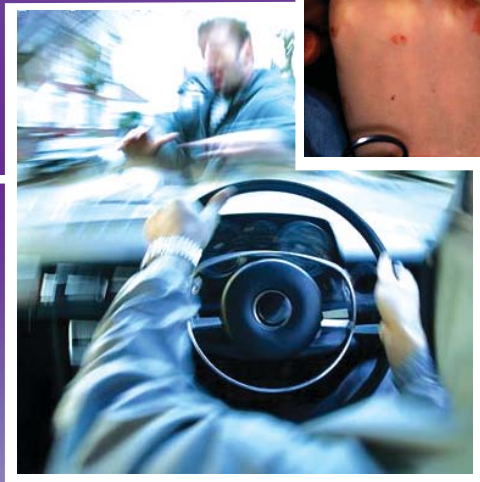
NATIONAL TRAUMA DATABASE
MAY 2006 TO APRIL 2007

FIRST REPORT



MINISTRY OF HEALTH
MALAYSIA

National Trauma Database
improving trauma care

National Trauma Database

Ministry of Health Malaysia

FIRST REPORT OF THE NATIONAL TRAUMA DATABASE MAY 2006 TO APRIL 2007

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Sabariah Faizah Jamaluddin

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General Line: 603-6145 4333
Fax: 603-6157 2727
Email: ntrd@acrm.gov.my
Website: http:/www.acrm.org.my/ntrd

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3. Dato' Dr. Abu Hassan Asaari Abdullah and my Co-Investigator Mr. N. Ramesh Narenthiranathan

4. The Ministry of Health, Malaysia for the research grants to set up the registry.

LIST OF PARTICIPATING CENTRES

1. **Selayang Hospital**

Department	: Emergency
Head of Department	: Dr. Mohamed Alwi Bin Haji Abdul Rahman
Coordinators	: MA Hushaimi Bin Husin
	: SN Afidah Bt Ibrahim
Department	: Surgery
Head of Department	: Dr. Fijerald Henry
Coordinator	: Dr. Geeverughese C. George
	: Dr. Nor Azira Bt Ismail

2. **Kuala Lumpur Hospital**

Department	: Emergency
Head of Department	: Dato' Dr. Abu Hassan Asaari Bin Abdullah
Coordinator	: Dr. Mahathar Bin Ab Wahab
	: Dr. Ranjini a/p Sivaganabalan
	: MA Mohd Ariff Bin Mohd Yusoff
	: MA Mudzaffar Shah Bin Abdul Ghaffar
	: MA Mohd Rizal Bin Alwi
Department	: Neurosurgery
Head of Department	: Mr. Mohammed Saffari B Mohammed Haspani
Coordinator	: Mr. N. Ramesh Narenthiranathan
	: Dr. Rahmat Bin Harun @ Haron
	: Dr. Siti Azleen Bte Mohamad
	: Dr. Priya Sharda a/p Jagdish Mitter
	: MA Mohd Fariz B Mohd Zaini
	: MA Mohd Azhan Bin Ahmad Sobli
	: MA Rosnizan Bin Ab Wahab

3. **Sultanah Bahiyah Hospital**

Department	: Emergency
Head of Department	: Dr. Fatahul Laham Bin Mohamed
Coordinator	: Dr. Zaidah Bt M. Arif
	: MA M Kamil Bin Din
	: SN Hapisiah Bt Abu Kasim
	: SN Lim Joo Sin

Department	: Surgery
Head of Department	: Mr. Mohan Nallusamy
Coordinator	: Dr. Wan Khamizar Bin Wan Kazim
	: Dr. Wan Najmi Bin Wan Daud
	: Dr. Jasjit Singh Nijhar
	: MA Syahrulamri Bin Abdullah
	: MA Arumugam a/l Balasamy

4. **Pulau Pinang Hospital**

Department	: Emergency
Head of Department	: Dr. Teo Aik Howe
Coordinator	: Dr. Noor Azleen Bt Ayop
	: Dr. Munirah Bt Osman
	: Dr. Mohmed Azmi Bin Ibrahim
	: MA Raj Kumar a/l Paramasiven
	: MA Ku Azmi Bin Ku Soh
	: MA Mohd Amir Bin Hashim

Department	: Neurosurgery
Head of Department	: Mr. K Ravindran a/l Kateerayson
Coordinator	: Dr. Noor Hazlina Bt Zainuddin
	: Dr. Regunath a/l Kandasamy
	: MA Mohd Imri Bin Ibrahim
	: MA Saidin Bin Jusoh
	: SN Noriah Bt Mohd Noor

