a MTS* AND are admitted directly to an intensive therapy unit (ITU), high dependency unit (HDU), major trauma ward (MTW), neurosurgical unit or spinal injuries unit (SIU) from the ED (or following theatre).
Denominator	Number of major trauma patients who are admitted to a MTC (first or transfer hospital).
Notes	*Primary or joint care of the MTS (or SIU, neurosurgery and cardiothoracic if isolated injury) which includes review by the designated major trauma consultant led team within 24 hours of admission AND admitted directly to an ITU, HDU, MTW, neurosurgical unit or SIU from an ED (or following interventional radiology (IR) or surgery).
	May 2023 - agreed to exclude patients with end-of-life care decisions made in ED from January 2022. June 2023 - STN agreed to MTS definition for adults. Description for paediatrics under review.

# 3. Ongoing hospital care

Ongoing hospital care includes rehabilitation of the patient within a hospital setting and/ or within the community.

### Assessment of rehabilitation needs.

3.1.1	
Description	Major trauma patients admitted to an MTC have a rehabilitation plan (RP) written.
Rationale	Rehabilitation should start as soon as appropriate to enable patients to achieve their functional potential. <sup>25,26</sup>
Numerator	Number of major trauma patients admitted to an MTC, with a length of stay of more than 3 days who have a RP.
Denominator	Number of major trauma patients whose length of stay is more than 3 days.
Note	Plan to extend SNAP governance to TUs from January 2024. Excludes patients admitted to the Spinal Injuries Unit.

### Time to assessment of rehabilitation needs.

3.1.2	
Description	Major trauma patients admitted to an MTC, who have a RP, have it written within 3 days of admission.
Rationale	As 3.1.1.
Numerator	Number of major trauma patients admitted to an MTC who have a RP that is written within 3 days of admission to a hospital.
Denominator	Number of major trauma patients admitted to an MTC (on day one, two or three) who have a RP.
Note	Plan to extend SNAP governance to TUs from January 2024.

### Functional outcome.

3.2	
Description	Patients who have survived major trauma have their functional outcomes assessed at specific timelines.
Rationale	Trauma systems have been shown to reduce mortality and reduce disability. This will provide information on the functional outcome of patients with major trauma to ensure that the MTS is effective.
Numerator	Number of major trauma patients who survive to discharge who are approached or considered about inclusion in the Patient Reported Outcome Measure (PROMs) trauma programme.
Denominator	Number of major trauma patients who survive to discharge.
Note	Plan to extend SNAP governance to trauma units from January 2024.

# Timely transfer to specialist in-patient facilities.

3.3	
Description	Patients who have suffered significant trauma and are admitted to the MTC, are transferred for further specialist in-patient rehabilitation within two days of being assessed fit for transfer.
Rationale	The trauma system relies on access to acute beds in the MTC for patients with these needs. Person-centred care should also ensure patients are in the best possible facility for each stage of their pathway. The inability to transfer patients quickly when a patient is clinically ready, will cause issues with patient flow including the admission of new patients.
	Discussions around transfer with appropriate services should be started as soon as possible. If there is a delay with availability of specialist beds, then patients should remain in a ward that continues to meet their ongoing needs and not be transferred inappropriately.
	<ul> <li>Fit for transfer should include patients:</li> <li>when treatment needs can be met within the specialist inpatient facility.</li> <li>when the patient can transfer using the patient transport service (or another type of transport agreed by the SAS).</li> </ul>
Numerator	Number of adult trauma patients with a RP who are transferred to a specialist rehabilitation unit within 2 days of being confirmed as fit for transfer.
	Date patient ready = day 0.
Denominator	Number of adult trauma patients with a RP who are transferred to a specialist rehabilitation unit.
Note	Documentation of this will be key for STAG data collection. Data to report on this will be taken from the rehabilitation minimum data set (MDS) so only patients with a RP will be included.
	As the MDS can be completed after 30 days then all patients who go to specialist rehab will be included, irrespective of timeline.
	November 2023 - new data added to eSTAG to calculate these KPIs. Compliance with this KPI will be available in early 2024.

