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To improve and optimise the health and wellbeing of the seriously injured. Helping them, their families, each other and our nation. Pioneering clinical excellence, health intelligence, innovation, education and research.

Introduction and background
Trauma remains the fourth leading cause of death in western countries and the leading cause of death for people under 40. Each year in Scotland, around 4000 people are seriously injured, with around 800-1000 cases being defined as ‘major trauma’ (an injury severity score of over 15). It is estimated that each year, there are also 100 cases of major trauma in children under 16.

In order to meet the needs of the population of Scotland, the new Scottish Trauma Network (STN) has been established. It is a bespoke, inclusive and equitable solution, which will involve the Scottish Ambulance Service (SAS) and hospitals across Scotland - including four major trauma centres - working collaboratively across traditional specialty and geographical boundaries, to deliver high quality integrated, multi-specialty care to severely injured patients. This new approach will save more lives and improve patient outcomes throughout the trauma pathway – from prevention to rehabilitation - ‘Saving lives and Giving life back’.

The network will work across a number of facets of trauma care as per the diagram below. Each of these dimensions of the STN will be critical in improving trauma care in Scotland and ensuring the STN delivers its aim of ‘Saving lives and Giving life back’.

The Cabinet Secretary for Health and Sport set out a clear commitment in May 2016, to implement a bespoke STN comprising of an inclusive network of hospitals, four Major Trauma Centres (MTCs) and integrated network infrastructure. This
commitment was subsequently included as a key outcome in the Programme for Government in 2016.

The four MTCs will be in Aberdeen (Aberdeen Royal Infirmary), Dundee (Ninewells Hospital), Edinburgh (the Royal Infirmary of Edinburgh) and Glasgow (Queen Elizabeth University Hospital) surrounded by four regions, North, East, South East and West of Scotland. These four regional networks will support patient care from working with the ambulance service to support pre-hospital care, through acute care in hospital, right through to community-based care and local authority services.

As well as having 4 MTCs, a network of Trauma Units (TU) will continue to manage moderate trauma across Scotland. Additionally, where patients are outwith the 45 minute access threshold to a MTC (i.e. 14% of the population), they will be taken to the nearest TU and if required, transferred to a MTC; 93% of the population of Scotland can reach a MTC or TU within 45 minutes by road. Local Emergency Hospitals (LEH) will manage minor trauma for Scotland, and support the care of patients who might require initial care prior to transfer to a TU or MTC.

A high level plan for implementation of the STN was developed in 2016, and the network was established in 2017 to work with the SAS and regional networks to develop this National Implementation Plan. This has drawn from implementation plans developed by SAS and the four regions over the past few years, with each of the groups reviewing their requirements to ensure that they are able to meet the minimum requirements for MTCs, as agreed by the STN Steering Group in November 2017.

Due to the size and complexity of service changes required, it will take several years for the network and service to fully mature. The network has a wide group of stakeholders from across Scotland who are supporting its development, from each of the regions and SAS and from other organisations who support the patient pathway, from the Coastguard and GPs to local authorities.

The STN has been established to support each of the four regional networks (North, East, South East and West), the SAS and the Scottish Trauma Audit Group (STAG) to work together to establish a trauma network across Scotland.

The STN team is now in place with an Associate Director, Programme Manager, Programme Support Officer and Lead Clinician and has been working with regions, SAS and STAG to support the implementation of regional networks and their planning across Scotland.

The goal of the STN is continual improvement in quality and safe care for the traumatised patient, whether that is at home, at work, by the roadside, or somewhere more distant and challenging. For our patients on this journey, successful rehabilitation thereafter will of course be dependent on all the interventions and improvements in quality care that came before.
This report sets out the progress of the network to date, and plans to progress the implementation of trauma services across the network over the next five years.

**Expected benefits of the network**

**What will better feel like?**

**For our patients**

- Quicker access to expert specialist care and intervention
- Taken to the most appropriate facility for their injuries
- Improved survival
- Improved general and specialist Rehabilitation
- Reduced morbidity
- Reduced secondary transfers

**For our Service**

- Increased and Improved expert presence in EDs
  - Minimum Requirements moving towards Standards
- eSTAG, data and Quality Improvement
- Public Health Intelligence
- Technology and Innovation
- A coordinated National Major Incident Response

**For our Staff**

- Education and Training Network
- Networking
- Recruitment and Retention

**Primary benefits**

There are a number of primary benefits of the STN, which aims to improve services for patients who have suffered a serious injury. These have been detailed below working through the patient pathway.

SAS has implemented the Trauma Desk, which has been running 24/7 from the end of October 2017. This will improve awareness of patients who have suffered a serious injury, ensuring that any enhanced pre-hospital care facilities are alerted and tasked to attend an incident as required. Through the Trauma Desk and the Trauma Triage Tool used by paramedics, patients will be taken directly to their centre of definitive care (the hospital where they will receive optimal treatment for their injuries), ensuring that the right services are available for patients as early in their care pathway as possible.
In each of the MTCs there will be 24/7 consultant cover in emergency departments, along with trauma teams trained to manage the most severely injured patients from their time of arrival at the hospital.

