The demographics of traumatic brain injury and in-patient costs in high dependency neurosurgical unit: a Cross-sectional study in a tertiary academic hospital

Researcher:
Dereje Gebrehiwot Mamo
MMed Neurosurgery

Objectives

- Socio-demographic characteristics of admitted TBI patients.
- Causes and types of inpatient TBI cases .
- Individual and total stay hours of TBI patients regarding ICU and high care stay and evaluate bed occupancy ratio.
- Estimated costs related to TBI patient hospital stay.
- To compare costs with differing levels of severity of TBI.

METHODOLOGY

- **Study design**

A descriptive retrospective cross-sectional study on patients admitted between January and December 2015.

- **Site of study**

Charlotte Maxeke Johannesburg Academic Hospital

CMJAH neurosurgery unit 22 beds out of 800 total hospital beds

8 neurosurgical ICU beds and 16 H/C beds

Receives referral Gauteng, Northwest Province and part of Mpumalanga as provincial neurosurgical units.

METHODOLOGY

Data collection

- Data were collected retrospectively from patient admission files and the finance office on total expenditures related to each patient.

Cost during a stay in neurosurgery:

- Direct medical ICU and high care costs of TBI (such as a bed, medication, laboratory tests and diagnostic imaging, etc.) were calculated.

- Total cost per patient = ∑ (ICU cost +High care cost+ theatre cost).

METHODOLOGY

In government health sector patients are classified into three main groups for service fee determination:

- A. full paying patients
- B. subsidised patients
- C. Free services.

METHODOLOGY

ICU bed occupancy rate was calculated as follows:

- Total ICU occupancy hours in 1year = 8 beds x 24hrs X 365d = 70080 potential ICU hrs. Per year.

- TBI ICU occupancy rate = $\frac{\text{Total hr. TBI patient spent in ICU}}{\text{70080 ICU hrs.}} \times 100\%$

High care bed occupancy rate was calculated as follows:

- Total high care beds in one year = 16 beds x 365days = 5840 high care days

- Total TBI occupancy rate = $\frac{\text{Total days occupied by TBI patients}}{\text{5880 high care}} \times 100\%$