5. **Sultanah Aminah Hospital**

Department	: Emergency
Head of Department	: Dr. Md Saed Bin Mian
Coordinator	: MA Raschidi Bin Abdul Karim
	: MA Radzman Bin Che Rus
	: MA Ahmad Salimi Bin Mohd Noor
	: MA Norzamzuri Bin Zakaria

Department	: Surgery
Head of Department	: Mr. Johari Siregar Bin Adnan
Coordinator	: Mr. Noor Azman bin A Rahman
	: MA Rahmad Bi Jaafar
	: SN Nurul Saadah Bte Saruan

NATIONAL TRAUMA DATABASE IN MALAYSIA

1. Introduction

Trauma is an ever increasing problem and it is the leading cause of morbidity and mortality in the under 40s age group in most developed countries and developing countries including Malaysia. For every person killed there are at least two who survive with serious permanent disabilities (Yates DW et al: 1990). In Malaysia, trauma is the third cause of admission to hospitals and fifth cause of death (Ministry of Health Malaysia, 2000). In 1998, there were 22,014 injuries due to road accidents and 55.5% resulted in serious injury. From January 2000 to August 2000 there were 164,599 injuries due to road traffic accidents and 3,625 victims died where as 5,529 were considered having serious injury. This shows and increasing trend when compared with the same period in 1999 where the number of injuries were 144,431 out of which 3,474 of them died and 5,786 were considered to have serious injuries (Royal Malaysia Police, 2002).

In terms of medically certified and inspected death, injuries accounted for about 15% of all deaths in the country from 1991 to 1995. In 1997 accident is the third most common cause of death in the country. Unintentional injuries form a major cause of this death. Of these 3,795 (60.3%) were from motor vehicle accident (*Injury Prevention Consultancy Report. 2001*). In 1996, 106,508 cases of accident at work place were reported to SOCSO (*SOCSO 1996*) with 10% (10, 693) resulted in permanent disability.

2. Rationale for National Trauma Database

Trauma care involves a chain of services, and its effectiveness depends on quality and cooperation between each individual service. Broadly, major trauma is defined as those injuries with the highest severity in terms of requiring time critical specialist care. Although the major impact of lowering the trauma morbidity and mortality is through prevention of injury, there is considerable evidence that early correction (resuscitation) and definitive management will result in better outcome (Cameron P et al: 1993). Therefore, quality of trauma care depends on pre-hospital care, resuscitation in Emergency Department as well as in-hospital care.

The lack of research into trauma epidemiology is well known. The paucity of information has lead to the conclusion that proper epidemiological studies cannot be conducted in the absence of meaningful data. United States has lead the way into major trauma epidemiological studies. The Major Trauma Outcome Study (MTOS) (Champion HR et al: 1990) was initiated by the American College of Surgeons Committee on Trauma in 1982 and its goals were to establish national patient outcome data, and to provide objective evaluation of quality assurance and outcome. During 1982-1987, 139 North American Hospitals submitted demographic, etiologic, injury severity and outcome

data for 80,544 trauma patients. The MTOS database is the international database and is the international standard against which all other trauma databases can be compared.

3. Objectives and Scope of the National Trauma Database (NTrD) in Malaysia

The objectives of the NTrD are to:

1. To determine the frequency, mechanism of injury and distribution of major trauma in Malaysia. These are useful measures of health burden arising from major trauma and its management in the country.
2. To determine the outcome and probability of survival of trauma patients
3. To evaluate major trauma management in the participating hospitals and to come up with guidelines for improved trauma care.
4. To determine the extent, improvements introduced have been achieved.
5. To stimulate and facilitate research on major trauma and its management.

4. Patient population

The patient population targeted for registration consists of male or female patients who satisfy the definition of Major Trauma and Traumatic Brain Injury. The participating sites in this first report are Hospital Kuala Lumpur, Hospital Selayang, Hospital Pulau Pinang, Hospital Alor Star and Hospital Sultanah Aminah Johor Bahru.

5. Selection of Subjects

Case definition: All trauma patients seen in participating emergency and neurosurgery department during the current calendar year (prospective).