# Timely repatriation from MTC.

3.4	
Description	Patients who have suffered significant trauma and are admitted to a major trauma centre (MTC) are transferred to an appropriate hospital to meet their needs, nearer home within 2 days of being assessed as fit for transfer.
Rationale	The trauma system relies on access to acute beds in the MTC for patients with these needs. Person-centred care should also ensure patients are in the best possible facility for each stage of their pathway. The inability to transfer patients quickly, when a patient is clinically ready, will cause issues with patient flow including the admission of new patients. Patients who are far away from home will have limited support from family or friends.
	Discussions around transfer with appropriate services should be started as soon as possible.
	<ul> <li>Fit for transfer should include patients:</li> <li>when treatment needs can be met out with the MTC.</li> <li>ability to transfer using patient transport service or other type of transport if agreed by the SAS.</li> </ul>
Numerator	Number of trauma patients (with a RP) who are transferred from an MTC to another hospital for repatriation or rehabilitation within 2 days of patient being fit for transfer.
	Date patient ready = day 0
	Exclude patients transferred to specialist rehabilitation units.
Denominator	Number of trauma patients (with a RP) who are transferred from an MTC to another hospital for repatriation or rehabilitation.
	Exclude patients transferred to specialist rehab units.
Note	Documentation of this will be key for STAG data collection.
	Plan to start with patients who have a rehabilitation plan but review how well estimated date of discharge or fit for discharge is routinely documented.
	November 2023 - new data added to eSTAG to calculate these KPIs. Compliance with this KPI will be available in early 2024.

### Summary

The development of the STN has revolved around the need to balance accessibility and specialist care. Large parts of Scotland are remote and rural. However, the number of people who are injured – and, severely injured – in these locations is small. Most incidents occur in urban areas, and within reasonable access times of the new MTCs.

This situation is not unique; there are other countries and regions facing similar issues. The challenge is in designing an equitable system which ensures that as many patients as possible reach definitive care as quickly as possible.

For this reason, the Scottish KPIs do not only include "traditional" measure of hospital performance, but also measures of the accessibility of the system.

It is intended that these KPIs will help to monitor the performance of the network as a whole and over time, drive its ongoing development and improvement. Furthermore, the KPIs themselves will be reviewed and updated regularly, to ensure that they are fit for purpose and capture the necessary information.

### References

- Deaths, numbers and rates by sex, age and cause, Scotland 2014. Available from: Vital Events Reference Tables 2014 | National Records of Scotland (webarchive.nrscotland.gov.uk) [Last accessed 13 March 2024]
- 2. National Planning Forum Major Trauma Subgroup. A quality framework for major trauma services. Edinburgh: 2013.
- SMR01 dataset publichealthscotland.scot/services/national-datacatalogue/national-datasets/a-to-z-of-datasets/general-acute-inpatientand-day-case-scottish-morbidity-record-smr01/ [Last accessed 13th March 2024]
- Trauma Audit and Research Network (website currently unavailable, March 2024 please email phs.stag@phs.scot for information).
- American College of Surgeons Committee on Trauma. Resources for optimal care of the injured patient: 2006. Chicago. Centres for Disease Control and Prevention. Guidelines for field triage of injured patients. MMWR 2009; 58(RR-1):1-35. Available from: www.cdc.gov/mmwr/pdf/rr/rr5801.pdf [Last accessed 27th July 2022]
- NHS Clinical Advisory Groups Report (2010). Regional Networks for Major Trauma. Available from: www.kcl.ac.uk/cicelysaunders/about/rehabilitation/The-NHS-Clinical-Advisory-Group-Report-on-Regional-Networks-for-Major-Trauma-(2010).pdf [Last accessed 27th July 2022]
- Findlay G, Martin IC, Carter S, Smith N, Weyman D, and Mason M. Trauma: Who cares? London: NCEPOD; 2007. Available from: www.ncepod.org.uk/2007report2/Downloads/SIP\_report.pdf [Last accessed 27th July 2022]