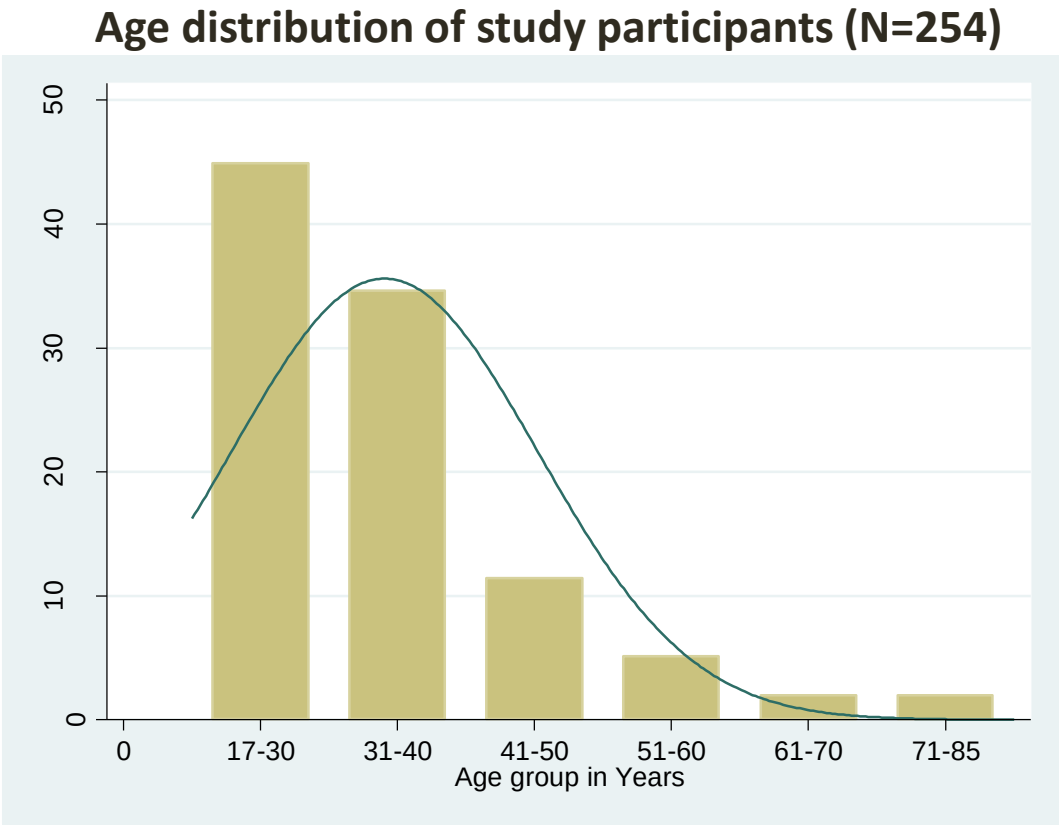
Data analysis

- The distributions of quantitative variables were evaluated by looking at graphical distributions and statistics, such as percentiles, medians or means as appropriate.

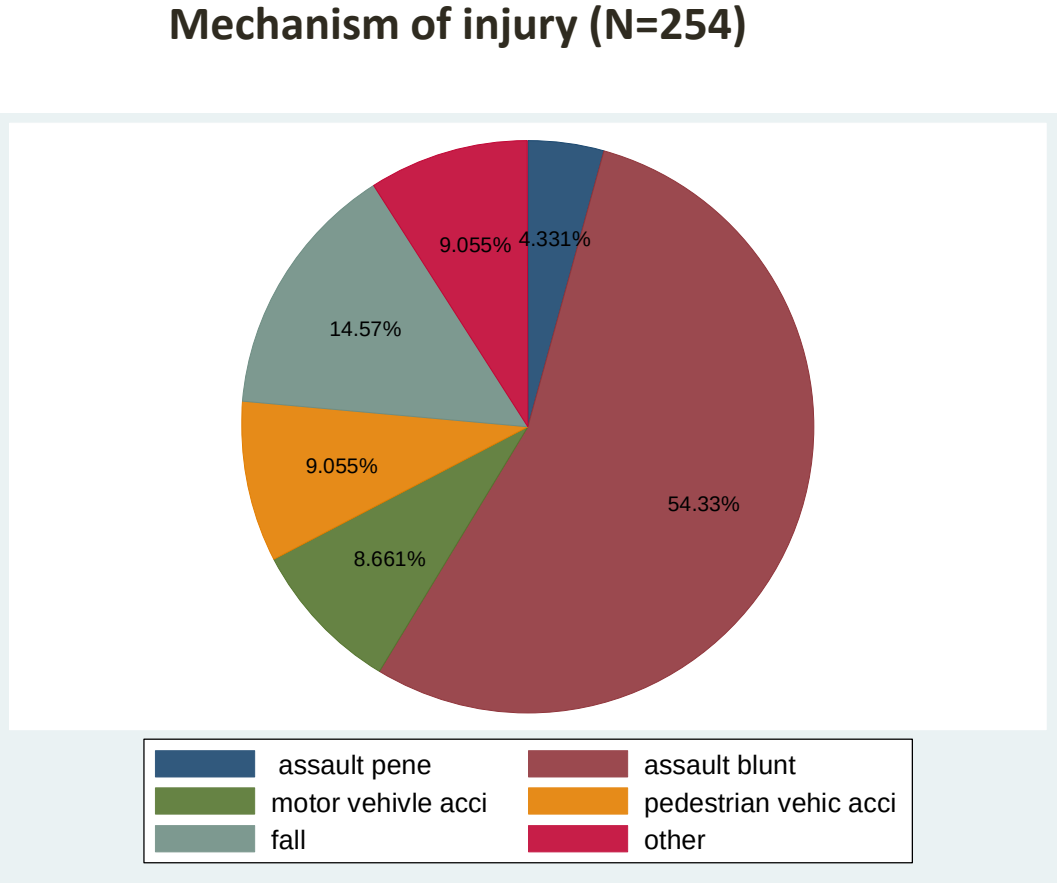
- Crude associations were assessed using chi-squared tests for categorical variables and t-tests for continuous ones.

- A two-sided p-value of 0.05 was used to determine statistical significance. Data entry and analysis was performed using STATA 12.

