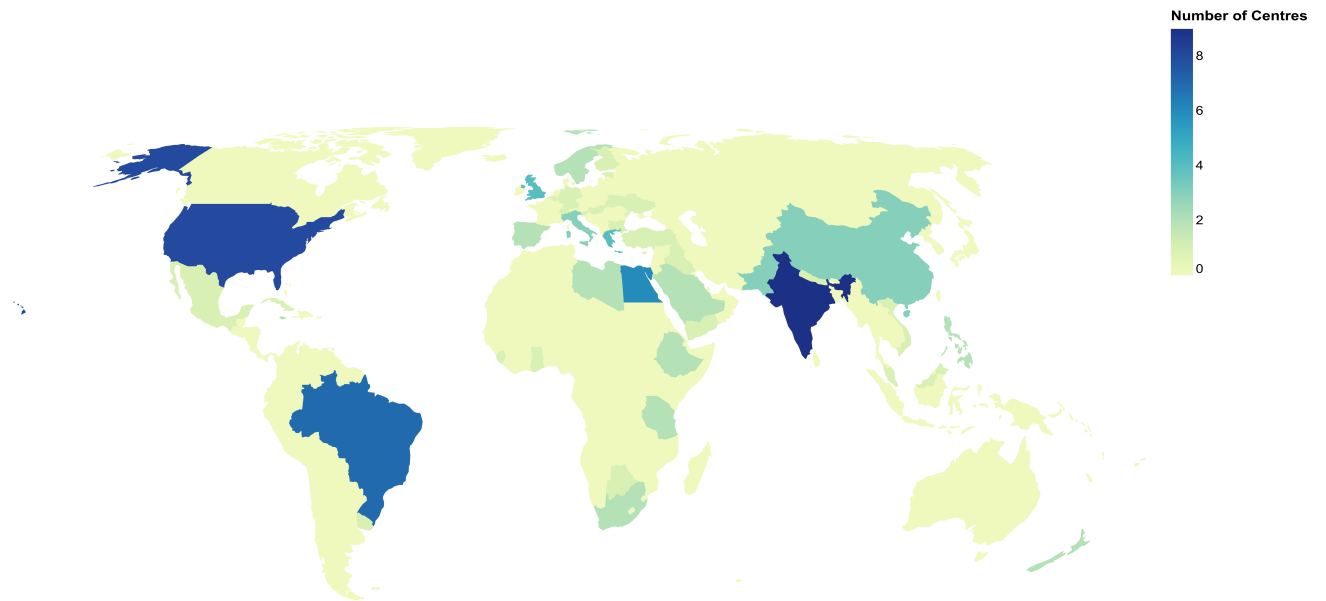


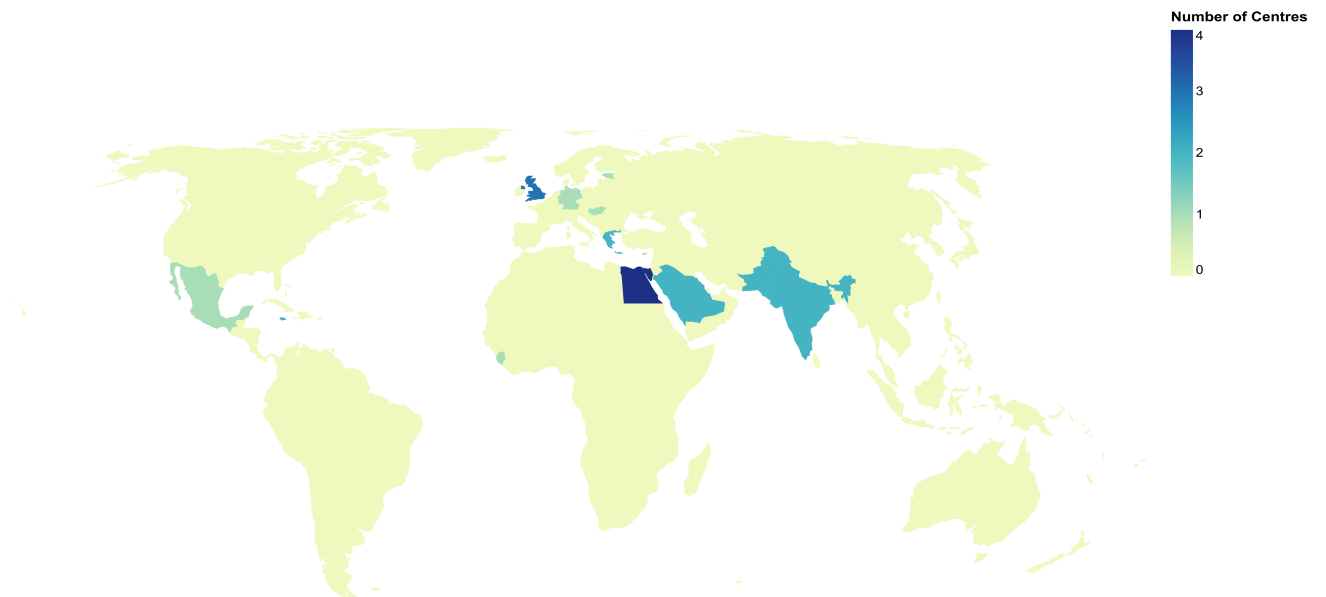


# Global Epidemiology and Outcomes Traumatic Brain Injury registry (GEO-TBI)

Registered Centres



Active Centres





# GEO-TBI

## Foreword

## Introduction

Dear GEO-TBI collaborator,

The GEO-TBI registry has been active internationally since the beginning of 2023. To date, we have registered almost 1800 patients! We are delighted to share the summary of data from 2024 to all the participant institutions.

Centre-level results and calculations are reported alongside a registry-level international benchmark. We believe the data offers interesting insight to the patterns of traumatic brain injury (TBI) mechanisms, management and outcomes, allowing for international comparison. We hope you find the data useful in your clinical practice!

Concluding preparations of the GEO-TBI: Incidence study are in full speed.

## Distribution of this report

The registry-wide summary is distributed to all participating institutions. Centre-level data is only included in the report sent to the respective institution – other centres do not have access to this centre-specific data.

## Rationale behind the metrics

This report includes core metrics of TBI case numbers, management and short-term outcomes. Data integrity and compliance is reported first to contextualise centre-specific case volumes and identify gaps in the data. The clinical data is reported on the centre, country and registry levels.

Different injury mechanisms result in different radiological injury characteristics – these central variables are described with heat-mapped table charts, as are the relationship of injury mechanism and Glasgow Coma Scale (GCS). The distribution of different radiological head injury types is detailed, and the frequency of intracranial pressure (ICP) monitoring is compared against primary injury type. Rates of pre- and in-hospital intubation, time to extubation (TTE) and requirement of surgery are reported, stratified by injury type.