This will be slightly different for paediatric trauma, where the model of consultant on-call is to be decided, as 99% of paediatric trauma happens between 8am and midnight. Where paediatric trauma happens outwith these hours, pre-alerts from the ambulance service will help to ensure that consultant level cover is available through on-call provision within 30 minutes of the pre-alert, which may still be before a patient arrives at hospital.

Increased immediate 24/7 access to imaging facilities including CT means that the patient’s injuries will be fully known to clinicians for appropriate management, and to ensure any required surgery can be carried out as early as possible. Through the agreed minimum requirements for MTCs, senior trainee/consultant surgeons will be on site early in the patient’s pathway to ensure that surgery requirements are able to be met.

Following initial treatment led by a senior trauma team, the major trauma patient will be moved into a dedicated major trauma ward, to ensure that ongoing management is able to be supervised by clinicians experienced in managing patients with poly-trauma. Rehabilitation will be made available at an early stage to ensure the best possible outcomes for patients.

Where appropriate, once the patient has recovered enough, they will be returned to a hospital closer to their home to continue their rehabilitation. Where possible patients will return home, and receive ongoing rehabilitation treatment through local services as prescribed by the in-hospital rehabilitation team. All of this comes together to save lives and give life back following traumatic injury.

Through the rehabilitation group we will be scoping different rehabilitation options, and endeavouring to use innovative solutions for a national approach. Engagement with Integrated Joint Boards (IJBs) is essential to support this work.

Secondary benefits
While the network and system is being established to improve care for people who have suffered a serious injury, it is anticipated that additional benefits for other patients will be seen. In particular, there will be shared learning and pathway/process benefits for other critically ill patients. This will be seen from the time of calling 999 for an ambulance, where patients requiring enhanced pre-hospital care will be recognised by a team of experts within the ambulance call centre.

The North of Scotland region plan includes a Highland Pre-hospital Immediate Care and Trauma Scheme (PICT). Whilst the main focus for this is on providing enhanced care to Major Trauma patients otherwise immediately inaccessible to teams based in the MTC in Aberdeen, this will support people who live, work, or holiday in the region.
surrounding the busiest Trauma Unit in Scotland, it will also bring a platform for decision support to paramedic crews and BASICS (British Association of Immediate Care) practitioners in the region who are supporting critically ill patients.

In MTCs, there will be 24/7 Emergency Medicine consultant presence in the Emergency Department (ED), which will improve access and reduce delays to specialist care for any critically ill patient attending ED.

Increases in hospital capacity for trauma through enhanced trauma wards will meet increased demand; it will also ensure that trauma patients are well known to specialist consultants for best management.

Additional rehabilitation capacity for trauma patients from acute stage onwards will enhance patient flow and discharge through hospitals which will have wider positive impacts for all patients, improving patient experience and outcomes.

While training requested is focussed on trauma delivery, some components of training will have positive impacts on delivery of non-trauma cases e.g. Secondary transfer, Trauma Risk Management (TRiM), etc.

In addition to all of these, improved networking across regional boundaries and the patient pathway will improve pathways for all patients who are required to travel between NHS Boards for treatment. Clinicians will become more accustomed to working and communicating across regions, and across the nation.
Governance and Accountability

The STN governance is overseen by the Steering Group, which provides strategic direction, oversight, leadership, assessment, and audit across the network. A Core Group of management and clinical representatives from each of the regions and SAS along with STAG has been created as the main point for discussions and action for the network to set recommendations and work up plans to send to the Steering Group for approval. The Core Group has a number of working groups sitting below it to work on their specific speciality. (See as below)

The Steering Group meet quarterly and their terms of reference describe the responsibilities of the group are to oversee, approve and ratify. The membership of the group consists of all regions planning managers, all regions clinical leads, Nurse lead, rehabilitation lead, major incident planning (SG), representatives from Scottish Government, Public Health, IJBs and Lay members and is Chaired by Caroline Lamb CEO, NES.

All regions are accountable for their planning and delivery with the finance that has been provided for major trauma. Each region will be required to provide reports each year on benefits realisation, spend and improvement. The STN will be required to work with all regions in order for them to account for their spending and demonstrate improvements to patient care.

Governance and reporting structure as below:

 Governance Structure
Objectives
The objective of the work leading to this report was to deliver a five-year phased plan for the implementation of the STN across four regions and SAS. The Scottish Government provided guideline budgets for the first three years of the plan (including 2017/18 as a planning year), and asked that the Core Group of the STN develop a plan against this budget. The Core Group was also asked to describe the budget requirements for years four and five in order to deliver a full trauma system around four MTCs in Scotland.

This report provides an overview of the detailed implementation plans developed by each of the regions and SAS, which are available from the STN management team.

Process worked through to date

Major Trauma Oversight Group
The Major Trauma Oversight Group (MTOG) was established in 2012 to review trauma services in Scotland and consider the best service model for Scotland following successful implementation of trauma networks across NHS England.

Each of the four regions and SAS developed implementation plans as part of MTOG, carried out regionally to consider where current services did not meet the agreed standards of major trauma centres and the associated services around those centres.

The final recommendation of MTOG was to develop four regional trauma networks, with an over-arching Scottish Trauma Network to support cross-regional working.