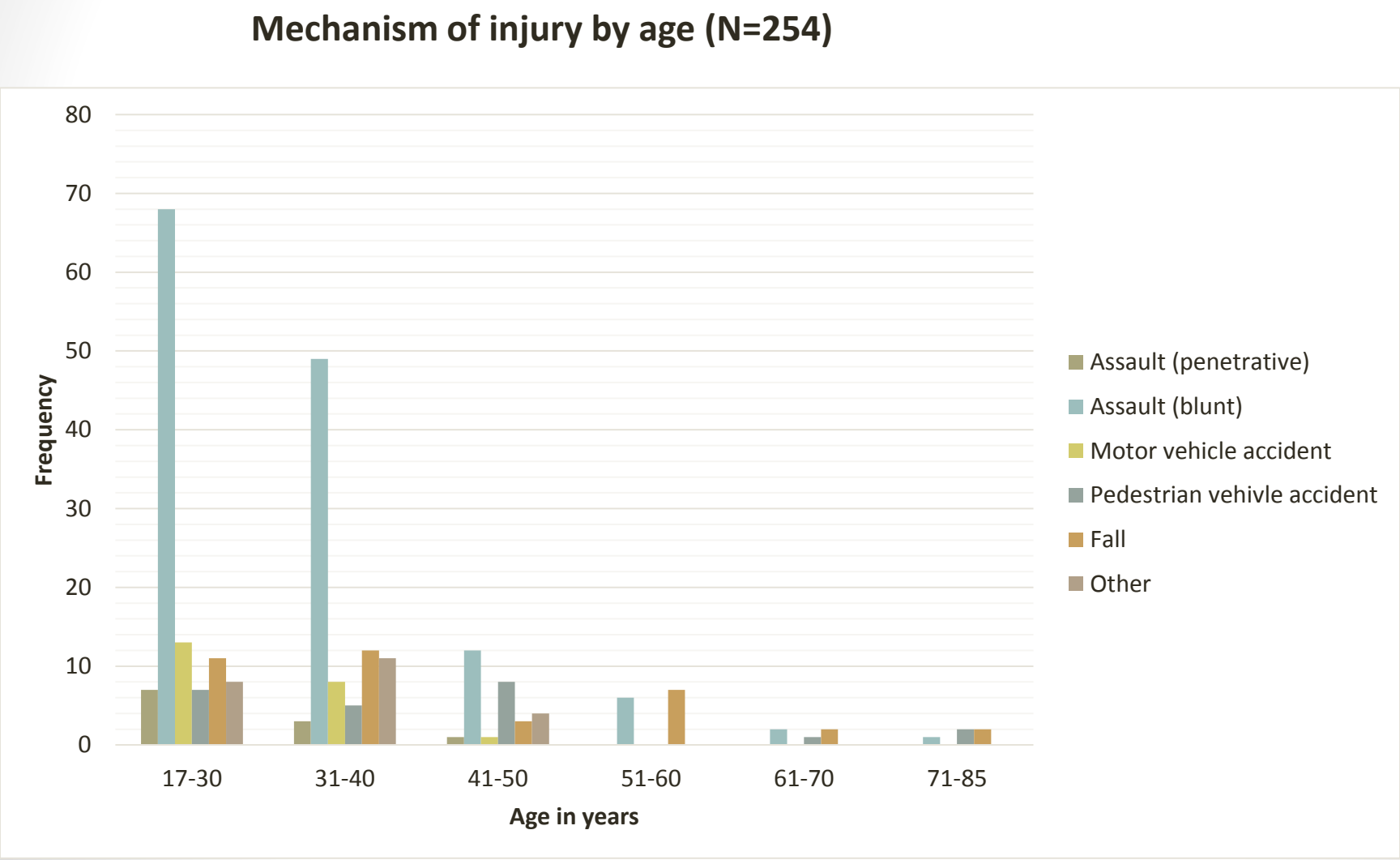
Characteristics of the study group



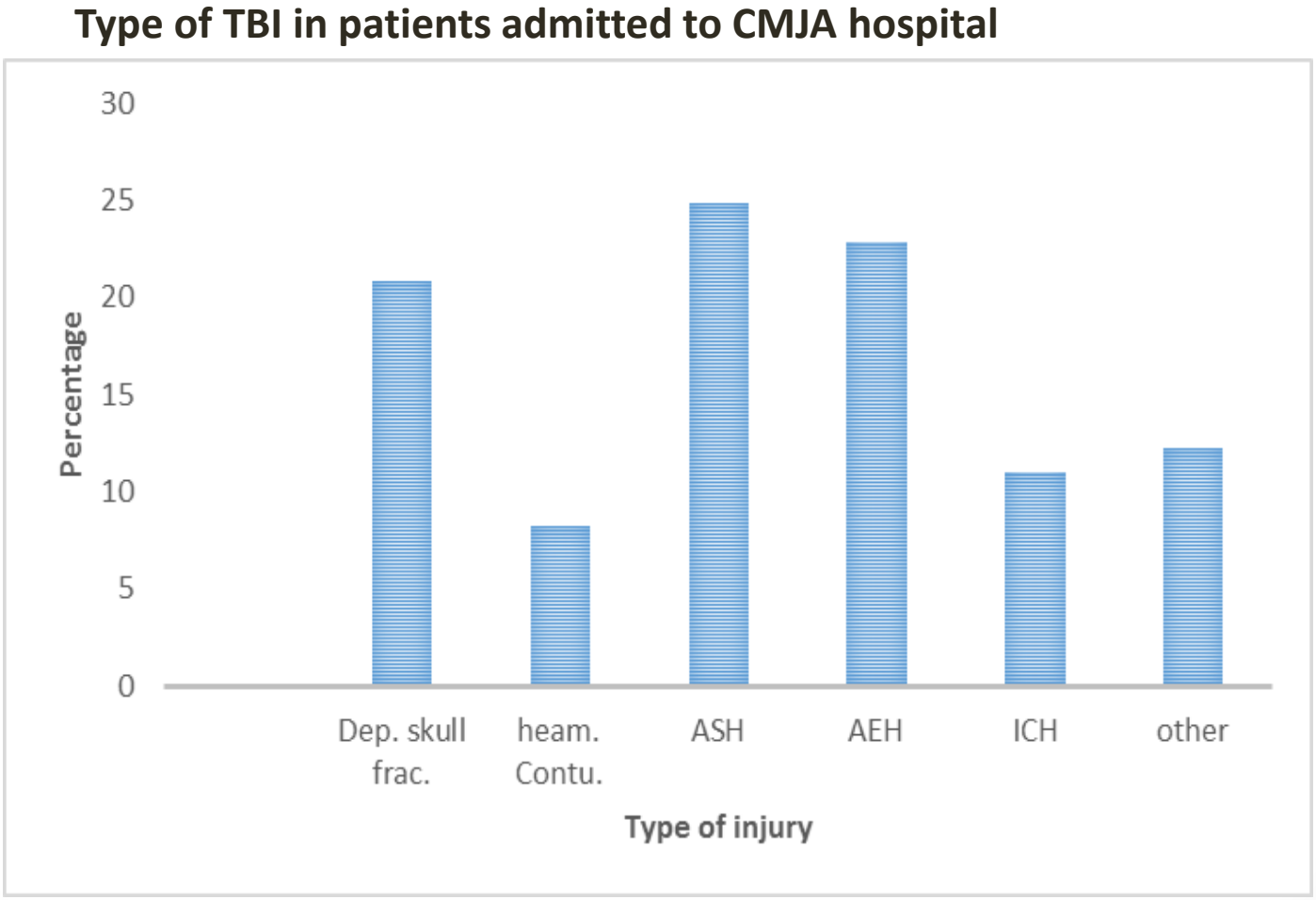
Mechanism of injury



Mechanism of injury by age

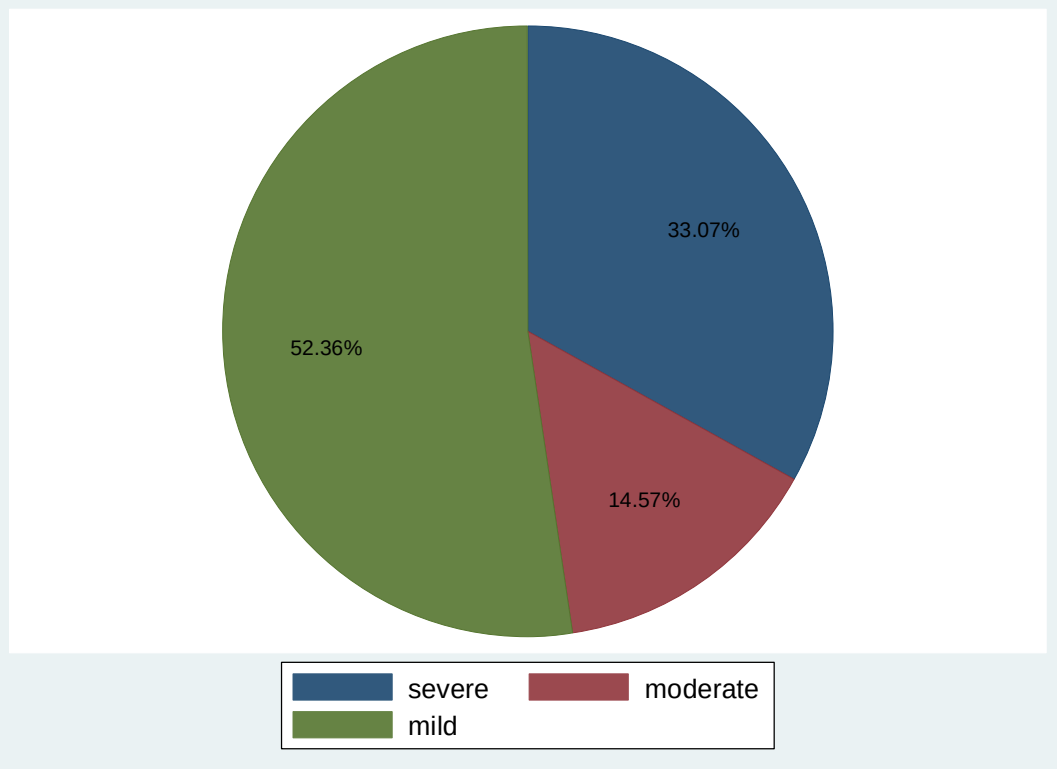