Short-term outcomes are summarised using GCS scores at admission and discharge. In-hospital mortality is reported for each primary head injury type alongside in-hospital intracranial infection rates and length of hospital stay (LOS). To account for loss-to-follow-up, the Glasgow Outcome at Discharge Scale (GODS) was collected for each patient. Its relation to injury type is reported. Finally, where available, longer-term follow-up data is summarised using the extended Glasgow Outcome Scale (GOSE).

# General Information

Primary Intracranial Injury types have been grouped as follows:

Injury Group	Primary intracranial injury
Acute subdural haematoma	Acute subdural haematoma
Chronic subdural haematoma	Chronic subdural haematoma
Extradural haematoma	Extradural haematoma
Parenchymal injury	<ul style="list-style-type: none"> <li>Diffuse brain injury</li> <li>Focal brain injury / contusion</li> </ul>
Skull fractures	<ul style="list-style-type: none"> <li>Fracture of skull vault</li> <li>Base of skull fracture</li> <li>Compound fracture of skull</li> </ul>
Traumatic subarachnoid haemorrhage	Traumatic subarachnoid haemorrhage
Miscellaneous	<ul style="list-style-type: none"> <li>Scalp injury</li> <li>Concussion</li> <li>Injury to cranial nerve</li> <li>Unspecified injury to head</li> <li>Intraventricular haemorrhage</li> </ul>

HDI groupings:

HDI group	HDI
Very High	$\geq 0.800$
High	0.700 – 0.799
Medium	0.550 – 0.699
Low	$< 0.550$

Human Development Index data from the 2022 Human Development Report.