- Royal College of Surgeons of Edinburgh, (2012) Trauma Care in Scotland. RCSEd, Edinburgh Available from: www.rcsed.ac.uk/news-publicaffairs/reports-and-campaigns [Last accessed 27th July 2022]
- Lerner B. Studies evaluating current field triage: 1966-2005. (2006) Prehosp Emerg Care; 10:303-6
- 10.Mackersie R. (2006) Field Triage and the fragile supply of "optimal resources" for the care of the injured patient. Prehosp Emerg Care; 10:347-50
- 11.Newgard C, Zive D, Holmes J, Bulger E, Staudenmayer K, Liao M, Rea T, Hsia R, Wang E, Fleischman R, Jui J, Mann N, Haukoos J, Sporer K, Gubler K, Hedges, J (2011). A multisite assessment of the American College of Surgeons Committee on Trauma field triage decision scheme for identifying seriously injured children and adults. J Am Coll Surg; 213(6):709-21
- 12.Garwe T, Cowan LD, Neas BR, Sacra JC, Albrecht RM. (2011) Directness of transport of major trauma patients to a level I trauma centre: A propensityadjusted survival analysis of the impact on short-term mortality, J Trauma; 70(5):1118-27.
- 13.Haas B, Gomez D, Zagorski B, Stukel TA, Rubenfeld GD, Nathens AB. (2010) Survival of the fittest: the hidden cost of under triage of major trauma, J Am Coll Surg, Dec; 211(6):804-11.
- 14.National Audit Office (2010). Major trauma care in England Available from: www.nao.org.uk/wp-content/uploads/2010/02/0910213.pdf [Last accessed 27th July 2022]
- 15.MacKenzie E, Rivara F, Jurkovich G, Nathens AB, Frey KP, Egleston BL Salkever DS, Scharfstein DO. (2006) A national evaluation of the effect of trauma centre care on mortality, New Engl J Med;354:366-78
- 16.Gabbe BJ, Simpson PM, Sutherland AM, Wolfe R, Fitzgerald MC, Judson R, Cameron PA. (2012) Improved functional outcomes for major trauma patients in a regionalized, inclusive trauma system, Ann Surg, Jun; 255(6):1009-15.

- 17.Davenport RA, Tai N, West A, Bouamra O, Aylwin C, Woodford M, McGinley A, Lecky F, Walsh MS, Brohi K. (2010) A major trauma centre is a speciality hospital not a hospital of specialities, Br J Sur; 97:109-17
- 18.Wyatt JP, Henry J, Beard D. (19) The association between seniority of Accident and Emergency doctor and outcome following trauma. Injury, Int.J. Care Injured; 30(3) 165-8
- 19.TARN: Trauma Audit & Research Network. Severe Injury in Children (England and Wales) (2012) Available from: (PDF) The Trauma Audit and Research Network (TARN) Severe Injury in Children (January 2019 - December 2020) (researchgate.net) [Last accessed 12th March 2024]
- 20.ScotSTAR www.snprs.scot.nhs.uk/?page\_id=2 [Last accessed 29th July 2021]
- 21.The Royal College of Radiologists. Standards of practice and guidance for trauma radiology in severely injured patients, Second addition (2015). Available from: Standards of practice and guidance for trauma radiology in severely injured patients (rcr.ac.uk) [Last accessed 11th November 2022]
- 22.British Orthopaedic Association and British Association of Plastic, Reconstructive and Aesthetic Surgeons Standard for Trauma-2009 Available from: www.boa.ac.uk/publications/boa-standards-trauma-boasts/ [Last accessed 11th November 2022]
- 23.The CRASH-2 Collaborators. (2010) Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial, Lancet;376: 23-32
- 24.The CRASH-2 Collaborators. (2011) The importance of early treatment with tranexamic acid in bleeding trauma patients: an exploratory analysis of the CRASH-2 randomised controlled trial. Accessed online: Lancet. 377: 1096-1101

- 25.Rehabilitation for patients in the acute care pathway following severe disabling illness or injury: BSRM core standards for specialist rehabilitation 2014 Available from: www.bsrm.org.uk/publications/publications [Last accessed 11th November 2022]
- 26.National Institute for Clinical Excellence (NICE) NG40 (2016) Major trauma: service delivery Major trauma services: Service delivery for major trauma. Available from: www.nice.org.uk/guidance/ng40 [Last accessed 11th November 2022]
- 27.Jansen JO, Champion HR (2012) Trauma care in Scotland: The importance of functional outcomes and quality of life, Surgeon, Oct; 10(5):247-8.

