

# Paediatric STAG data: Year 1

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# Background



## *Quality Framework for Major Trauma Services, Report to NPF – September 2013*

- ‘Urgent need for mandatory collection of paediatric trauma data’
- ‘Specific component of STAG should be developed’
- ‘The challenges of methodology should not preclude collecting injury data.’
- ‘This work should be prioritised.’
- ‘...mandatory prospective collection of paediatric trauma data is essential to permit accurate planning of paediatric trauma services.’

# Paediatric STAG



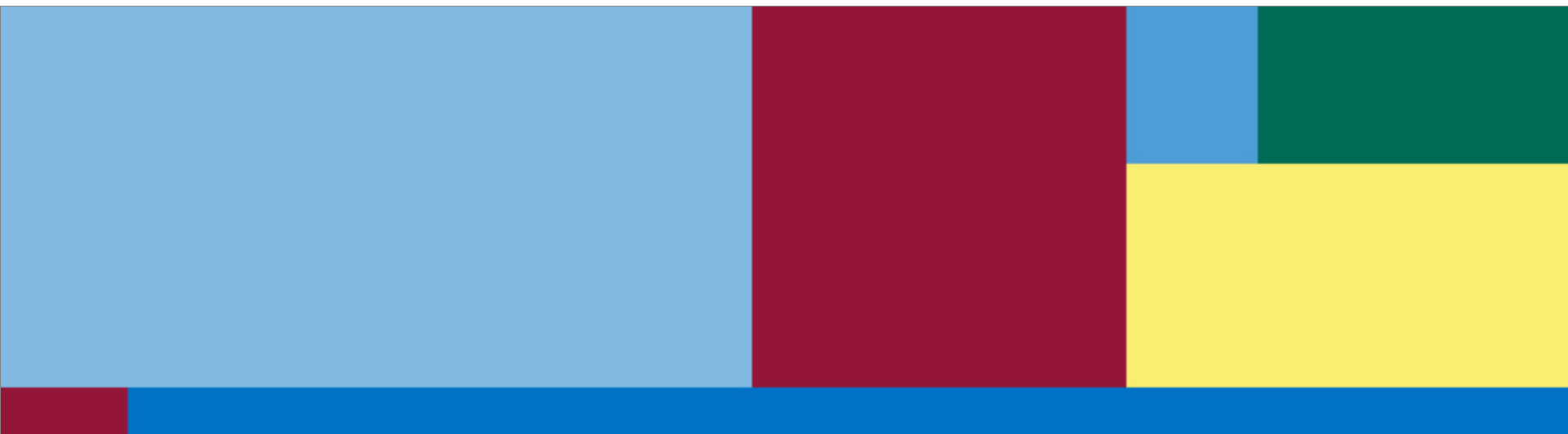
- Aligned to that for adult audit
- All trauma patients 0-16 years
- Fulfil length of stay criteria
  - 3 or more days for direct admissions or combined hospital stay of 3 or more days for transfers
  - OR patients that die in hospital within 3 days of attendance
- AND fulfil injury criteria (same as for adult STAG)

# RHC Glasgow Pilot



- LC in post from end of 2014
- 2 scoping exercises looking initially at 1 month (June)
  - 1 retrospective (2014)
  - 1 prospective (2015)
- Prospective data collection from June 2015 to present
- Local validation process ongoing
- Review of inclusion/ exclusions
- Review paediatric data set

# RHC Glasgow STAG data Year 1

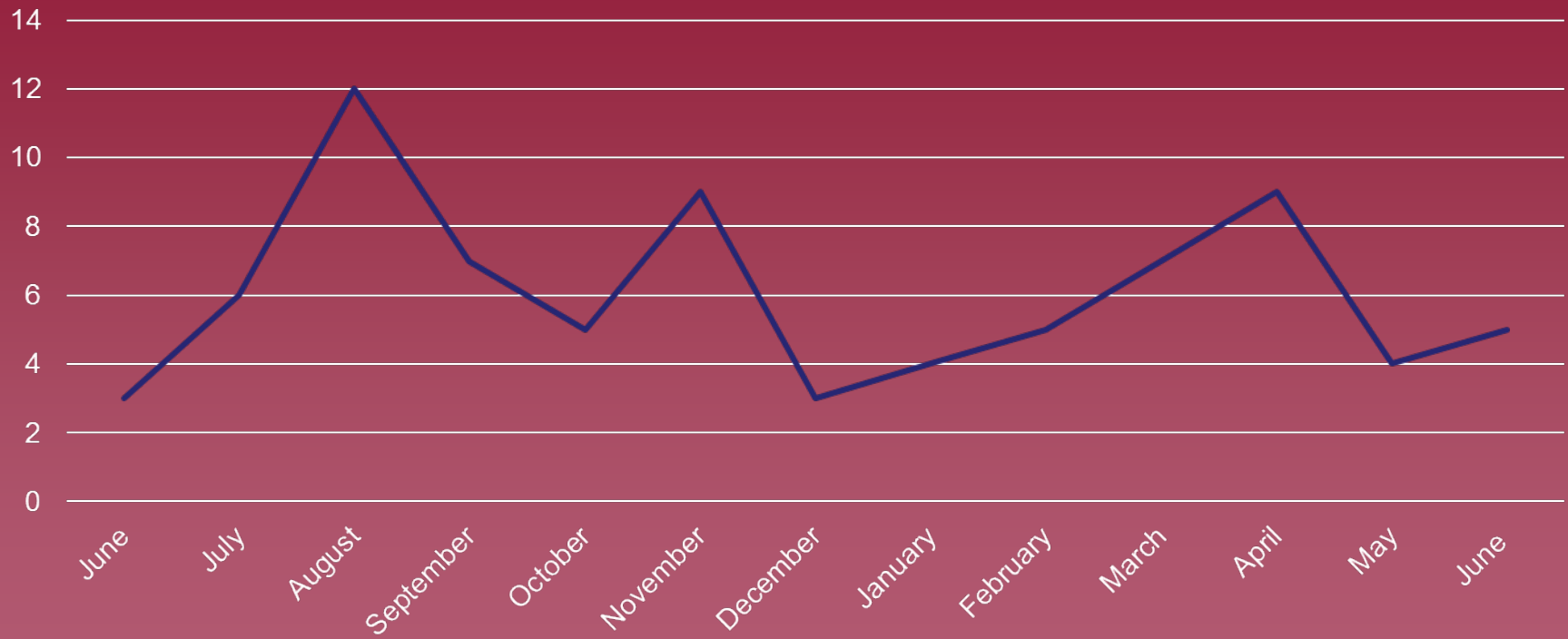


# Demographics



- June 2015 to June 2016
- 83 cases met STAG entry criteria
- 4 removed after review as pathological injuries (IO)
- **79 cases entered into audit**
- Mean age 7.4 years
- Age range 2 months to 15 years
- 57 (72%) male vs. 22 (28%) female
- All initial presentations between 0800 hours and 12MN
  - 3 transfer patients arrived at RHC outwith these times
  - All de novo presentations to RHC had consultant led reception