The HDI data provided within unit reports pertains to the HDI group of the country in which that centre resides.

Mechanisms of injury have been grouped as follows:

Mechanism Group	Mechanism of Injury
Fall	<ul style="list-style-type: none"> <li>Fall: level</li> <li>Fall: <math>&lt; 2m</math></li> <li>Fall: <math>&gt; 2m</math></li> </ul>
NOS	<ul style="list-style-type: none"> <li>NOS: occupational</li> <li>NOS: recreational</li> <li>NOS: other</li> <li>NOS: unknown</li> <li>Blast</li> </ul>
Vehicle	<ul style="list-style-type: none"> <li>Vehicle collision: car</li> <li>Vehicle collision: motorcycle</li> <li>Vehicle collision: bicycle</li> <li>Vehicle collision: pedestrian</li> <li>Vehicle collision: other</li> </ul>
Assault	<ul style="list-style-type: none"> <li>Assault: blunt</li> <li>Assault: blade</li> </ul>

Surgical management has been grouped as follows:

Surgery Group	Surgical management
Craniectomy	Craniectomy
Major surgery	<ul style="list-style-type: none"> <li>Fracture elevation</li> <li>Craniotomy</li> <li>Posterior fossa decompression</li> </ul>
Minor surgery	<ul style="list-style-type: none"> <li>ICP monitoring</li> <li>Washout/debridement</li> <li>EVD</li> <li>Burrhole(s)</li> </ul>
Other	Other surgical procedure
No surgery	Non-operative management only

GCS scores have been grouped as follows:

GCS group	GCS
Mild	13 - 15
Moderate	9 - 12
Severe	3 - 8
Dead	In-hospital mortality

GODS scores have been grouped as follows:

GODS group	GODS
Unfavourable	<ul style="list-style-type: none"> <li>1 Dead</li> <li>2 Not conscious</li> <li>3 Lower severe disability</li> <li>4 Upper severe disability</li> </ul>
Favourable	<ul style="list-style-type: none"> <li>5 Lower moderate disability</li> <li>6 Upper moderate disability</li> <li>7 Lower good recovery</li> <li>8 Upper good recovery</li> </ul>

GOSE scores have been grouped as follows:

GOSE group	GOSE
Dead	1 Death
Unfavourable	<ul style="list-style-type: none"> <li>2 Vegetative state</li> <li>3 Lower severe disability</li> <li>4 Upper severe disability</li> </ul>
Favourable	<ul style="list-style-type: none"> <li>5 Lower moderate disability</li> <li>6 Upper moderate disability</li> <li>7 Lower good recovery</li> <li>8 Upper good recovery</li> </ul>
Lost to follow-up	Not assessed (recorded)

Abbreviations:

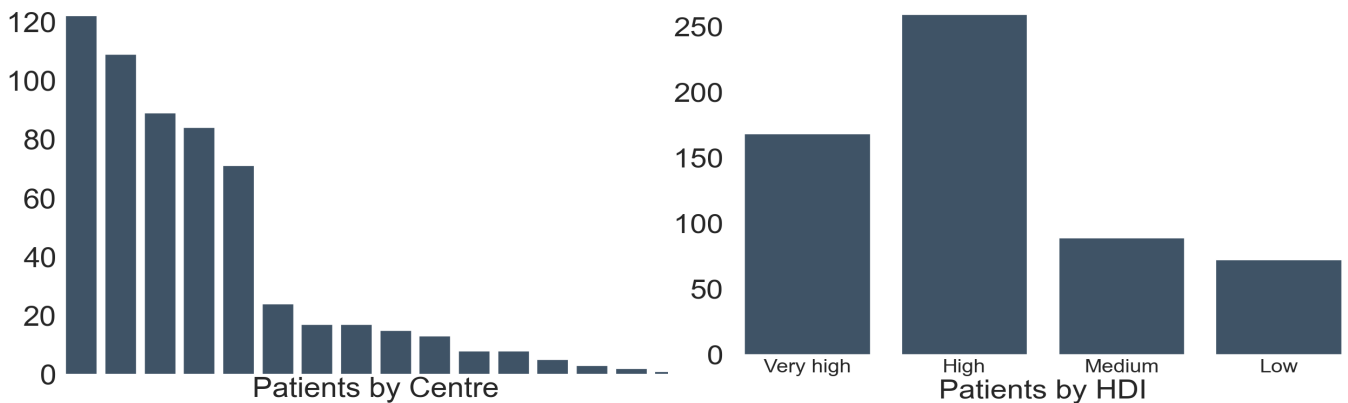
Abbreviation	Meaning
EVD	External Ventricular Drain
ICP	Intracranial Pressure
IQR	Interquartile Range
GCS	Glasgow Coma Scale
GODS	Glasgow Outcome at Discharge Scale
GOSE	Glasgow Outcome Scale-Extended
LOS	Length of Stay
NOS	Not Otherwise Specified
TTE	Time To Extubation



# GEO-TBI 2024

## Aggregate Report

**International: 588 patients**

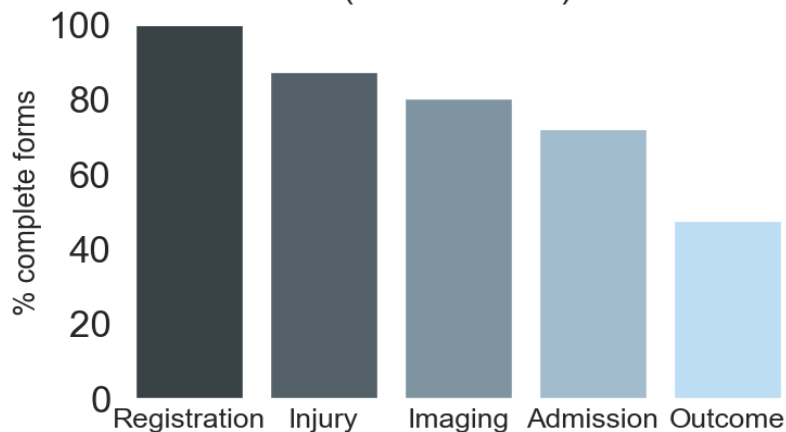


## Data Integrity

This section applies to all registry submissions

Compliance Metric	n	International
Total registered patients	n	1609
Patient records with incomplete injury form	n[%]	202 [12.6%]
Patient records with incomplete imaging form	n[%]	318 [19.8%]
Patient records with incomplete admission form	n[%]	448 [27.8%]
Patient records with incomplete outcome form	n[%]	845 [52.5%]

### Data Compliance (International)



\* Patients with an incomplete injury form are excluded from further analysis

# Epidemiology

## Injury types

### Injury \*

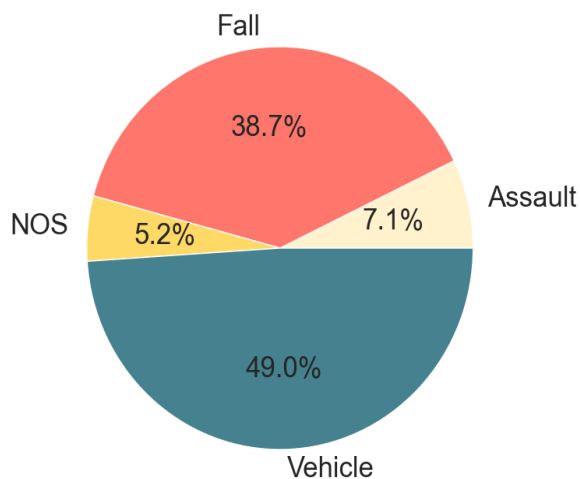
Acute subdural haematoma	n[%]
Chronic subdural haematoma	n[%]
Extradural haematoma	n[%]
Parenchymal injury	n[%]
Skull fractures	n[%]
Traumatic subarachnoid haemorrhage	n[%]
Miscellaneous	n[%]