# Glossary

AIS	Abbreviated injury scale
СТ	Computerised tomography
DT	Date and time
ED	Emergency department
GCS	Glasgow coma scale
ISS	Injury severity score
ITU	Intensive therapy unit
HDU	High dependency unit
IR	Interventional radiology
IV	Intravenous
KPI	Key performance indicator
LEH	Local emergency hospital
MDS	Minimum dataset
MIU	Minor injuries unit
MOA	Mode of arrival
MTC	Major trauma centre
MTS	Major trauma service
MTW	Major trauma ward
NICE	National Institute for Health and Care Excellence
NPF	National planning forum

#### NHS NSS NHS National Services Scotland

PHS	Public Health Scotland
PMTC	Paediatric major trauma centre
PROMs	Patient reported outcome measures
RCC	Red blood cells
RP	Rehabilitation plan
SAS	Scottish Ambulance Service
SASTTT	SAS trauma triage tool
SGNAPB(H)	Scottish Government National Audit Programme Board (Health)
SHI	Severe head injury
SIGN	Scottish Intercollegiate Guidelines Network
SIU	Spinal injuries unit
SMR01	Scottish morbidity record 01
SNAP	Scottish National Audit Programme
STAG	Scottish Trauma Audit Group
STN	Scottish Trauma Network
TARN	Trauma Audit and Research Network
TU	Trauma unit
ТХА	Tranexamic acid

# Appendix one: Hospitals in Scotland with an ED

Health Board	Hospital Name
NHS Ayrshire and Arran	University Hospital Ayr University Hospital Crosshouse
NHS Borders	Borders General Hospital
NHS Dumfries and Galloway	Dumfries and Galloway Royal Infirmary Galloway Community Hospital
NHS Fife	Victoria Hospital, Kirkcaldy
NHS Forth Valley	Forth Valley Royal Hospital
NHS Grampian	Aberdeen Royal Infirmary Dr Gray's Hospital, Elgin Royal Aberdeen Children's Hospital
NHS Greater Glasgow and Clyde	Glasgow Royal Infirmary Inverclyde Royal Hospital Royal Alexandra Hospital, Paisley Royal Hospital for Children, Glasgow Queen Elizabeth University Hospital
NHS Highland	Belford Hospital Caithness General Hospital Lorn and Islands District General Hospital Raigmore Hospital, Inverness
NHS Lanarkshire	University Hospital Hairmyres, East Kilbride University Hospital Monklands, Airdrie University Hospital Wishaw
NHS Lothian	Royal Infirmary of Edinburgh St. John's Hospital, Livingston Royal Hospital for Children and Young People, Edinburgh
NHS Orkney	The Balfour, Kirkwall
NHS Shetland	Gilbert Bain Hospital, Lerwick

Health Board	Hospital Name
NHS Tayside	Ninewells Hospital, Dundee Perth Royal Infirmary
NHS Western Isles	Western Isles Hospital, Stornoway

# Appendix two: KPI subgroup members (2024)

Name	Role	Health Board or equivalent
Hazel Dodds	Senior Nurse, SNAP	PHS
Malcolm Gordon	Consultant in Emergency Medicine STAG Chair	NHS Greater Glasgow & Clyde
Dean Kerslake	Consultant in Emergency Medicine And ICU. Clinical Lead from MTC	NHS Lothian
Angela Khan	National Clinical Coordinator, STAG	PHS
Marie Spiers	Consultant in Paediatric Emergency Medicine	NHS Greater Glasgow & Clyde

Original draft by Mr Jan Jansen (on behalf of STAG/ Major trauma oversight group)

# Appendix three: Acknowledgements

Name	Role	Health Board or equivalent
Stuart Baird	Service Manager, SNAP	PHS
Helen Gooday	Consultant in Rehabilitation Medicine	NHS Grampian
Mike Johnson	Clinical Lead for Major Trauma on MTOG	Tayside
Vicky Jones	Regional Coordinator, STAG, SNAP	PHS
Robin Lawrenson	Clinical Lead	SAS
William Leach	Clinical Lead for Major Trauma on MTOG	West of Scotland
Andrew McIntyre	Associate Medical Director	SAS
Mark Mitchelson	Clinical Lead for Major Trauma on MTOG	North of Scotland
Martin O'Neill	Principal Analyst, SNAP	PHS
Neil Sinclair	Consultant Paramedic	SAS
STAG steering group	Various members	