# Trauma cases by month



# Injury Severity Score

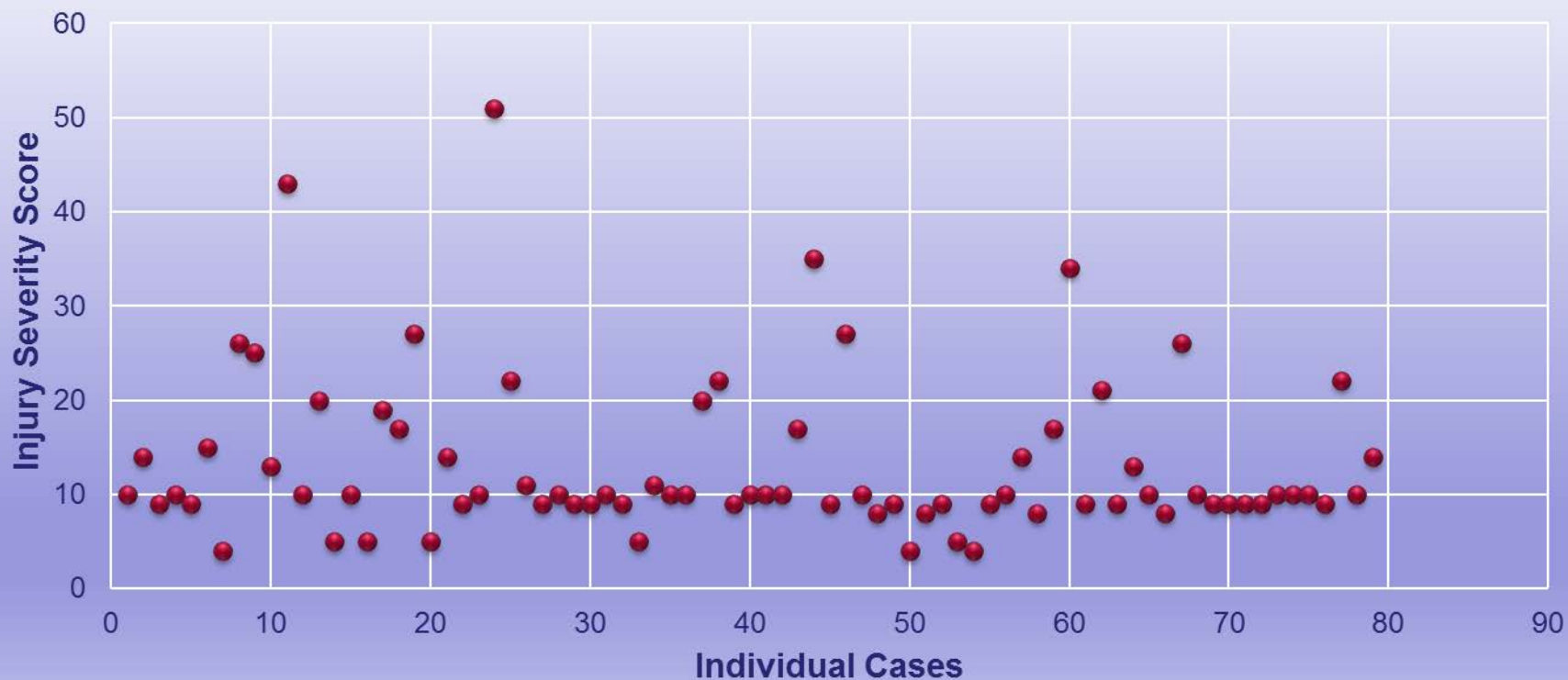


- Range ISS 4 to 51; mean ISS 13.3
- **Major ISS >15**
  - 19 cases (24%); 2.5:1 M:F ratio; mean age 8.4 years
- **Moderate ISS 8-15**
  - 52 cases (66%); 2:1 M:F ratio; mean age 7.3 years
- **Minor ISS <8**
  - 8 cases (10%); all male; mean age 7.4 years