### International

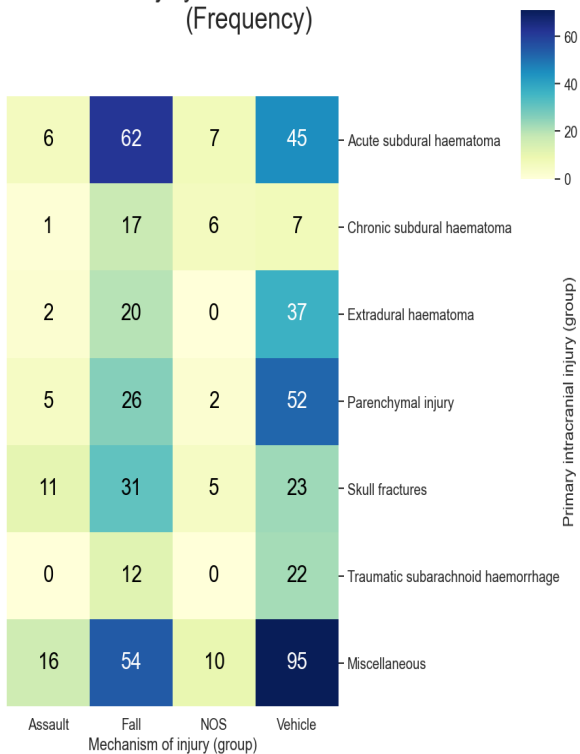
121 [20.6%]
31 [5.3%]
59 [10.0%]
86 [14.6%]
72 [12.2%]
36 [6.1%]
178 [30.3%]

\* Primary head injury type

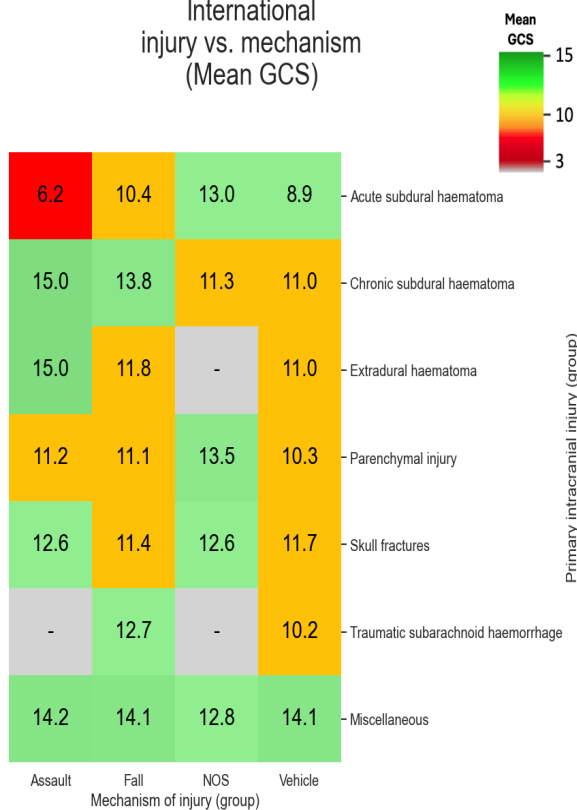
## Mechanisms of injury (International)