- Major trauma patients who fill one or more criteria as follows:
  - Patients who died from injuries after admission
  - Patients with injury severity score (ISS) of > 15
  - Patients admitted to ICU or high dependency area for > 24 hours and mechanically ventilated
  - Urgent surgery within 24 hours for intracranial, intrathoracic, intra-abdominal, or fixation for pelvic or spinal injuries.
- All head injury patients with Moderate GCS of 9-12
- All head injury patients with Severe GCS of 3-8

6. Data collection

The data is collected into a form and the data is then entered into the NTrD data website. Study variables for NTrD database were categorized as follows:

1. Subjects' Sociodemography/Universal variables:
   - Name

- IC number
- Address/contact number
- Age
- Gender
- Nationality
- Ethnicity

2. Subject Admission details
    - Date of admission
    - Time of admission
    - Type of admission

3. Injury details
    - Date of injury
    - Time of injury
    - Mechanism of injury
    - Injury intent
    - Cause of injury
    - Place of injury

4. Subject Clinical details
    - Pulse rate
    - Respiratory rate
    - Blood pressure
    - Temperature
    - Pulse oximetry
    - Glasgow Coma scale
    - Review details
    - Disposition from Emergency Department

5. Operative Procedure details
    - Traumatic brain injury based on ICD10
    - Date of operation
    - Time of operation
    - Duration time to operation
    - Operative procedure

6. Subject In-hospital outcome
    - Discharge date
    - Length of stay in ICU
    - Length of stay in Hospital
    - Patients' outcome at discharge

7. Traumatic brain injury outcome at follow-up
    - At 3 months
    - At 6 months
    - At 12 months

8. Statistical Analysis

    Descriptive analysis was employed in this report. All data were described in terms of numbers and percentages.

EXPERT PANEL

NTrD has established the expert panel or expert group comprises of individuals who are subject matter experts i.e. Emergency Physicians and Neurosurgeons.

The role of the expert panel is:

1. To undertake quality control of the clinical database form and the data dictionary.
2. To conduct quality control of the reported data.
3. To perform literature review in the relevant area.
4. To interpret the results generated by the NTrD's statistician.
5. To write the section of the NTrD report relevant to the panel's expertise.
6. To specify the data reporting procedure.
7. To facilitate access to source documents for NTrD staff to do data verification.

List of Expert Panel members for respective departments:

Department of Emergency:

1.	Dr. Siti Rubiah Ibrahim	Department of Emergency, Selayang Hospital
2.	Dr. Mahathar Abdul Wahab	Department of Emergency, Kuala Lumpur Hospital
3.	Dr. Fatahul Laham Mohamed	Department of Emergency, Sultanah Bahiyah Hospital
4.	Dr. Zaidah Bt. M. Arif	Department of Emergency, Sultanah Bahiyah Hospital
5.	Dr. Teo Aik Howe	Department of Emergency, Pulau Pinang Hospital
6.	Dr. Ng Cheong Peng	Department of Emergency, Pulau Pinang Hospital
7.	Dr. Mohamed Azmi b Ibrahim	Department of Emergency, Pulau Pinang Hospital
8.	Dr. Munirah Bt. Osman	Department of Emergency, Pulau Pinang Hospital
9.	Dr. Md. Saed Mian	Department of Emergency, Sultanah Aminah Hospital

Department of Neurosurgery / Surgery:

1.	Mr. (Dr.) Mohammed Saffari Bin Mohammed Haspani	Department of Neurosurgery, Kuala Lumpur Hospital
2.	Dr. Rahmat Bin Harun Alias Haron	Department of Neurosurgery, Kuala Lumpur Hospital
3.	Dr. Siti Azleen Bt. Mohamad	Department of Neurosurgery, Kuala Lumpur Hospital

4.	Dr. Priya Sharda a/p Jagdish Mitter	Department of Neurosurgery, Kuala Lumpur Hospital
5.	Dr. Geeverughese C. George	Department of Surgery, Selayang Hospital
6.	Dr. Nor Azira Ismail	Department of Surgery, Selayang Hospital
7.	Mr. Amit Kumar Sharma	Department of Surgery, Sultanah Bahiyah Hospital
8.	Dr. Wan Khamizar Bin Wan Khazim	Department of Surgery, Sultanah Bahiyah Hospital
9.	Dr. Wan Najmi Bin Wan Daud	Department of Surgery, Sultanah Bahiyah Hospital
10.	Mr. K. Ravindran Katheerayson	Department of Neurosurgery, Sultanah Bahiyah Hospital
11.	Dr. Noor Hazlina Zainuddin	Department of Neurosurgery, Sultranah Bahiyah Hospital
12.	Dr. Regunath Kandasamy	Department of Neurosurgery, Sultanah Bahiyah Hospital
13.	Mr. Johari Siregar Bin Adnan	Department of Surgery, Sultanah Aminah Hospital
14.	Mr. Noor Azman Bin Abdul Rahman	Department of Surgery, Sultanah Aminah Hospital
15.	Dr. Sharon Casilda Theophailus	Dept. of Surgery, Sultanah Aminah Hospital