# Injury Severity Score

## ISS per audit case

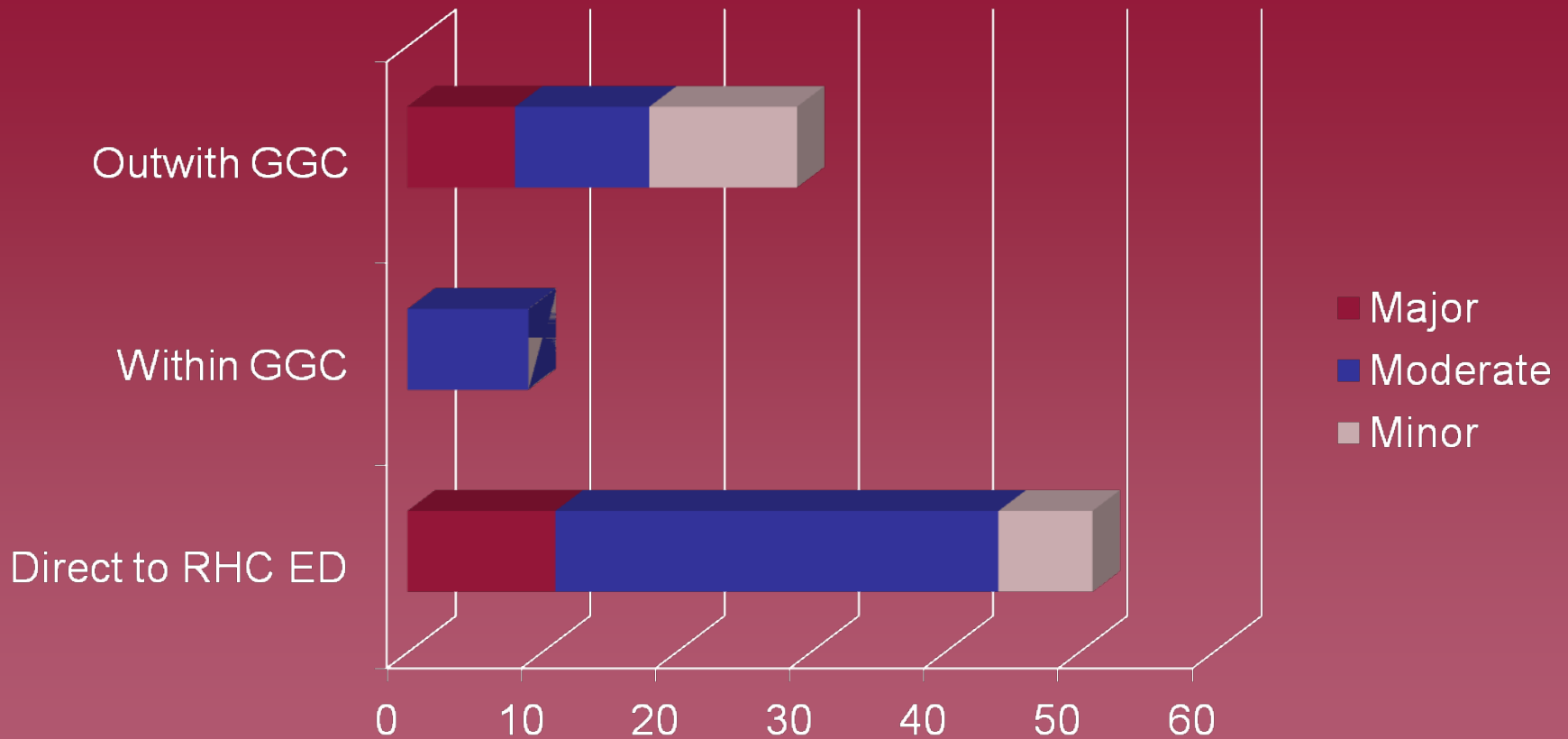


# Source of Arrival



- 51 (65% total) presented directly to RHC Glasgow ED
  - 11 (21%) major
  - 33 (65%) moderate
  - 7 (14%) minor
- 28 (35% total) transferred to RHC Glasgow from another site
- 9 from within GGC- all moderate
- 19 from outwith GGC (5 coming from Highlands/ Islands)
  - 8 (42%) major
  - 10 (53%) moderate
  - 1 (5%) minor