Type of TBI injury



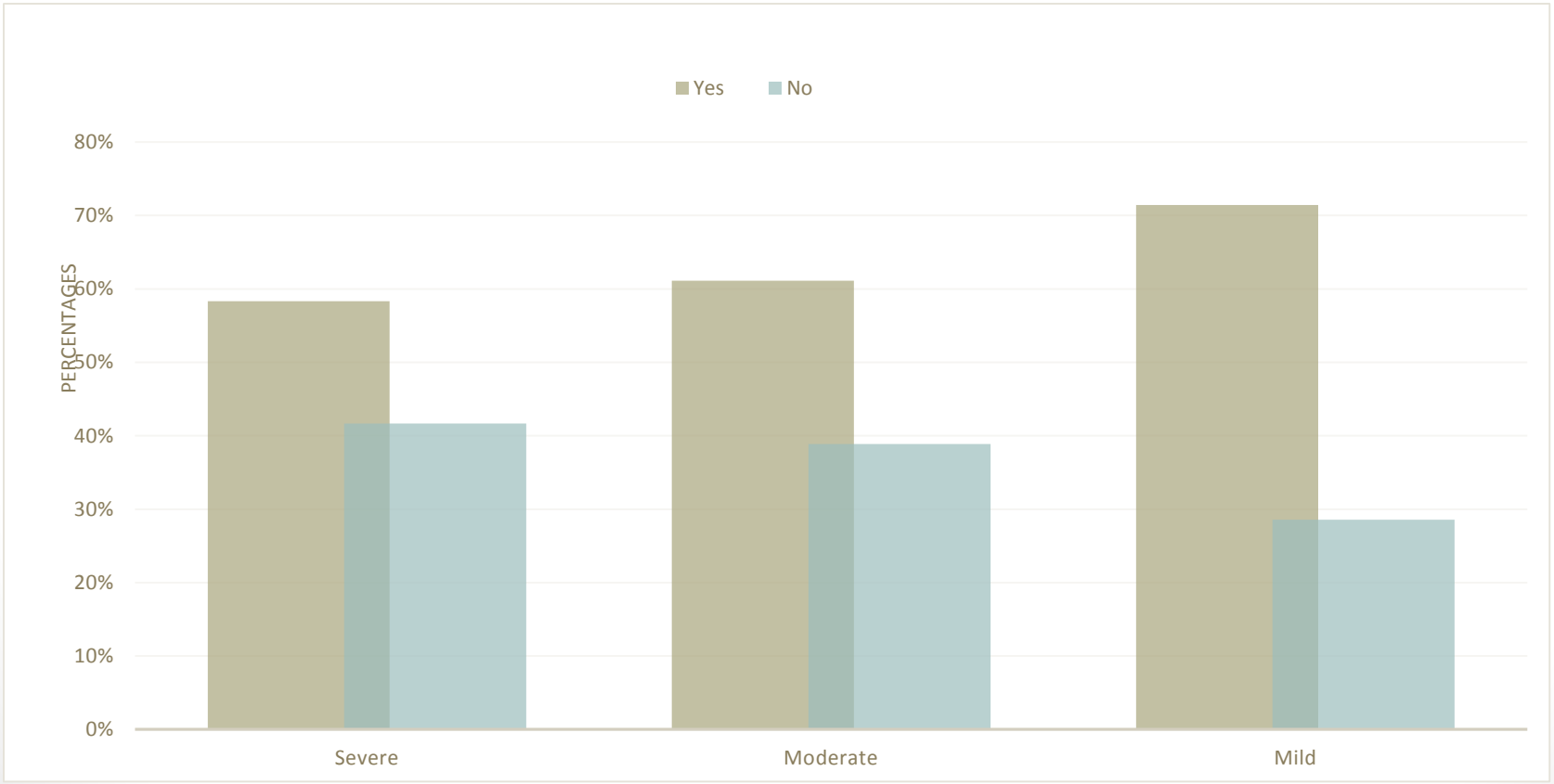
Severity of injury

Severity of injury of TBI patients admitted to CMJA hospital



Severity of the injury and neurosurgical intervention