NATIONAL TRAUMA DATABASE STEERING COMMITTEE

1.	Dr. Sabariah Faizah Bte Jamaluddin	Head of Department, Emergency Department, Sungai Buloh Hospital
2.	Mr. Ramesh Narenthiranathan	Neurosurgeon, Neurosurgery Department, Kuala Lumpur Hospital
3.	Dr. Fatahul Laham Bin Mohamed	Head of Department, Emergency Department, Sultanah Bahiyah Hospital
4.	Dr. Jamaiyah Bt. Haniff	Head of Unit, Clinical Epidemiology Unit, Clinical Research Centre
5.	Dr. Shanti Varatharajan	Head of Unit, Clinical Economic Research Unit, Clinical Research Centre

STAFF OF NATIONAL TRAUMA DATABASE

Clinical Registry Manager	Mr. Mohd Fadhleen Bin Md Dom

SUPPORTING STAFF FROM THE CLINICAL RESEARCH CENTRE

The Clinical Research Centre (CRC) of the Ministry of Health provided technical support for the National Trauma Database. The clinical epidemiologists provided methodological and epidemiological input while the database is supported on CRC's IT infrastructure.

Clinical Epidemiologist	Dr. Jamaiyah Bt. Haniff
Information & Communication Technology (ICT) Manager	Mdm. Celine Tsai Pao Chien
Network Administrator	Mr. Kevin Ng Hong Heng
Assistant Network Administrator	Mr. Adlan Ab. Rahman
Database Administrator	Ms. Lim Jie Ying
Programmer	Mr. Sebastian Thoo / Mr. John Chong
Desktop Publisher	Ms. Azizah Bt. Alimat

BIOSTATISTICAL CONSULTANTS

Consultant Biostatistician	Dr. Sharon Chen Won Sun
Biostatistician	Ms. Lena Yeap

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REPORT SUMMARY

This preliminary report contained data from 933 patients with major trauma who were admitted to the five hospitals from May 2006 to April 2007.

1 DEMOGRAPHIC

1.1 There were a total of 12,3916 trauma patients admitted to the emergency departments of the five centres. Centre B contributed to the highest total trauma to the emergency department with 50,526 admissions (40.77%) and Centre C with only 9,238 admissions (7.46%).

1.2 Of the 12,3916 trauma patients admitted to the emergency departments, only 933 (0.75%) were reported as major trauma cases. The highest major trauma cases were reported by Centre B (49.52%), which reported 8 times (6.54%) more cases than Centre C.

1.3 August 2006 had the highest number of major trauma cases (14.15%) while March 2007 had the least number of cases (3.64%).

1.4 August 2006 had the highest number of major trauma deaths (14.97%) while December 2006 had the least number of cases (1.2%).

1.5 Gender distribution was significantly different between male (83.49%) and female (15.97%) patients.

1.6 By nationality, Malaysians (88.21%) had higher rates than non-Malaysian (10.72%) patients.

1.7 Malays accounted for 57.96% of the cases followed by Chinese (22.48%) and Indians (15.55%).

1.8 Most of the patients were young patients within the age group 15-24 years (30.23%).

2 CHARACTERISTIC OF MAJOR TRAUMA ADMISSION

2.1 Most major trauma cases were admitted between 6.01 PM and 12.00AM

2.2 Wednesday (16.72 %) was the busiest day for major trauma cases by the centres.

2.3 More than half (53.48%) of cases were referred from other medical facilities. Most of the cases in Centre A (85.53% were direct admissions, while majority of patients in Centre B (68.31%) were transferred from other hospitals.

3 PATTERN OF INJURY

3.1 Blunt injury was the main mechanism of injury (83.91% was notably higher in males than females).

3.2 Majority of the major trauma patients were unintentionally injured (72.88%).

3.3 The most common place of injury was at the road, street and highway (72.56%). Injuries at home contributed to 9.32% of all cases.

4 CLINICAL PARAMETERS

4.1 More than half (57.02%) of the major trauma patients had systolic BP greater than 120 mmHg on admission to the emergency department. 29.69 % of the patients had systolic BP of 89-120 mmHg.

4.2 Of the 933 patients, 66.56% had respiratory rate of 10-29 breath/min and only 2.68% had respiratory rate greater than 29 breath/min.