# Appendix four: Meetings and wider consultation

Date	Meetings	Wider consultation
3 Sep 2014	KPI subgroup members	
13 Nov 2014	KPI subgroup members	
28 Nov 2014	STAG Steering Group members	
Dec 2014	V4.2 sent to Major Trauma Clinical Leads and SAS AMD for comment by 6 Jan 2015 (extended to 14 Jan 2015)	
19 Jan 2015	KPI subgroup members	
23 Feb 2015	STAG Steering Group members	
4 Mar 2015	AK, PO	
5 Mar 2015	V6.4 sent to JJ, MG, AC, CS, HD for comment	
12 Mar 2015	AK, MG	Produced presentation for MTOG and sent to Craig Bell.
18 Mar 2015	Updated to V6.5 and sent to Craig Bell for distribution to MTOG members	
19 Mar 2015	MTOG	Presented at MTOG. Minor changes to wording (v 6.6 produced). MTOG members given 2 weeks to comment before signing off.
2 Apr 2015	MTOG	No further comments received from MTOG group.
21 May 2015	STAG Steering Group members	
Nov 2016		Shared with networks for comment via Scottish Government.

Date	Meetings	Wider consultation
21 Apr 2017	STN steering group	Agreed on starting to report on current KPIs and these will evolve over time as the network progresses.
May 2020	STN steering group – discussion around updating CT head KPI to align better with NICE guidelines and ensure clinically relevant – refer to minutes for more detail.	
July 2020		Presented at STAG clinical leads meeting following refinements to ensure correct cohort of patients.
September 2020		Discussed at STN clinical forum - request to continue monitoring current CT KPI by members of the STN clinical forum.
November 2020		New proposed CT head KPIs shared with STN and regional trauma networks for comment. Both new head CT KPIs agreed by core group.
December 2020		Sent to the Clinical outcome measures for quality improvement (COMQI) group at Scottish Government for ratification. Agreed by the group who have replaced COMQI, SGNAPB(H) August 2021.
February 2022	STAG KPI subgroup	Discussions started regarding new KPIs and review of denominators for 1.2, 1.3 and 2.1. Agreement to change 1.1 to automatically assume use of triage tool for patients conveyed by pre-hospital medical teams.

Date	Meetings	Wider consultation
August 2022	STN steering group - new KPIs for time to specialist rehabilitation and repatriation agreed at this meeting.	
November 2022	SGNAPB(H)	New KPIs sent for ratification.
May 2023	STAG steering group - agreed changes to 1.2, 1.3 and 2.1 as noted in these KPIs. Also, agreement to remove patients with end-of-life care decisions in ED from KPIs 2.5 and 2.8.	
June 2023	STN core group - amendments above ratified at this meeting.	
November 2023	SGNAPB(H) - amendments above agreed. 1.3 needs further discussions with SAS to determine 45-minute timeframe.	
February 2024	Update agreed to KPI 2.4.5 at the STAG Steering Group and ratified by SG NAPB(H).	STAG Clinical Leads meeting March 2024.

# **Appendix five: Archived KPIs**

# Time to CT Head (no longer included as part of SNAP governance process).

2.4.1	
Description	Patients with a severe head injury (SHI) have a CT scan within 1 hour of arrival in first hospital with an ED.
Rationale	SHI is defined as a patient with a GCS $\leq 8$ and/ or an AIS (head) $\geq 3$ . All patients with a SHI following trauma should have a CT scan as soon as possible to determine treatment required to reduce mortality and improve functional outcome. <sup>21</sup>
Numerator	Number of patients with a SHI who undergo a CT head within 1 hour of arrival in ED.
Denominator	Number of patients with a SHI.
Notes	Discussion around cohort (NICE/ Scottish Intercollegiate Guidelines Network (SIGN) guidelines GCS <13). Agreed to start with GCS 8 as there is clinician support for this and review once we have compliance data.
	May 2020 – reviewed and agreed to introduce two new KPIs which better align to NICE guidelines. 2.4.1 and 2.4.2 no longer monitored.

# Time to CT head written report (no longer included in SNAP governance process).

2.4.2	
Description	Patients with a SHI have a CT scan written report available within 1 hour of the CT scan.
Rationale	All patients with a SHI following trauma to the head should have a CT scan with a written report as soon as possible to determine treatment required. <sup>21</sup>

2.4.2	
Numerator	Number of patients with a SHI where a CT head written report by a radiologist is available within 1 hour of the time the CT scan was performed.
Denominator	Number of patients with a SHI.