The number of cases requiring neurosurgical intervention by the severity of the injury

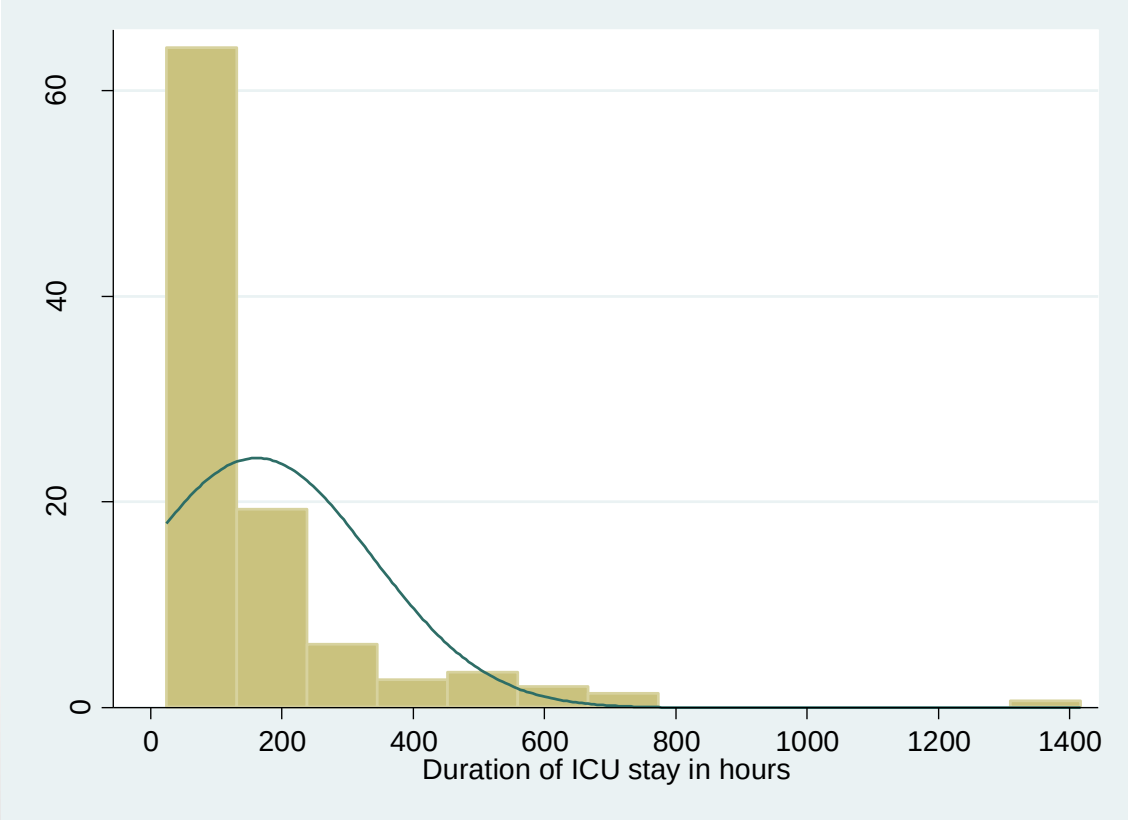


Hospital stay-ICU

145 TBI cases were admitted in the neurosurgical ICU

TBI cases occupied a total of 23,429 ICU hours for the year studies out of a possible 70,080 neurosurgical ICU hours of the year with a bed occupancy rate of 33.4%.