4.3 42.77% of major trauma patients had GCS of 3-8 (which is classified as severe head injury).

4.4 Most of the centres had GCS 3-8 for their head injury while Centre B was the highest for GCS 13-15 (mild head injury).

4.5 Centre A reported the highest percentage of patients with moderate head injury. Centre B had the highest percentage (15%) of patients with only moderate head injury without major trauma.

4.6 Of the 933 patients, 28.83% of them had Revised Trauma Score (RTS) from 5 to 5.99 followed by patients with RTS from 6 to 6.99 (25.4%). Only 1.07% of them had RTS from 1 to 1.99.

4.7 Centre B reported the highest numbers of patients with RTS of less than 4.

4.8 Most major trauma cases were reviewed by the medical officer or trainee while only 1.93% and 6.32% of patients were reviewed by the emergency physician and the surgeon respectively.

4.9 35.48% of the major trauma patients were sent to ICU from the emergency department while 32.58% were admitted to the general ward.

4.10 268 (28.72%) major trauma cases were operated on. The most common operation was for intracranial surgery (89.18%) with 55.65% for evacuation of intracranial haematoma.

4.11 Traumatic subdural haemorrhage is the commonest intracranial injury with 20.69% of the cases.

5 OUTCOME

5.1 More than half (57.66%) of the major trauma cases survived. The highest survival rate was from Centre B (71.86%) followed by Centre E (62.3%). There were high rates of missing data from Centres C and D.

5.2 Overall, most major trauma patients were discharged home (63.38%) while 17.29% were discharged back to the referring hospital.

5.3 Most deaths occurred in the elderly age group >75 years.

5.4 About 64.88% of the major trauma cases were attributed motorcycles which involved the rider and the pillion. There were no significant differences in mortality rates between the rider and the pillion. Vehicle drivers and the pedestrians contributed to 23.3% and 25.9% of non-survivors respectively.

5.5 Both cases that were referred and those who were admitted directly had survival rates of more than 50%.

5.6 Injuries at the construction sites and at service areas accounts for 33.61% and 33.3% of deaths respectively.

5.7 More than half (59.12%) of the major trauma patients that had systolic BP of less than 120mmHg survived while the majority of patients with systolic BP of < 90mmHg died.

5.8 621 patients that have respiratory rate from 10 to 29 breath/min, 53.95% survived while patients that have respiratory rate greater than 29 breath/min, 36% of them did not survive.

5.9 Most survivors (71.52%) were patients that have Revised Trauma Score (RTS) between 7 and 7.84. High mortality rate was reported for patients that have RTS from 0 to 0.99. Most deaths occurred with RTS 2-6.

6. LENGTH OF STAY

6.1 The average length of stay (ALOS) for major trauma ranges was 7-10 days and the shortest time was reported in Centre C (7 days).

6.2 Survivors had length of stay of 11-15 days with Centre D having ALOS of 15 days and Centre C 10 days. The ALOS for patients with direct admission was 8 days compared to 12 days for referred cases.

6.3 Patients with injury caused by road traffic accidents reported the highest average length of stay (11 days).

6.4 48.55% of patients were admitted to ICU and Centre E reported the highest percentage of ICU admission (92.9%).

6.5 About 49.26% of the patients admitted to the ICU survived while patients that were not admitted to the ICU reported 50.74% survival rate.

6.6 The length of stay of the major trauma patients in ICU totaled 1,645 days. The ALOS in ICU was 6 days.

6.7 Centre A had the longest ALOS on ICU i.e. 7 days while Centre D had the longest ALOS for ICU survivors i.e. 8 days.

NATIONAL TRAUMA DATABASE (NTrD)