Scottish Trauma Network
The STN was established as a result of recommendations from MTOG, and the first meeting of the STN Steering Group was held in April 2017, with a further three meetings over the course of the year. The Steering Group provides strategic oversight for the network. Following the establishment of the STN Management Team in June 2017, the Core Group was established to bring together the key planning and clinical leads from each of the regions and SAS to discuss and agree recommendations for the STN Steering Group.

The STN Management Team have worked to support each of the regions in the development of their plans, visiting regions to hear their specific concerns and developing relations with the regions, SAS and STAG.

Regional Networks and SAS Plans were submitted in September 2017 to be reviewed in October 2017, and it was agreed that it would be relevant for the STN Core Group to peer review each of the plans before they were submitted to the Steering Group. This was carried out over three extraordinary Core Group meetings.
during October and November to ensure that a phased plan would allow each of the regions to fully implement by the end of financial year 2021/22.

The Core Group’s preferred option sees the phased development of trauma services over 2017 to 2022. This phased approach is described in more detail in the following section of the report.

The Steering Group and representatives from Scottish Government Finance agreed to delivery of a phased implementation plan across SAS and all four regional networks. Funding to support implementation has been included in the Scottish Government financial plan.
The implementation of the STN to meet the requirements of a population of approximately 5.5 million is a highly complex task, requiring new staff, training for those already in post and new processes and procedures to support the delivery of care. This is being phased over a five year period to ensure that changes to services do not have a negative impact on services already delivered by NHSScotland, and that the required changes are achievable.

**Year one achievements**

A number of achievements have been met in 2017, with SAS and the regional networks gearing up for implementation of a new trauma care system. SAS have been at the forefront, ensuring that patient retrieval and transfer services are prepared to meet changing demands from the new system.

SAS have undertaken a number of projects funded through the STN. They have implemented the Trauma Desk which is manned by clinicians (advanced paramedics or nurses) to monitor calls to the SAS call handling centre to support tasking of enhanced pre-hospital care for people who have suffered serious injury. To support this, SAS is piloting the use of advanced paramedics based in MTCs who will augment the treatment already available through ambulance crews. This pilot will be rolled out across the four regional MTCs in the next three years.
One aim of the STN is to ensure that patients with serious injuries are taken to definitive care as soon as possible, bypassing some hospitals to get to MTCs. To support this aim a Trauma Triage Tool has been developed for use by ambulance crews to support decision-making on where a patient should go depending on the severity of their injuries. The Trauma Triage Tool has undergone testing in one region, and further testing and training will be undertaken before full implementation.

The STAG recommenced an audit of trauma in 2011 with the aim of improving the quality of care, overall experience and long term outcome of patients with significant injuries through measuring compliance against standards of care to support local quality improvement. STAG data has supported the work to establish the network, and data gathered through STAG was used by regions when developing plans. The launch of a bespoke electronic data collection system (eSTAG) in November 2017, will allow STAG to monitor the full patient journey, which may start in hospitals or health centres without EDs in some cases, especially in more rural parts of Scotland.

Each of the regions has appointed a lead clinician for the region, and work is underway to recruit to other key posts for trauma services.

Training sessions have been arranged across all of the regions to support improved skills and competencies in the management of major trauma survivors. These include opportunities for clinicians to network across the regions and share examples of best practice.

The regions are reviewing guidelines for the management of major trauma patients, and introducing new protocols where these are required.

To support appropriate management of patients and collection of data to support quality improvement, a bespoke and innovative Trauma App is in development.

To support planning, the network developed minimum requirements for MTCs, TUs and LEHs, in particular for the North and East regions whose MTCs will open in 2018. This has been supplemented by minimum requirements for pre-hospital care developed by the Pre-hospital, Transfer and Retrieval Group.

Planning has been supported through the provision of planning resources to each of the regional networks and SAS. This has supported the delivery of updated phased five-year plans from each of the regions and SAS, which have been used to develop this document.

Other working groups established include a paediatric working group which will develop guidelines and pathways of care for children who have suffered a serious injury; and the rehabilitation group, which will map current rehabilitation services, and develop recommendations for the future service in Scotland.
Further working groups for Education and Workforce, Major Incident Planning and Prevention are being established. Work has begun with the Scottish Public Health Network to produce data to support prevention work in major trauma.

The first STN network event was held jointly with STAG on 18th and 19th January 2018 at Murrayfield Stadium, Edinburgh. Initial feedback has been good, and a full evaluation of the event will be produced in due course.

**Year two (2018/19)**

Each of the regions will appoint Trauma Co-ordinators/Case managers for MTCs to support improvements across the patient pathway, a total of 10 posts are to be recruited to in year two, concentrated in the North and East MTCs.

The North and East of Scotland MTCs have a concentrated period of activity in 2018/19 to open their MTCs in 2018. This includes recruitment to new posts, some work to improve access to emergency departments and develop trauma wards.

SAS have two key projects in 2018, the extension of hours of ScotSTAR West to have pre-hospital critical care teams available from 7am to 11pm (previously 8am to 6pm). This is a change from these staff being on-call outwith their previous on-site hours.