# Source of arrival

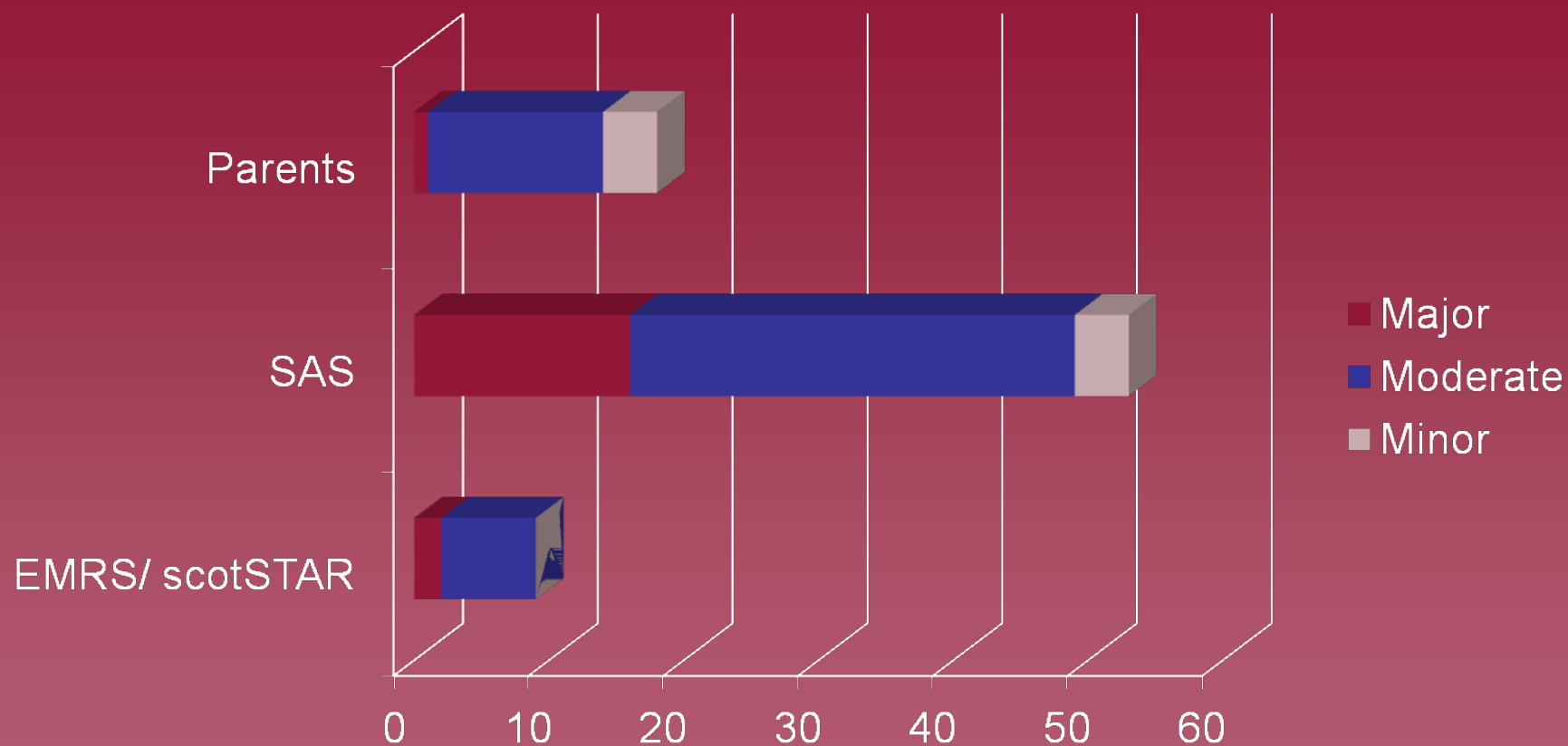


# Mode of arrival

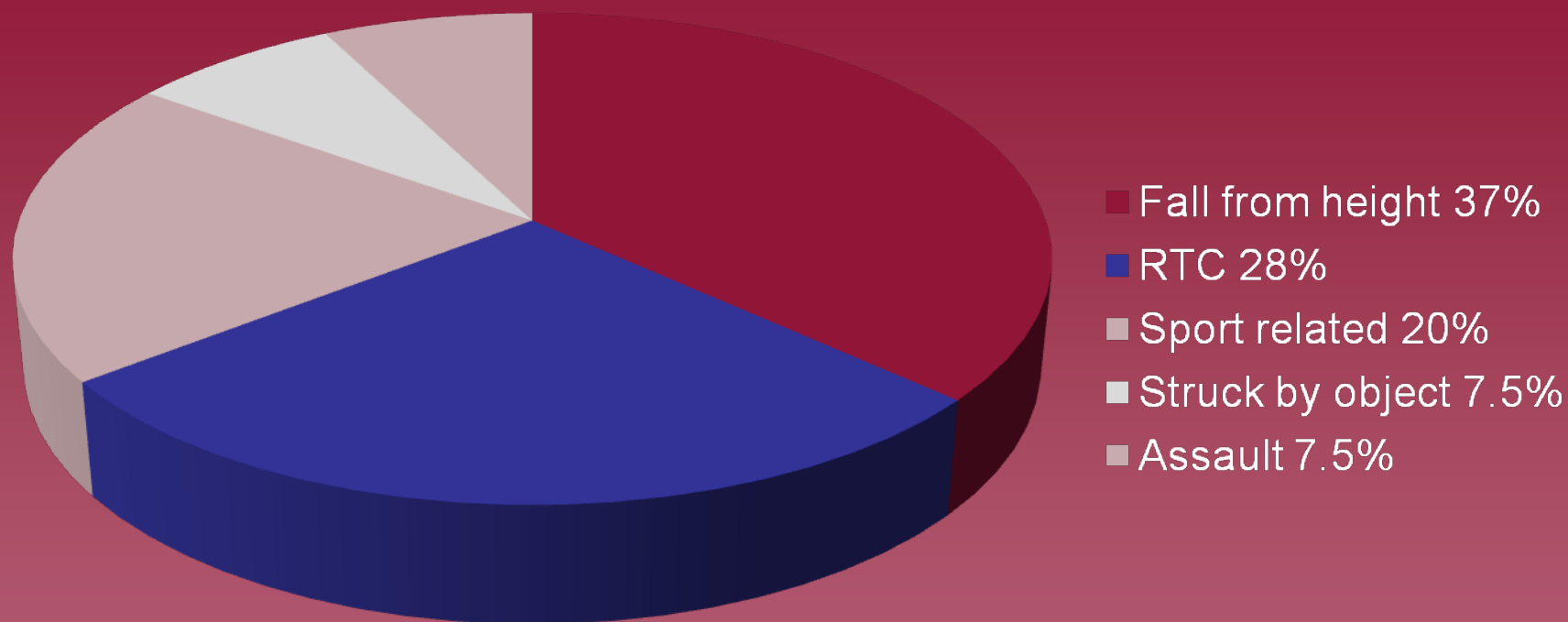


- 61 (77%) arrived via Scottish Ambulance Service
  - Including ALL transfers
  - 5 transferred by air- the rest by road ambulance
  - 10 (16%) accompanied by EMRS/ ScotSTAR
- 46 (75%) of cases from SAS were 'pre-alerted' to ED
- 18 (23%) self referred to RHC ED
- **43% of total cases were unheralded prior to arrival in ED**
  - Of these:
    - 12% major
    - 70% moderate
    - 18% minor