## International injury vs. mechanism (Frequency)



## International injury vs. mechanism (Mean GCS)



# Management

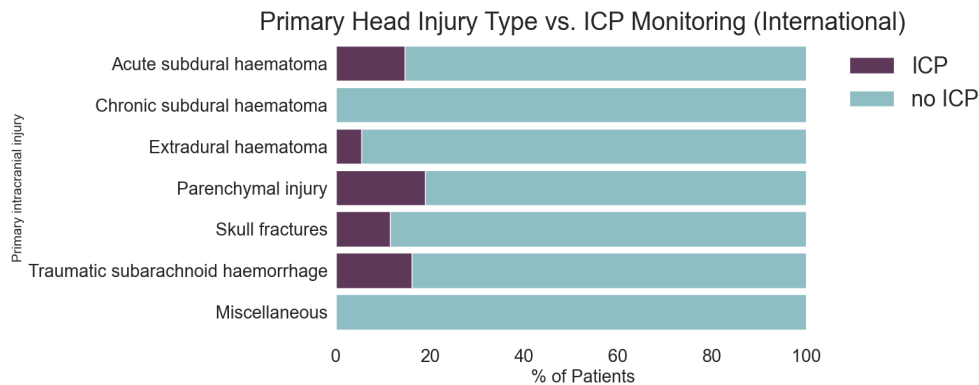
## Imaging performed

Injury *		International
Acute subdural haematoma	n[%]	101.0 [83.5%]
Chronic subdural haematoma	n[%]	29.0 [93.5%]
Extradural haematoma	n[%]	45.0 [76.3%]
Parenchymal injury	n[%]	76.0 [88.4%]
Skull fractures	n[%]	65.0 [90.3%]
Traumatic subarachnoid haemorrhage	n[%]	32.0 [88.9%]
Miscellaneous	n[%]	115.0 [64.6%]

## ICP Monitoring

Injury *		International
Acute subdural haematoma	n[%]	13.0 [14.6%]
Chronic subdural haematoma	n[%]	0.0 [0.0%]
Extradural haematoma	n[%]	2.0 [5.4%]
Parenchymal injury	n[%]	11.0 [19.0%]
Skull fractures	n[%]	6.0 [11.5%]
Traumatic subarachnoid haemorrhage	n[%]	5.0 [16.1%]
Miscellaneous	n[%]	0.0 [0.0%]