Following initial implementation of an advanced paramedic team in the West of Scotland in 2017, SAS will add another advanced paramedic team in the South East of Scotland region, to support advanced care of patients in the pre-hospital setting.

**Year three (2019/20)**

- Three advanced paramedic teams
- SCOTSTAR North to start delivering a pre-hospital critical care team from the North of Scotland
- South East of Scotland are close to implementation with two-thirds of resources allocated
- Three more Trauma Co-ordinators appointed in West of Scotland

**Year four (2020/21)**

- South East of Scotland MTC will open
- West of Scotland MTC will open
- Advanced paramedic teams will be operational from all MTCs

**Year five (2021/22)**

- All regional plans will be fully implemented

**Phased implementation of the STN**

The STN will be phased in over the next five years up to 2022. The phased implementation has already begun, with the implementation of the Trauma Desk in
the SAS, and the introduction of a team of advanced paramedics based at future MTC in the West of Scotland.

The North and East MTCs will open in 2018, meeting the minimum requirements agreed by the STN Steering Group. Each of these hospitals will have Trauma Co-ordinators, and 24 hour consultant led reception of major trauma patients.

Work will be undertaken by the West and South East to begin recruitment and training staff to prepare for opening in the coming years. The South East and West of Scotland regions also face some logistical challenges, as the number of additional patients who will be seen in the MTC is significantly higher than the increases in the North and East.

The planning and implementation will include the provision of Trauma Units and Local Emergency Hospitals (LEHs) and the introduction of Trauma Co-ordinators (also known as Case Managers) will support more than just MTCs. Trauma Co-ordinators will play a key role in the patient pathway including supporting repatriation of patients to a service close to home. Co-ordinators will ensure that patient needs are recognised, and the correct specialists are involved in patient care, supporting ongoing improvement across patient pathways.

The West and South East of Scotland regions have developed a phased plan over the next three to five years, recognising that there are more significant changes required to allow them to meet the increased service demand at these major trauma centres. In the East, there will be a very small increase in trauma patient numbers in comparison to the current service model where bypass arrangements have been in place for Perth Royal Infirmary for around 20 years.
Outline workforce implications

Existing Workforce
Services across the regions are already in place to support the delivery of patient care for those who are severely injured. The staff will be vital in maintaining and sustaining services, as well as ensuring continued improvements to patient care.

Key increases in workforce
Across the four regions a number of new posts are being created, broken down in the detailed implementation plans available from the STN Management team. The increase in staffing across the country is phased over the next four years (2018 to 2022). Key highlights from the detailed plans are:

- **143 WTE new Nurses**
- **8.5 WTE new Radiographers**
- **11.5 WTE new Emergency Consultants**
- **30 WTE new rehab AHPs**
- **24 Advanced Paramedics**
- **17.6 WTE Trauma Co-ordinators/Case Managers**
Assessment of risks to implementation

A key risk to implementation is the ongoing availability of funding for staff to deliver the enhanced STN. There is also a risk to recouping consumable costs between NHS Boards through the transfer of activity under the new pathways and the time lag in recouping the consumable costs.

There are recognised challenges in recruiting to certain job types within NHS Scotland, and difficulties in filling posts may result in delays to implementing the enhanced trauma pathway. Where there is a long lead in for recruitment, this risk is likely to be minimal; however, there are risks for regions due to open their MTCs in 2018. In particular, there are recognised radiology staffing challenges in NHS Scotland, which are being reviewed by the Scottish Clinical Imaging Network.

How the benefits will be measured

Benefits detailed above will be recorded in a benefits realisation matrix and measured on a regular basis by the STN Management Team. This will be carried out in partnership with the STN Core Group to ensure that all regions and SAS have input in the management and measurement of benefits held by their areas. All members of the network will then be able to celebrate benefits together.

The STN has an aim of ‘Saving Lives, Giving Life Back’. It is the intention of the STN to work with external stakeholders for example: Scottish Government Transport Department, Police Scotland, Department of Work and Pensions to identify any current statistics which show the incidents of e.g. ‘Death on Scene’, hours lost to the workplace as a consequence of Major Trauma.

We intend to develop a suite of metrics showing the status quo of services and patient pathways which can be mapped over the life of the STN. This will be used to demonstrate improvements made, establish progress delivered, and measure the benefits to the population of Scotland.

The STN is currently undertaking a piece of work with Public Health to develop a further suite of metrics for demographics and epidemiology. This, when completed will inform the STN on a concentrated programme of work to reduce incidents of major trauma, thereby reducing mortality and morbidity. We will be able to measure the progress and report on improvements.

STAG

A crucial role is played by STAG. Since the inception of the core STN team, STAG and the STN work very closely together and this is proving to be of great benefit. STAG’s current annual report continues to demonstrate STAG’s expertise, continuing development and support for the whole network. This will ensure that the STN has the critical information to direct and measure the entire infrastructure.
A number of Key Performance Indicators (KPIs) have been developed to support the monitoring of patient care across Scotland, to ensure that patients receive appropriate care at the right time. See appendix A.