# Mode of arrival

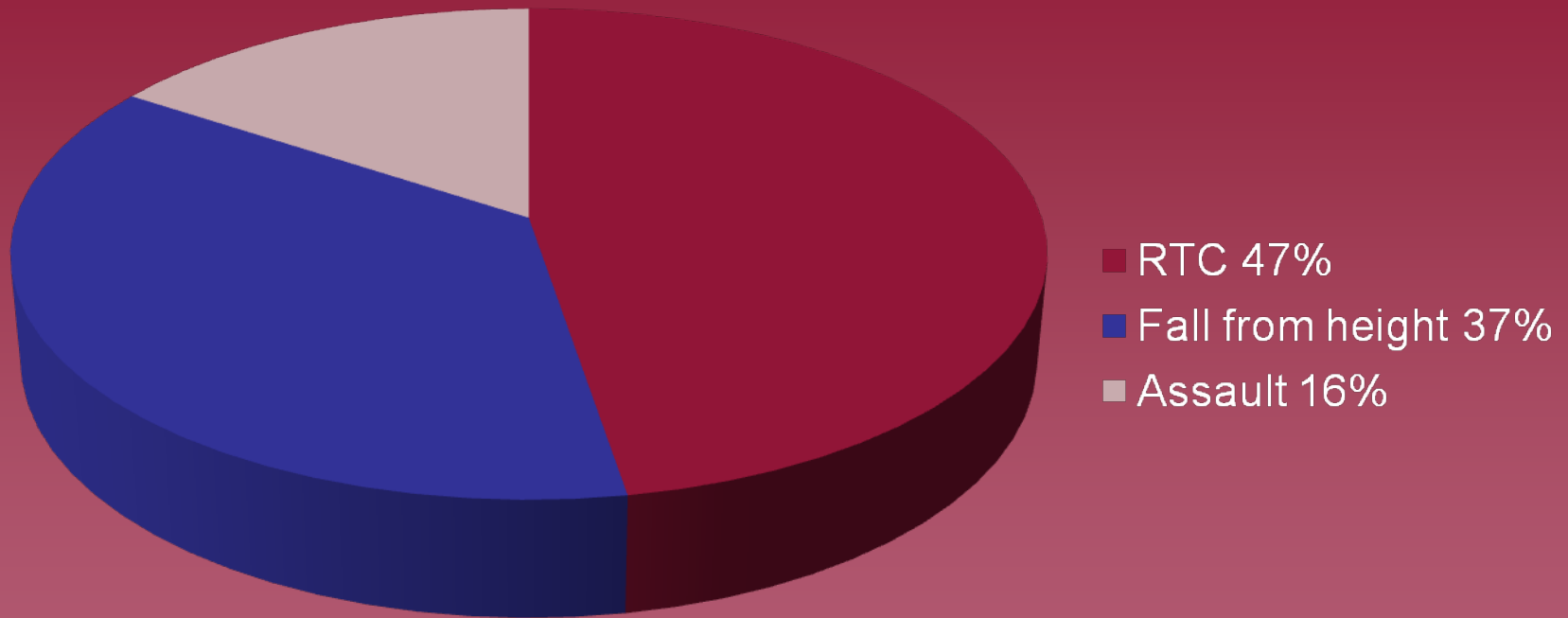


# Mechanism of Injury



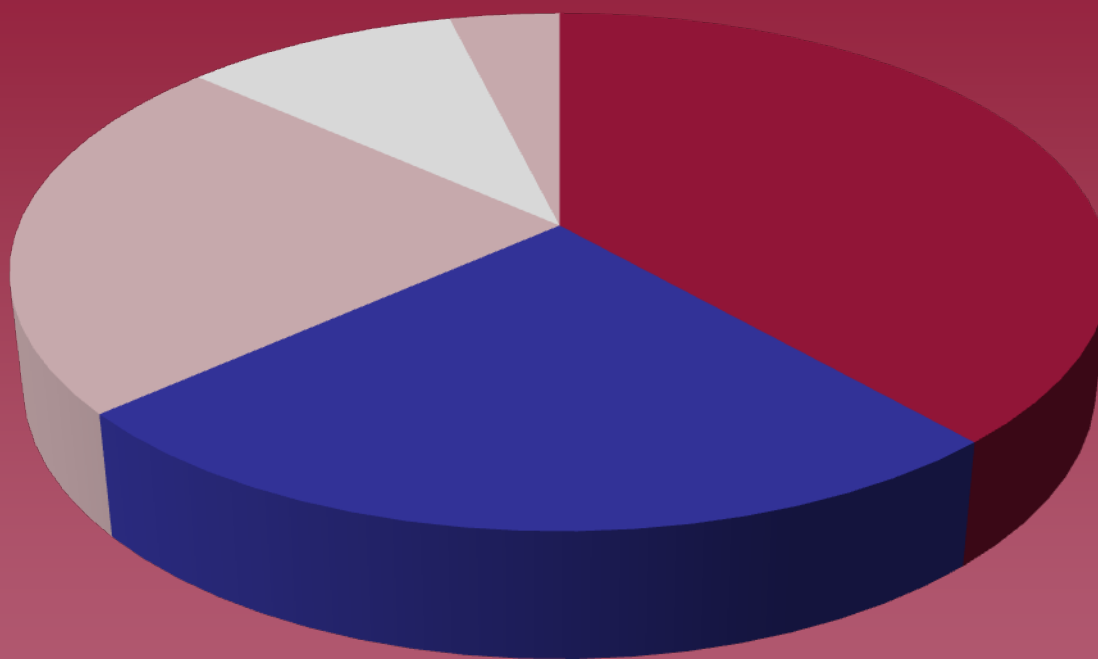
# Mechanism of Injury by Category

## Major



# Mechanism of Injury by Category

## Moderate

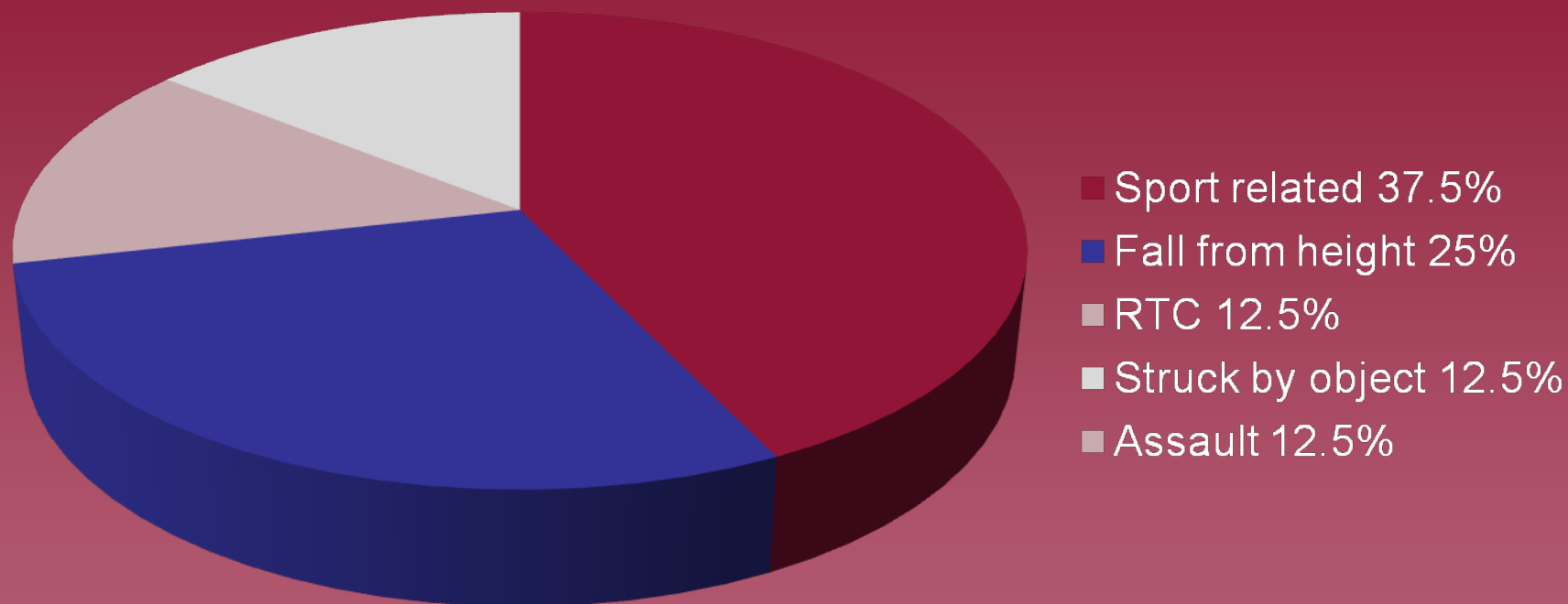


- Fall from Height 38%
- Sport related 25%
- RTC 23%
- Struck by object 10%
- Assault 4%