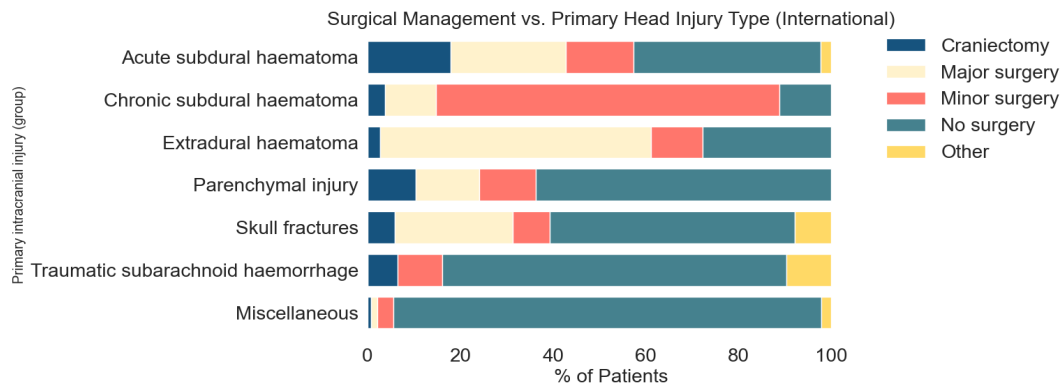
\* Primary head injury type



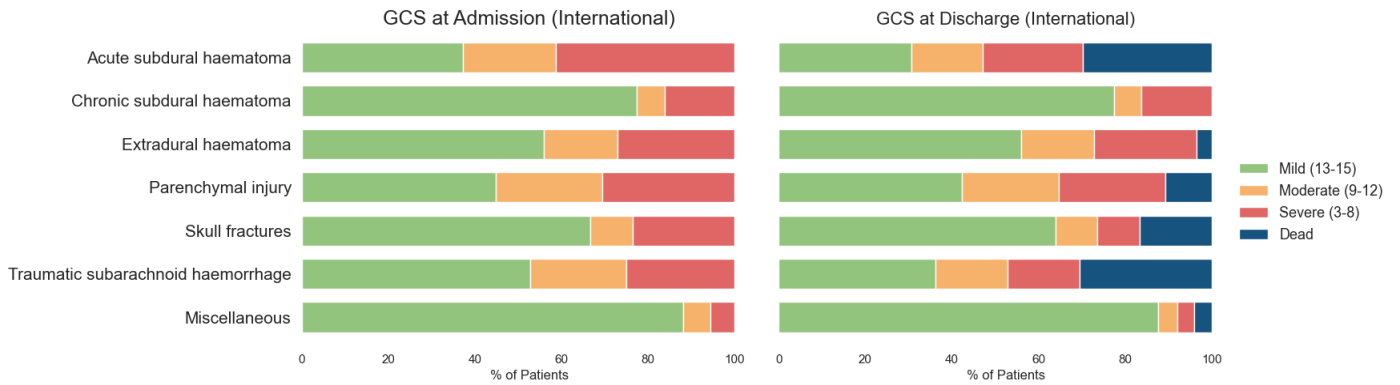
## Intubation

Injury *			International
Acute subdural haematoma	Pre-hospital	n[%]	31.0 [25.6%]
	In-hospital	n[%]	55.0 [45.5%]
	Median TTE q50[IQR] (days)		4.0 [5.0]
Chronic subdural haematoma	Pre-hospital	n[%]	2.0 [6.5%]
	In-hospital	n[%]	2.0 [6.5%]
	Median TTE q50[IQR] (days)		8.0 [7.0]
Extradural haematoma	Pre-hospital	n[%]	4.0 [6.8%]
	In-hospital	n[%]	13.0 [22.0%]
	Median TTE q50[IQR] (days)		4.0 [9.0]
Parenchymal injury	Pre-hospital	n[%]	16.0 [18.6%]
	In-hospital	n[%]	22.0 [25.6%]
	Median TTE q50[IQR] (days)		5.5 [6.25]
Skull fractures	Pre-hospital	n[%]	13.0 [18.1%]
	In-hospital	n[%]	22.0 [30.6%]
	Median TTE q50[IQR] (days)		5.0 [7.75]
Traumatic subarachnoid haemorrhage	Pre-hospital	n[%]	8.0 [22.2%]
	In-hospital	n[%]	18.0 [50.0%]
	Median TTE q50[IQR] (days)		3.0 [4.75]
Miscellaneous	Pre-hospital	n[%]	4.0 [2.2%]
	In-hospital	n[%]	8.0 [4.5%]
	Median TTE q50[IQR] (days)		2.0 [4.75]

\* Primary head injury type

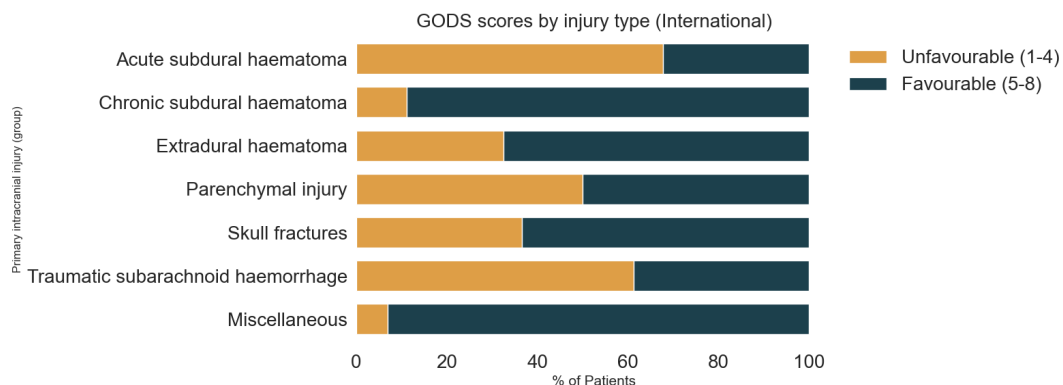


## Short Term Outcomes



\*Excluding patients that are missing a GCS score at discharge due to incomplete patient records