Distribution of ICU length of stay for TBI patient at CMJA Hospital

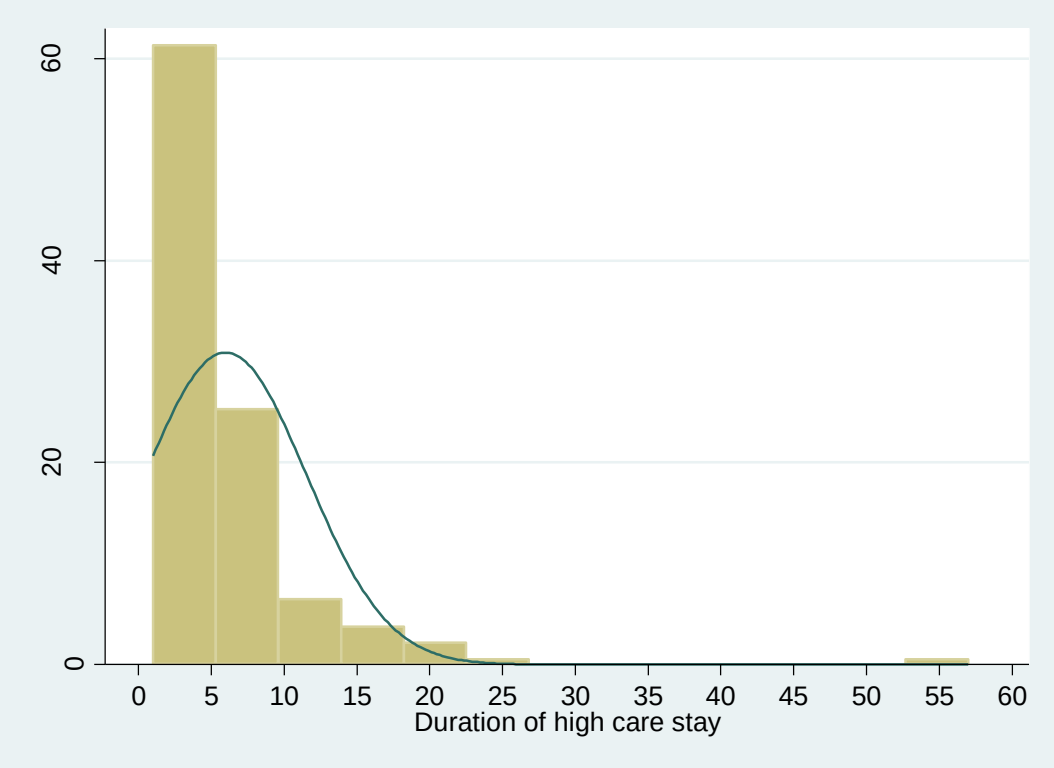


A significant ICU stay period was occupied by 15 patients remaining a total period of 365 days cumulatively.

Hospital stay- High care

- 186 TBI patients were admitted to the neurosurgical high care unit
- With 5113.5 potential high cares bed days available for the year a total of 1113 amount of HC bed days were utilised by TBI cases making the occupancy rate 21.8%.
- The majority of patients (90%) of patients stayed less than 11 days

Distribution of length of high care stay in days for TBI patients .



In-patient Cost of TBI in the Unit.

The major contributor to cost in the acute management of TBI is

ICU stay - 8,306, 698 rands

High care- 4,202, 685 rands.

Other expenses include surgical, imaging and laboratory cost at 2, 753, 474 rands,431, 633 rands and 217,164 rands respectively.

The total cost was estimated to be 15,911,654.