The electronic data collection system (eSTAG) has been developed to facilitate collection of data from the 30 hospitals in Scotland treating patients who have suffered trauma is now complete and active. The system allows the collection and storage of data pertaining to patients who meet the inclusion criteria for the STAG audit. Reporting functionality will now be via Tableau reports real time data from eSTAG which will allow reporting of performance against the nationally agreed KPIs for trauma care in Scotland. This will allow NHS Boards to locally access data in a timely way, monitor performance and investigate gaps in service provision and breeches in relation to the KPIs all of which will ultimately result in driving improvement in patient care.

All hospitals with an Emergency Department will be contributing to STAG and the audit will expand to include paediatric trauma.

National KPIs are agreed and measured to help monitor the success of the STN and drive improvements. KPIs are now agreed having been previously agreed by the STN Steering Group following a long consultation process and literature reviews for supporting evidence. These 16 KPIs include indicators that measure performance across the patient pathway from pre-hospital care to rehabilitation.

eSTAG includes data collection on the full patient journey including rehabilitation and Patient Reported Outcome Measures (PROMs) and rehabilitation information has been added to the new dataset; eSTAG and the SAS data are now linked to allow for more robust information on the early stages of care.

**Conclusion**

This document was developed to highlight the key achievements already made through the STN, regional networks and the SAS. It also shows the timelines anticipated for achieving key milestones over the next five years to implement a network of trauma services across Scotland.

The benefits of the STN were considered, with the key benefits to patients noted as quicker access to specialist care and intervention, meaning improved survival and reduced morbidity. Staff will see increased training and education, with the potential of improved recruitment and retention as a result.
Appendix A – Key Performance Indicators

KEY PERFORMANCE INDICATORS FOR THE SCOTTISH TRAUMA SYSTEM

Original draft by Jan Jansen (on behalf of STAG/MTOG) (version 7.1)
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\(^1\). Major trauma describes serious and often multiple injuries where there is a strong possibility of death or disability.

In order 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 Major Trauma Subgroup\(^2\), (NPF) outlined possible 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 will be the introduction of Major Trauma Centres (MTCs), where patients with suspected major trauma will be taken, either directly or after initial assessment and treatment in a Trauma Unit (TU) or Local Emergency Hospital (LEH). Work to achieve this objective is well underway with the network expected to be established by 2016. The system will rely on the right patients being taken to the right facility and the Scottish Ambulance Service, Major Trauma Centres, Trauma Units and Local Emergency Hospitals will 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 Healthcare Audits Team, part of Public Health and Intelligence (PHI), a division of NHS National Services Scotland.

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 in 18 hospitals throughout the Scottish mainland.

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 in Scotland:

- All hospitals with an Emergency Department (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 Scottish Ambulance Service (SAS) data should be linked to allow for more robust information on the early stages of care;
- STAG and hospital in-patient data (ISD SMR01 data) linkage should be progressed allowing valuable information to be explored in relation to outcomes and survival;
- The audit should expand to include paediatric trauma; and
- National Key Performance Indicators should be agreed and measured to help monitor the success of the major trauma service and drive improvements.

All of these recommendations are either completed or being progressed. More information on the STAG audit can be found at [www.stag.scot.nhs.uk](http://www.stag.scot.nhs.uk)
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) 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 is being developed to ensure that there is a clear and robust process to ensure that hospitals are given direction and support to ensure improved compliance with these indicators and to drive local improvement.

The KPIs are split into three sections:

1. **Pre hospital care** includes the response from the call alerting the emergency services, to on-scene care, triage and primary transfer.
2. **Early hospital care** 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.
3. **Ongoing hospital care** includes rehabilitation of the patient and Patient Reported Outcomes Measure (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 considered to be 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 Scottish Ambulance Service and hospitals, will be essential to the success of the KPIs. The linkage work has been carried out by STAG, the SAS and the Service Access team of PHI.
Section 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 and (if required).

1.1 Pre hospital Triage

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients who have suffered significant trauma are assessed by the Scottish Ambulance Service (SAS) using the SAS Trauma Triage Tool (SASTTT).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>The Trauma system relies on the need of the patient and the capacity of the service being matched and triage will help deliver this (4-12).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of major trauma patients who are assessed by the SAS, using the SASTTT.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of major trauma patients who arrive by the SAS.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG cohort - ISS &gt; 15 AND MOA = SAS. SAS – Trauma tool use = yes (OR result of TTT available).</td>
</tr>
<tr>
<td>Notes and reporting</td>
<td>Await the start date for use of triage tool.</td>
</tr>
</tbody>
</table>

The triage tool will be reviewed on a regular basis 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 therefore 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.
### 1.2 Pre-alert

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients who are triaged as requiring Major Trauma Centre (MTC) care are notified to the receiving hospital (pre-alert).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>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 ((8, 13)).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of patients triaged as requiring MTC care for whom a pre-alert is recorded.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of patients triaged as requiring MTC care.</td>
</tr>
<tr>
<td>Data source</td>
<td>SAS- Triage decision = MTC care, Pre alert = Y.</td>
</tr>
<tr>
<td>Notes</td>
<td>Await SAS data</td>
</tr>
</tbody>
</table>