Injury *	Complications		International
Acute subdural haematoma	Intracranial infection during admission	n[%]	3.0 [2.5%]
	In-hospital mortality	n[%]	36.0 [29.8%]
	Median LoS	q50[IQR] (days)	8.0 [15.0]
Chronic subdural haematoma	Intracranial infection during admission	n[%]	0.0 [0.0%]
	In-hospital mortality	n[%]	0.0 [0.0%]
	Median LoS	q50[IQR] (days)	4.0 [9.0]
Extradural haematoma	Intracranial infection during admission	n[%]	1.0 [1.7%]
	In-hospital mortality	n[%]	2.0 [3.4%]
	Median LoS	q50[IQR] (days)	5.0 [11.0]
Parenchymal injury	Intracranial infection during admission	n[%]	1.0 [1.2%]
	In-hospital mortality	n[%]	9.0 [10.5%]
	Median LoS	q50[IQR] (days)	5.0 [12.0]
Skull fractures	Intracranial infection during admission	n[%]	0.0 [0.0%]
	In-hospital mortality	n[%]	12.0 [16.7%]
	Median LoS	q50[IQR] (days)	4.0 [6.0]
Traumatic subarachnoid haemorrhage	Intracranial infection during admission	n[%]	0.0 [0.0%]
	In-hospital mortality	n[%]	11.0 [30.6%]
	Median LoS	q50[IQR] (days)	7.0 [10.0]
Miscellaneous	Intracranial infection during admission	n[%]	1.0 [0.6%]
	In-hospital mortality	n[%]	7.0 [3.9%]
	Median LoS	q50[IQR] (days)	2.0 [3.0]

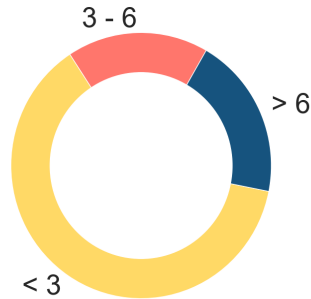


# Follow-up

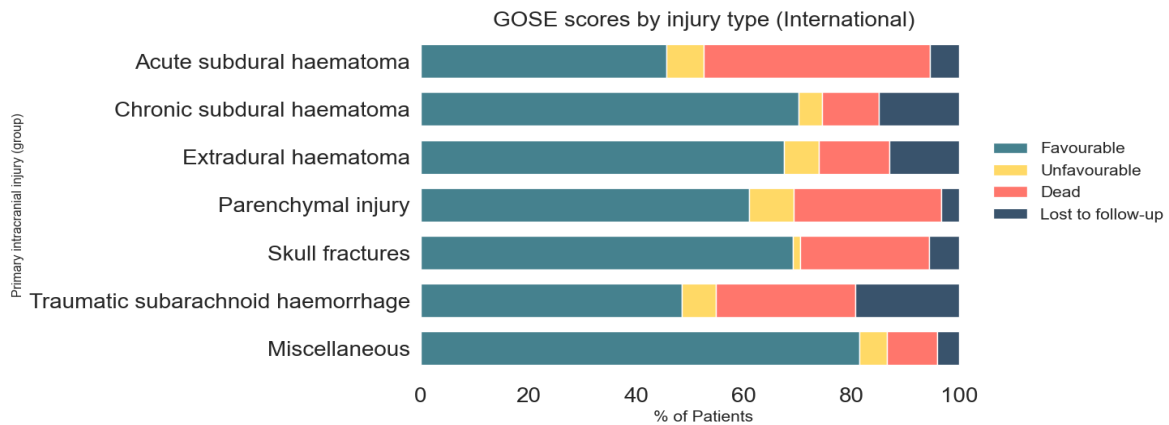
This section applies to all registry submissions

**Number of patients with at least one follow-up 764 [47.5%]**

Follow-up Intervals (months)  
(International)



Injury *	Time to follow-up	International
Acute subdural haematoma	q50[IQR] (days)	91.0 [174.0]
Chronic subdural haematoma	q50[IQR] (days)	38.0 [95.0]
Extradural haematoma	q50[IQR] (days)	34.5 [153.75]
Parenchymal injury	q50[IQR] (days)	14.0 [137.0]
Skull fractures	q50[IQR] (days)	30.5 [100.25]
Traumatic subarachnoid haemorrhage	q50[IQR] (days)	117.0 [158.0]
Miscellaneous	q50[IQR] (days)	12.0 [7.5]



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