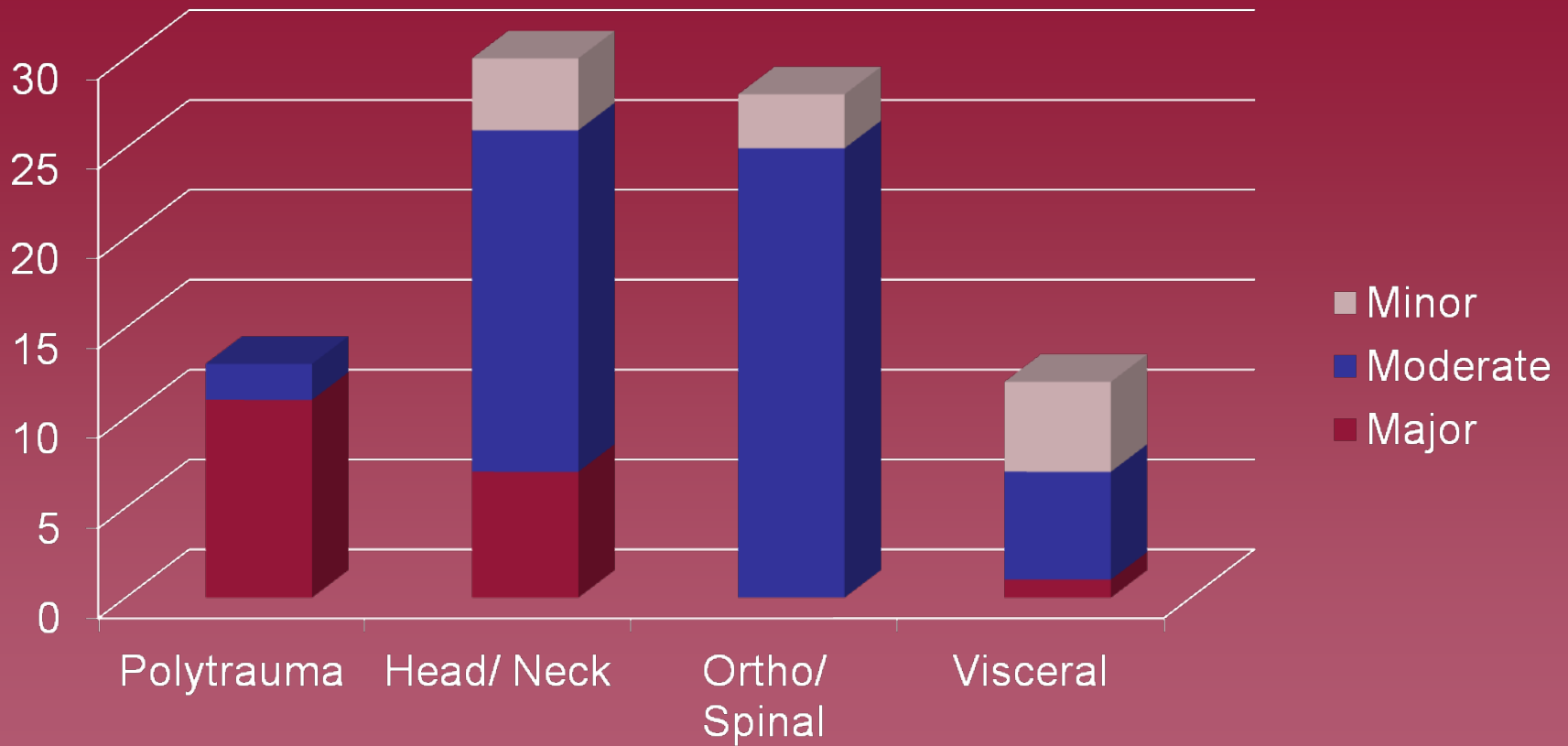


# Mechanism of Injury by Category

## Minor



# Types of injury by category



# Imaging



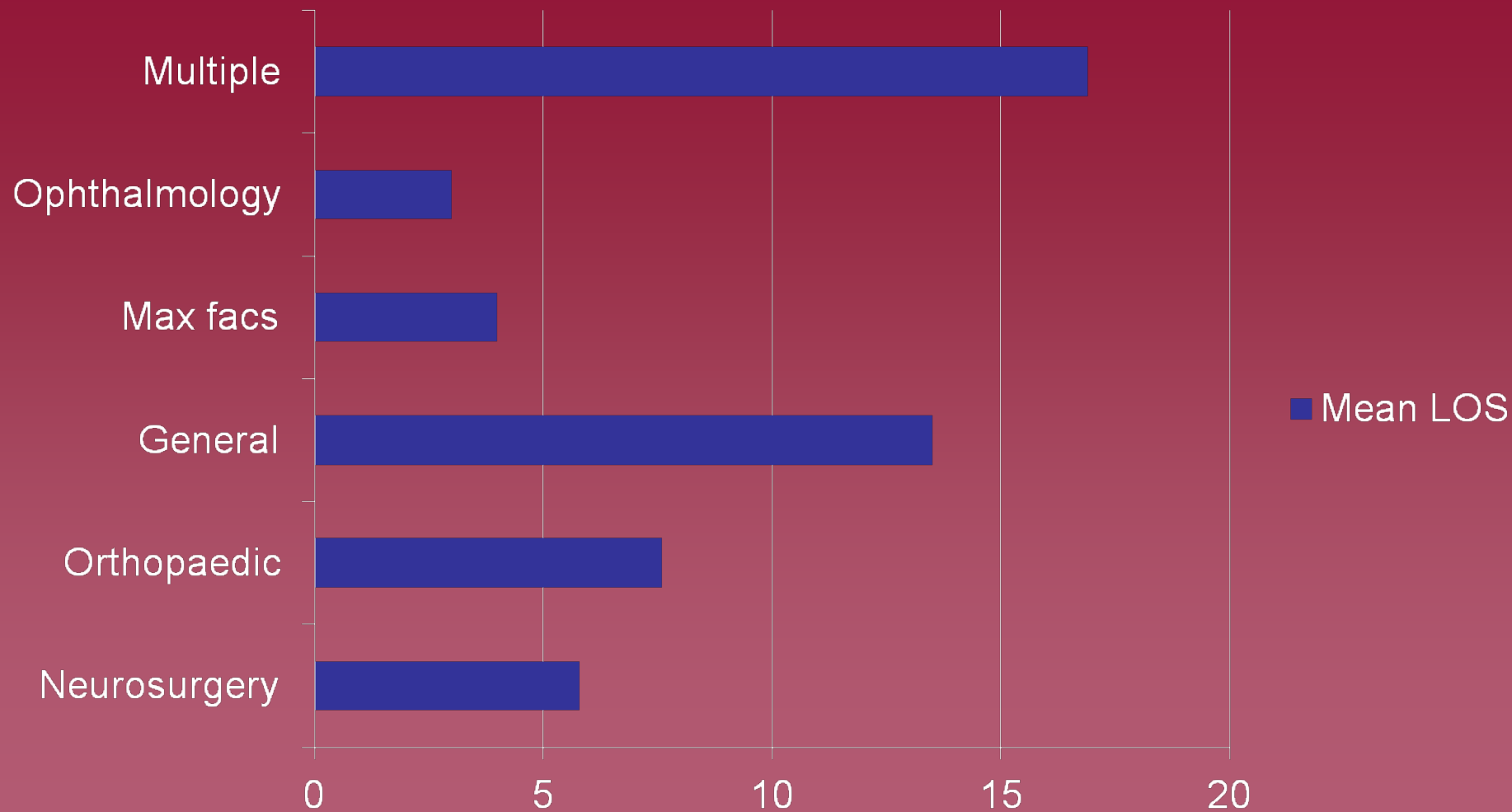
- 50 (63%) cases had a CT
  - 23 Head
  - 3 Head/ C-spine
  - 9 Abdo/ pelvis
  - 15 Multi-region
- 80% of CT scans were performed at RHC
- Mean time to CT (any scan)= 108 minutes
  - RHC = 96 minutes
  - External sites = 154 minutes
- Mean time to CT head= 107 minutes
  - RHC = 101 minutes
  - External sites = 145 minutes
- 73% of multi-region CT scans performed at RHC