### 1.3 Diversion to lower level of care

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients who are triaged as requiring MTC care are taken directly to a MTC if they are within 45 minutes travel time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>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 ((2, 14 – 16)).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of patients triaged to MTC care that are within 45 minutes travel time of a MTC and are taken directly to a MTC.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of patients triaged to MTC care that are within 45 minutes travel time of a MTC.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG- linkage with SAS data (as in 1.1), StagHospType = MTC. SAS- Triage decision = MTC, MTC achievable within 45 minutes, provider judgement (to determine instability requiring the patient being taken to nearest ED).</td>
</tr>
</tbody>
</table>
| Notes       | Await SAS data  
Report on compliance but analysis must also included number out with range and provider judgement decision |
# Section 2: Early hospital Care

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

## 2.1.1 Consultant led reception for patients triaged and taken to MTC care

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients who are triaged and taken to MTC care are received by a Consultant led trauma team.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rationale</strong></td>
<td>A Consultant will have the necessary expertise and experience to effectively coordinate the initial assessment and treatment of a major trauma patient [6, STAG paper].</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>Number of patients who are triaged and taken to a MTC and are received by a Consultant led trauma team.</td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>Number of patients who are triaged and taken to a MTC.</td>
</tr>
</tbody>
</table>

### Paediatrics

- **Paediatric Emergency Medicine Consultant:**
  1. Same definition as adult from 8.00-23.59.
  2. Seen by a consultant within 30mins from 00.00 to 7.59 (16).

### Paeds numerator

- 1. Number of patients who are triaged and taken to PMTC care and time of admission is between 08.00 and 23.59 and are received by a consultant led trauma team.
- 2. Number of patients who are triaged and taken to PMTC care and time of admission is between 00.00 and 7.59 and are seen by a consultant within 30 minutes of arrival.

### Paeds denominator

- 1. Number of patients who are triaged and taken to PMTC care and time of admission is between 08.00 and 23.59.
- 2. Number of patients who are triaged and taken to PMTC care and time of admission is between 00.00 and 7.59.

### Data source

- SAS- Triage decision= MTC care
- STAG- StagHospType = MTC, ConsultLed = Y
- Paeds option 1 – EnterTime
- Paeds option 2 - GradeSenior, EnterTime, EnterDate, ArriveDateSenior, ArriveTimeSenior

### Notes

LACs need list of TTLs
### 2.1.2 Consultant review for patients triaged to MTC care and taken to a TU

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients who are triaged to MTC care and are taken to a TU should be seen by a Consultant within 60 minutes of arrival.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>A Consultant will have the necessary expertise and experience to effectively coordinate the initial assessment and treatment of a major trauma patient.</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of patients who are triaged to MTC care and taken to a TU and are seen by a Consultant within 60 minutes of arrival.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of patients who are triaged to MTC care and taken to a TU.</td>
</tr>
<tr>
<td>Data source</td>
<td>SAS- Triage decision = MTC care. STAG- StagHospType = TU, ConsultLed OR GradeSenior, EnterTime, EnterDate, ArriveDateSenior, ArriveTimeSenior</td>
</tr>
<tr>
<td>Notes</td>
<td>STAG will need confirmation of hospitals that have TU status to allow this to be reported.</td>
</tr>
</tbody>
</table>

### 2.2 Time to Major Trauma Centre care

<table>
<thead>
<tr>
<th>Description</th>
<th>Major trauma patients who are not taken directly to a MTC and are later transferred to a MTC are transferred within 24 hours.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>Some patients with major trauma will not be taken directly to a MTC due to a number of reasons including prolonged distance to a MTC, unstable clinical condition, under triage and patients having being taken to hospital by private transport. It is essential that these patients are transferred to definitive care (MTC) as soon as possible, improving the patient experience and outcome.</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of major trauma patients, who are admitted to a MTC within 24 hours of arrival in the first ED.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of major trauma patients who are transferred from an LEH or TU to a MTC.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG- ISS &gt; 15, StagHospType = LEH or TU, EnterDate, EnterTime, TransHospType = MTC, TransHospDate, TransHospTime</td>
</tr>
</tbody>
</table>
## 2.3 Time to secondary transfer

<table>
<thead>
<tr>
<th>Description</th>
<th>Time to secondary transfer to a MTC for patients who have suffered major trauma (ISS &gt; 15) is minimised to ≤ four hours from time of call to SAS to departure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>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 (2).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of major trauma patients who depart their receiving hospital to a MTC in ≤ four hours from call to SAS.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of major trauma patients who are transferred from a non-MTC to a MTC.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG- ISS &gt; 15, StagHospType = LEH or TU, TransReason = MTC, SAS- journey type = inter hospital transfer, call start date and time, resource left scene date/time ScotSTAR – Referral date/time, mobilisation date/time, arrival with patient date/time, type of transport – road/mainland or island/air</td>
</tr>
</tbody>
</table>

### Paediatrics
- Referral to mobilisation time <60 minutes.
- Referral to team arrival with patient <3 hours (road/mainland).
- Referral to team arrival with patient <4 hours (island/air)

### Paeds numerator

### Paeds denominator
Number of major trauma patients who are transferred from a non-MTC to a MTC and age on admission in first hospital ≤ 16.