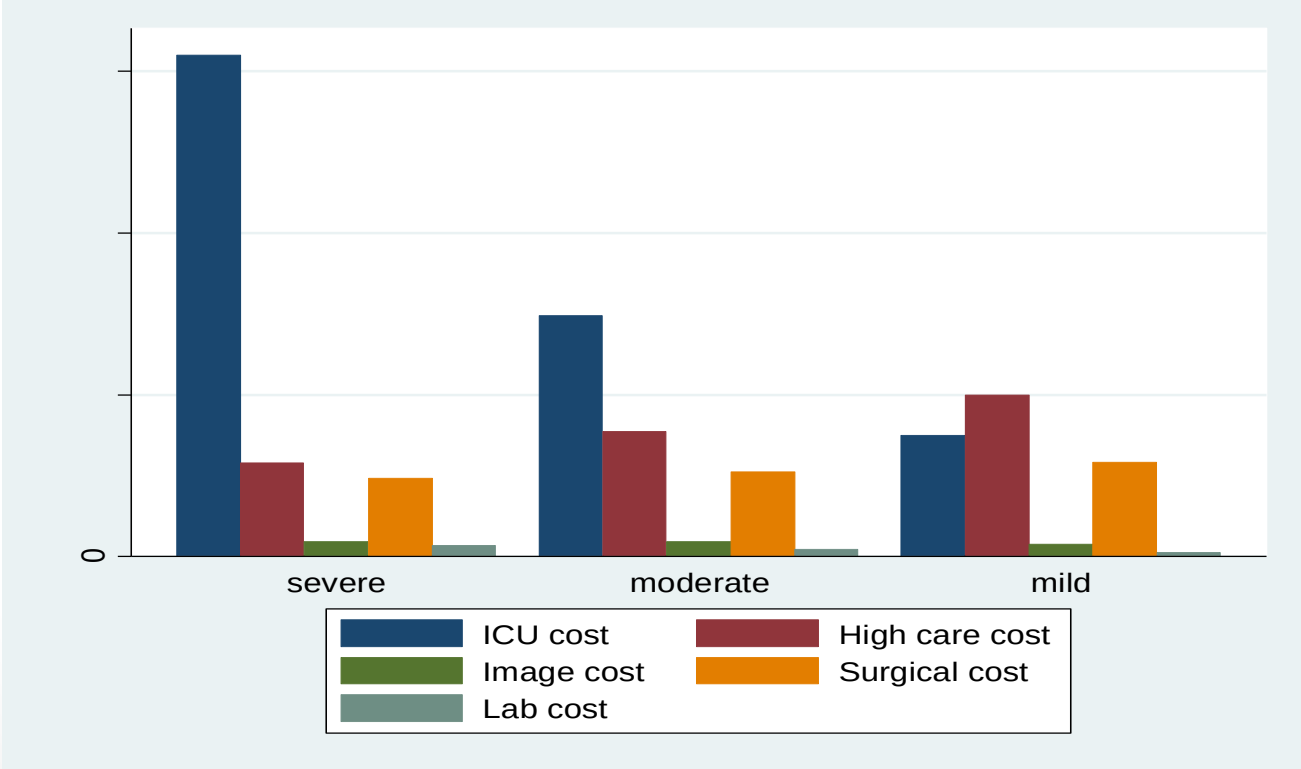
In-patient Cost of TBI in the Unit.

Average and median in-patient cost for TBI patients

	N0. of patients	Mean cost	Median cost
Severe	84	86,533.87	64,134.5
Moderate	37	58,499.46	62,712
Mild	133	48,709.24	40,244

In-patient Cost of TBI in the Unit.

Average TBI patient hospital stay costs by the severity of the injury



Discussion of results

- The study demonstrated that TBI predominantly occurs in males correlates with most studies done in adult populations.
- Assault due to blunt trauma and PVA are the leading causes of head injury in our study which confirms the findings from previous studies.
- The use of significant ICU and high care bed occupancy by patients with a TBI is also of concern.
- In this study, 65% of the patients required neurosurgical intervention which is high compared to other studies where 75% of admissions were treated none operatively.
- The significant Bed occupancy rate of ICU and high care of TBI cases at 33.4% and 21.8% respectively needs further study to investigate its impact on other neurosurgical cases.

Discussion of results

- The cost of brain injury is immense involving acute hospital care, rehabilitation costs, loss of income and lifetime emotional and financial burden on the individual and the society.

- The cost of managing TBI compared to another developing world like India is more expensive being equivalent to a country like Turkey and is much lower than developed nations like America.

Discussion of results

- Where health delivery is under constraints and sharing of resources with epidemics like HIV and Tuberculosis is a reality, the consequences of TBI in our society is not entirely understood and hence is underfunded.
- Our study looked only at a subset of TBI patients and their management in our unit.
- Much broader research is needed to understand the impact on health care provision fully.
- As the healthcare costs escalate, the old idiom holds true "Prevention is better than cure" as TBI leaves many financial, physical and psychological scars on society .