# Outcomes

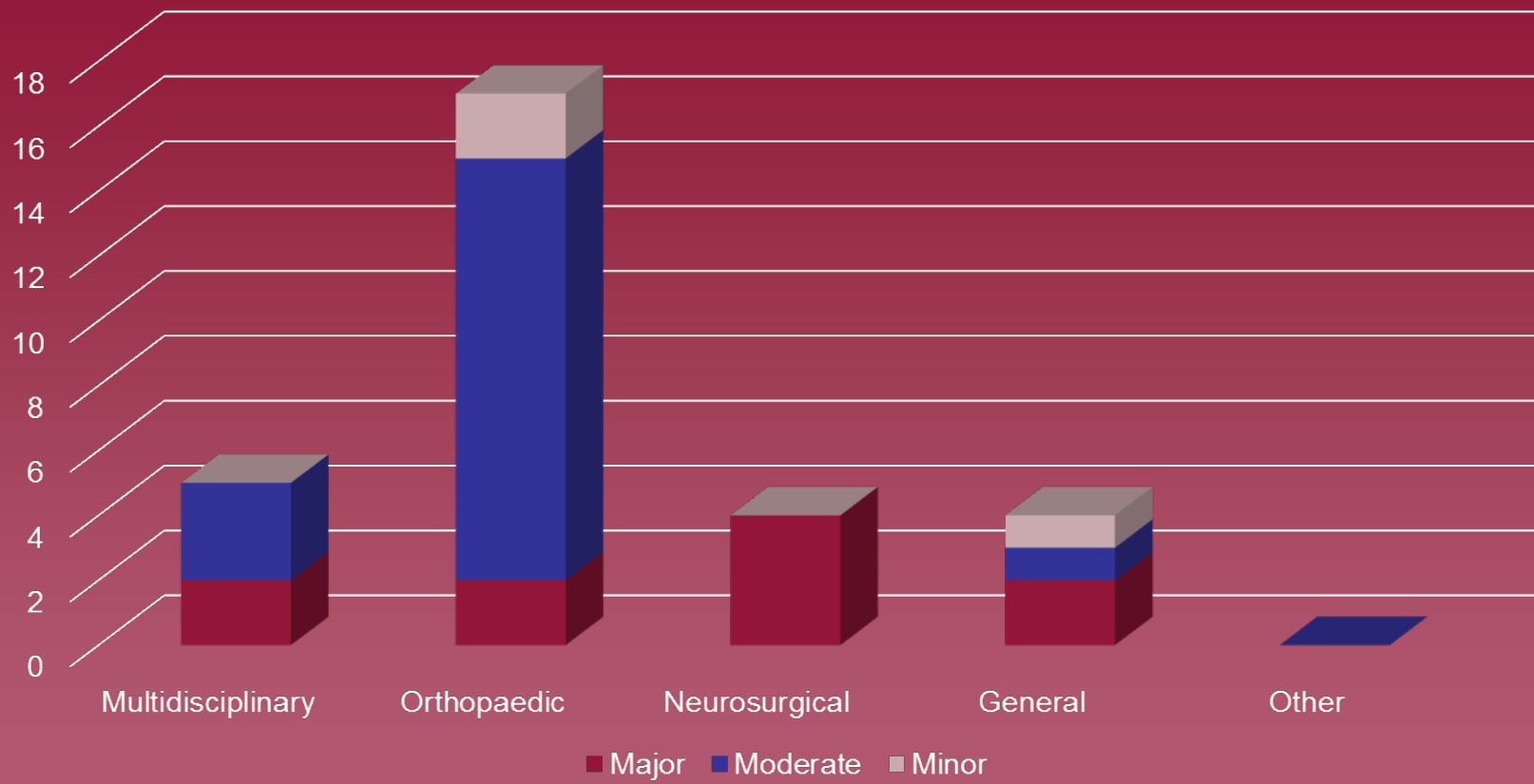


- LOS range 3 to 30+ days; mean 9.3
- Total number PICU bed days 102; range 1 to 30+ days
- All alive at 30 days
- 32 cases (40%) were taken to theatre

# Mean LOS by specialty



# Theatre cases by category



# Non accidental injuries



- 14 (18%) underwent child protection investigation as per GGC policy
- 8 no evidence of NAI
- **6 proven cases of NAI (8% NAI rate)**
  - ISS range 5 to 26; mean 13.1
  - 33% major
  - 50% moderate
  - 17% minor
  - All under 2 years of age
  - All male

# TARN NAI data

- Review of TARN database Jan 2004 to Dec 2013
- 5.2% suspected child abuse (SCA)
- 76.3% SCA occurred in under 1s
- SCA vs. accidental injury:
  - 1.7 times more likely to have ISS>15
  - Nearly 3 fold higher death rate
  - Severe brain injury most likely injury

## A profile of suspected child abuse as a subgroup of major trauma patients

Ffion C Davies,<sup>1</sup> Timothy J Coats,<sup>2</sup> Ross Fisher,<sup>3</sup> Thomas Lawrence,<sup>4</sup> Fiona E Lecky<sup>5</sup>

### ABSTRACT

**Introduction** Non-accidental injury (NAI) in children is an important cause of major injury. The Trauma Audit Research Network (TARN) recently analysed data on the demographics of paediatric trauma and highlighted NAI as a major cause of death and severe injury in children. This paper examined TARN data to characterise accidental versus abusive cases of major injury.