### Notes
Paediatric transfer data will come from ScotSTAR to STAG as separate extract each month.
### 2.4.1 Time to CT head

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients with a severe head injury have a CT scan within 60 minutes of arrival.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>Severe head injury is defined as a patient with a (Glasgow Coma Scale (GCS) ( \leq 8 )) and/or an Abbreviated Injury Scale (AIS) (head) ( \geq 3 ). All patients with a severe head injury (GCS ( \leq 8 )) following trauma to the head should have a CT scan as soon as possible to determine treatment required in order to reduce mortality and improve functional outcome (STAG Ref, 19).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of patients with a severe head injury who undergo CT head within 60 minutes of arrival.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of patients with a severe head injury.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG- GCS/AIS head codes, EnterDate, EnterTime, CTBodArea = head, CTScanDate, CTScanTime.</td>
</tr>
<tr>
<td>Notes</td>
<td>Discussion around cohort (NICE and SIGN guidelines GCS&lt;13). Start GCS 8 as there is clinician support for this and review once we have compliance data.</td>
</tr>
</tbody>
</table>

### 2.4.2 Time to CT head written report

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients with a severe head injury have a CT scan written report sent within one hour of the CT scan.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>Severe head injury is defined as a patient with a (Glasgow Coma Scale (GCS) ( \leq 8 )) or a AIS (head) ( \geq 3 ). All patients with a severe head injury following trauma to the head should have a CT scan as soon as possible to determine treatment required in order to reduce mortality and improve functional outcome. (STAG Ref, 19).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of patients with a severe head injury where a CT head written report is sent within one hour of the time the CT scan was performed.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of patients with a severe head injury.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG- GCS/AIS head codes, EnterDate, EnterTime, CTBodArea = head, CTScanDate, CTScanTime, CTScanWrittenDate, CTScanWrittenTime.</td>
</tr>
</tbody>
</table>
### 2.5 Major Trauma Centre care for patients with a severe head injury

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients who have suffered a severe head injury are managed in a MTC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>Severe head injury is defined as a patient with an AIS (Head) ≥3.</td>
</tr>
<tr>
<td></td>
<td>Patients who have suffered severe head injury should be managed in a MTC with specialist facilities to reduce mortality and improve functional outcome ((^2, ^15)).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of patients who have suffered a severe head injury and are managed in a MTC.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of patients with who have suffered a severe head injury.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG- AIS head codes, StagHospType or TransHospType = MTC</td>
</tr>
</tbody>
</table>

### 2.6 Management of severe open long bone fractures

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients with a severe open long bone fracture will receive intravenous (IV) antibiotics within three hours of arrival.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>Evidence recommends that IV antibiotics are given to patients with severe open long bone fractures as soon as possible (ideally within three hours) ((^20)).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of patients with a severe open long bone fracture who received IV antibiotics within three hours.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of patients with a severe open long bone fracture.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG- AIS codes, EnterDate, EnterTime, IVAbxDate, IVAbxTime</td>
</tr>
</tbody>
</table>
### 2.7 Administration of Tranexamic Acid in patients with severe haemorrhage

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Trauma patients with severe haemorrhage should be given Tranexamic Acid (TXA) within three hours of first contact with Emergency services.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rationale</strong></td>
<td>Trauma patients with severe haemorrhage are defined as having received at least one unit of blood products within six hours of injury for the purpose of this indicator. Blood products include: fresh frozen plasma, red blood cells, cryoprecipitate and platelets. TXA has been shown to reduce death by bleeding if given within three hours of injury to bleeding trauma patients (^{21,22}). As injury time data is poorly collected, STAG will use “first contact with emergency services” as a surrogate. This will be either call start date and time (SAS) or arrival in first ED if the patient self presents.</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>Number of trauma patients with severe haemorrhage that start the administration of TXA within three hours of first contact with emergency services.</td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>Number of trauma patients with severe haemorrhage.</td>
</tr>
<tr>
<td><strong>Data source</strong></td>
<td>STAG-cohort = severe haemorrhage = Blood = Y TXADate, TXATime, CallStartDate, CallStartTime, EnterDate, EnterTime.</td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td></td>
</tr>
</tbody>
</table>
### 2.8 Specialist care

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients who have suffered major trauma and are taken to a MTC, are admitted under the care of a Major Trauma Service.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>The Major Trauma Service would coordinate care from the acute phase through to rehabilitation ensuring patients receive all necessary care in a timely manner (^2).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of major trauma patients who are admitted to a MTC (primarily or secondarily) and are under the care of a Major Trauma Service.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of major trauma patients who are admitted to a MTC (primarily or secondarily).</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG- ISS &gt; 15, StagHospType OR TransHospType = MTC, AdmitSpec or TransAdmitSpec = Major Trauma Service</td>
</tr>
<tr>
<td>Notes</td>
<td>Single organ injuries may still go to specialty e.g. isolated head will go to Neuro, update when decision final.</td>
</tr>
</tbody>
</table>
Section 3: Ongoing hospital care