**Methods** The national trauma registry of England and Wales (TARN) database was interrogated for the classification of mechanism of injury in children by intent, from January 2004 to December 2013. Contributing hospitals' submissions were classified into accidental injury (AI), suspected child abuse (SCA) or alleged assault (AA) to enable demographic and injury comparisons.

**Results** In the study population of 14 845 children, 13 708 (92.3%, CI 91.9% to 92.8%) were classified as accidental injury, 368 as alleged assault (2.5%, CI 2.2% to 2.7%) and 769 as SCA (5.2%, CI 4.8% to 5.5%). Nearly all cases of severely injured children suffering trauma because of SCA occurred in the age group of 0–5 years (751 of 769, 97.7%), with 76.3% occurring in infants under the age of 1 year. Compared with accidental injury, suspected victims of abuse have higher overall injury severity scores, have a higher proportion of head injury and a threefold higher mortality rate of 7.6% (CI 5.51% to 9.68%) vs 2.6% (CI 2.3% to 2.9%).

**Conclusions** This study highlights that major injury occurring as a result of SCA has a typical demographic pattern. These children tend to be under 12 months of age, with more severe injury. Understanding these demographics could help receiving hospitals identify children with major injuries resulting from abuse and ensure swift transfer to specialist care.

### INTRODUCTION

Children account for around 10% of major trauma in developed world countries and are known to present to the major trauma system in a different way from adults.<sup>1,2</sup> The creation of Major Trauma Networks over the last 5 years has radically changed the delivery of trauma care in the UK, and preliminary data are very encouraging in showing that patient outcomes have improved.<sup>3</sup> These changes were made on evidence of improved outcome in adults, with little data available on the influence of organised trauma systems on outcomes in paediatric major trauma.

Within the UK, national trauma audit is performed by the Trauma Audit Research Network (TARN), which includes data from 96% of acute hospitals in England and Wales, and is funded by

### Key messages

#### What is already known on this subject?

- ▶ Non-accidental injury (NAI) is known to be an important cause of major trauma in small children (reference 1 in paper, Trauma Audit Research Network (TARN) 2012 report on Severe Injury in Children, reference 2 from the Victoria Trauma Registry, reference 6 from Israel).
- ▶ Patients injured as a result of NAI are likely to have severe brain injury (reference 5).
- ▶ No previous study has compared the demography, injuries and outcome of NAI versus non-NAI as a mechanism of injury in severely injured children.

#### What might this study add?

- ▶ This study compares NAI with accidental injury and assault not due to NAI, for the UK paediatric population entered into the TARN database, for the 10-year period 2004–2013.
- ▶ NAI as a mechanism of injury is associated with age under 1, higher injury severity score, severe brain injury and higher mortality rates than children accidentally injured. These findings may have implications for the design of major trauma networks.

individual hospital membership subscriptions. The TARN report 'Severe Injury in Children 2012' identified non-accidental injury (NAI) as a significant cause of injury in the under 2-year olds. This led us to examine whether abused children form a distinct subset with different characteristics compared with children who are accidentally injured.

Children severely injured as a result of abuse are under-researched, with the published literature around child abuse often focussing on minor injuries (as markers to allow early detection of NAI before major injury) rather than major injury. In contrast, media reports and national inquiries are focused on deaths, so non-fatal major injury is relatively poorly described. There has been no previous national overview of severe injuries caused by non-accidental injury. We sought to address this by characterising the demographic and injury characteristics of children who sustained abusive major trauma compared with unintentional injury.

### METHODS

The TARN database from January 2004 to December 2013 was examined. Hospitals report

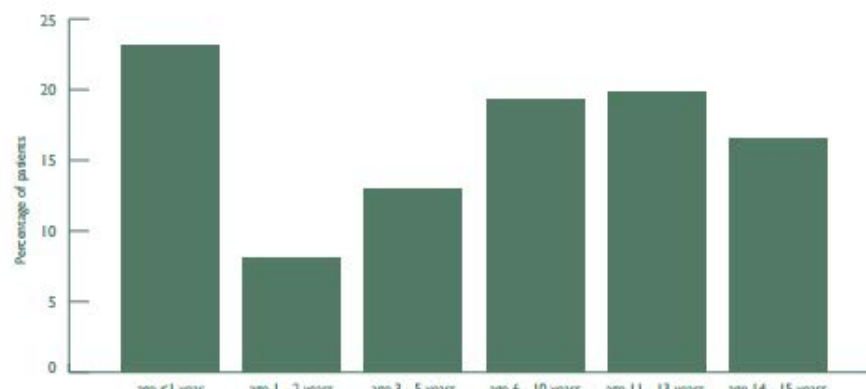


# TARN: Severe injury in children 2012

## Severe Injury in Children (ISS > 15)

### Demographics

	Number (%)
Total	737
age < 1 year	171 (23.2%)
age 1 - 2 years	60 (8.1%)
age 3 - 5 years	96 (13%)
age 6 - 10 years	142 (19.3%)
age 11 - 13 years	146 (19.8%)
age 14 - 15 years	122 (16.6%)
Median Age (IQR)	7.7 (1.3 - 12.7)
Male (percentage)	65.8
Median ISS (IQR)	22 (16 - 26)



# Moving forward with paediatric STAG



## Locally

- Ongoing work looking at excluded cases from the first year
  - Particular focus on the under 1s
- Trauma documentation
- Protocols to improve time to CT

## Nationally

- Aim for national roll out of paediatric data collection as soon as feasible

# Questions?