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

### 3.1.1 Assessment of rehabilitation needs

<table>
<thead>
<tr>
<th>Description</th>
<th>Major trauma patients admitted to a MTC have a rehabilitation plan written.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>Rehabilitation should start as soon as appropriate to enable patients to achieve their functional potential (^{(23, 24)}).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of major trauma patients admitted to a MTC, with a length of stay of more than three days who have a rehabilitation plan.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of major trauma patients whose length of stay is more than three days.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG, ISS, TotalLOS, EnterDate, RehabPlanDate.</td>
</tr>
<tr>
<td>Notes</td>
<td>Rehabilitation Plan in draft.</td>
</tr>
</tbody>
</table>

### 3.1.2 Time to assessment of rehabilitation needs

<table>
<thead>
<tr>
<th>Description</th>
<th>Major trauma patients admitted to a MTC, who have a rehabilitation plan, have it written within three days of admission.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>Rehabilitation should start as soon as appropriate to enable patients to achieve their functional potential (^{(23, 24)}).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of major trauma patients admitted to a MTC who have a rehabilitation plan that is written within three days of admission.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of major trauma patients admitted to a MTC who have a rehabilitation plan.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG, RehabPlan, RehabPlanDate, EnterED.</td>
</tr>
</tbody>
</table>
### 3.2 Functional outcome

<table>
<thead>
<tr>
<th>Description</th>
<th>Patients who have survived major trauma have their functional outcomes assessed at specified timelines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>Trauma systems have been shown to reduce mortality and reduce disability. This will provide information on the functional outcome of patients with moderate or major trauma to ensure that the Major Trauma Service is effective (^{(15,25,26)}).</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of major trauma patients who survive to discharge who are enrolled in Patient Recorded Outcomes Measure (PROMS).</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of major trauma patients who survive to discharge.</td>
</tr>
<tr>
<td>Data source</td>
<td>STAG – PROMs, outcome, ISS &gt; 15 to start should report on all patients that are recruited</td>
</tr>
</tbody>
</table>
Summary

The development of Scotland’s trauma network 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 in particular, severely injured – in these locations is small. The majority of incidents occur in urban areas, and within reasonable access times of the new major trauma centres.

This situation is not unique; there are other countries and regions facing similar issues. The challenge is in designing a 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.

Hopefully, 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


Key Performance Indicators for the Scottish Trauma System

decision scheme for identifying seriously injured children and adults. 
*J Am Coll Surg;* 213(6):709-21


17. Awaiting STAG Reference


**KPI Subgroup Members**

Jan Jansen  
Major Trauma Oversight Group; STAG Steering Group

Malcolm Gordon  
Chairman of the STAG Steering Group

Hazel Dodds  
Scottish Healthcare Audits (SHA), National Services Scotland

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Project Manager, National Services Scotland

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**Acknowledgements**

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Scottish Ambulance Service

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Scottish Ambulance Service

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Scottish Ambulance Service

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Rehabilitation

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Stuart Baird  
SHA, National Services Scotland

Vicky Jones  
STAG, National Services Scotland

Martin O’Neill  
SHA, National Services Scotland

STAG Steering Group  
Various
# Meetings and Wider Consultation

<table>
<thead>
<tr>
<th>Date</th>
<th>Meetings</th>
<th>Wider consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd September 2014</td>
<td>MG, AC, JJ, HD, CS, AK, SB, MON</td>
<td></td>
</tr>
<tr>
<td>13th November 2014</td>
<td>MG, AC, JJ, HD, CS, AK, SB, MON</td>
<td></td>
</tr>
<tr>
<td>28th November 2014</td>
<td>STAG Steering Group members</td>
<td>V4.2 sent to Major Trauma leads and SAS MD for comment by 6th Jan 2015 (extended to 14th Jan 2015)</td>
</tr>
<tr>
<td>December 2014</td>
<td>STAG Steering Group members</td>
<td></td>
</tr>
<tr>
<td>19th January 2015</td>
<td>AK, HD, AC, PO, MON, CS, VJ</td>
<td>V6.4 sent to JJ, MG, AC, CS, HD for comment</td>
</tr>
<tr>
<td>23rd February 2015</td>
<td>STAG Steering Group members</td>
<td>Produced presentation for MTOG and sent to Craig Bell</td>
</tr>
<tr>
<td>4th March 2015</td>
<td>AK, PO</td>
<td>Updated to V6.5 and sent to Craig Bell for distribution to MTOG members</td>
</tr>
<tr>
<td>5th March 2015</td>
<td></td>
<td>V6.4 sent to JJ, MG, AC, CS, HD for comment</td>
</tr>
<tr>
<td>12th March 2015</td>
<td>AK, MG</td>
<td>Produced presentation for MTOG and sent to Craig Bell</td>
</tr>
<tr>
<td>18th March 2015</td>
<td></td>
<td>Updated to V6.5 and sent to Craig Bell for distribution to MTOG members</td>
</tr>
<tr>
<td>19th March 2015</td>
<td>MTOG</td>
<td>Presented at MTOG. Minor changes to wording (v 6.6 produced). MTOG members given 2/52 to comment before final sign off.</td>
</tr>
<tr>
<td>2nd April 2015</td>
<td></td>
<td>No further comments received from MTOG group</td>
</tr>
<tr>
<td>21st May 2015</td>
<td>STAG Steering Group members</td>
<td></td>
</tr>
</tbody>
</table>