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Chapter 1: Demographic

Figure 1.1. Total Trauma Emergency Department Admission by Centre

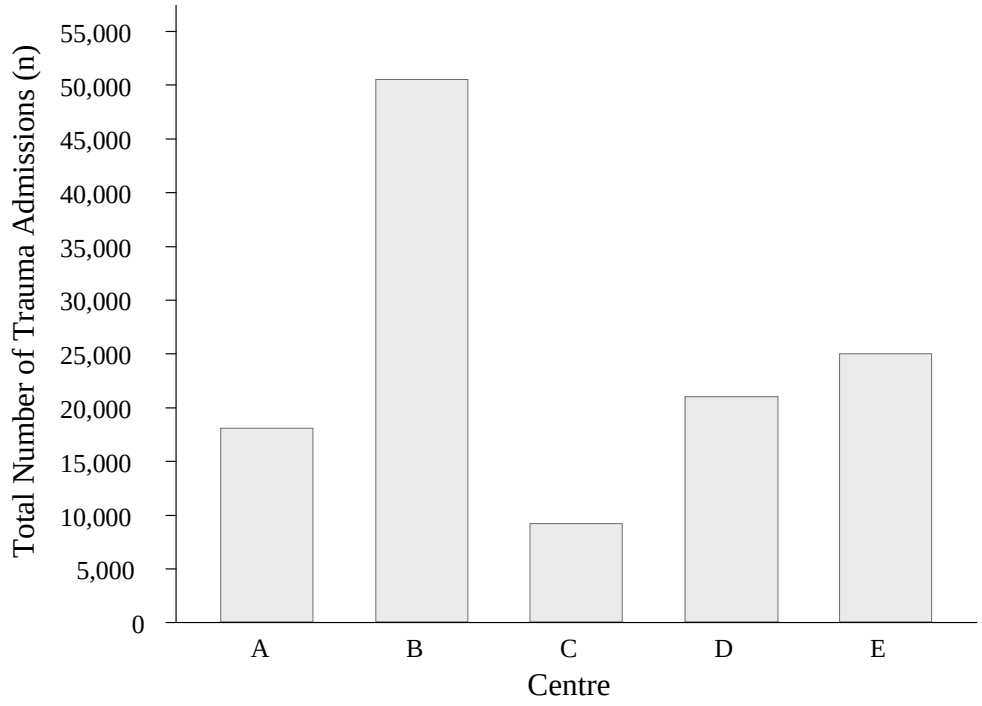


Table 1.1. Total Trauma Emergency Department Admission by Centre

Centre	No	%
A	18,090	14.60
B	50,526	40.77
C	9,238	7.46
D	21,025	16.97
E	25,037	20.20
TOTAL	12,3916	100.00

Figure 1.2. Major Trauma Cases by Centre

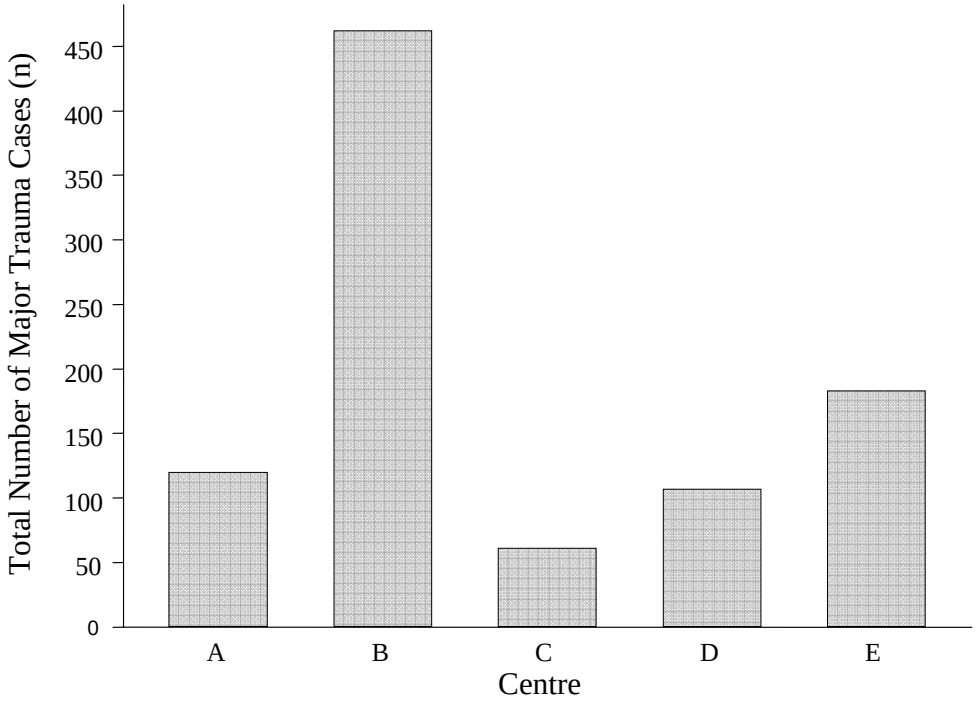


Table 1.2. Major Trauma Cases by Centre

Centre	**No**	**%**
A	120	12.86
B	462	49.52
C	61	6.54
D	107	11.47
E	183	19.61
TOTAL	933	100.00

Figure 1.3. Seasonal trend of Major Trauma Cases by Month

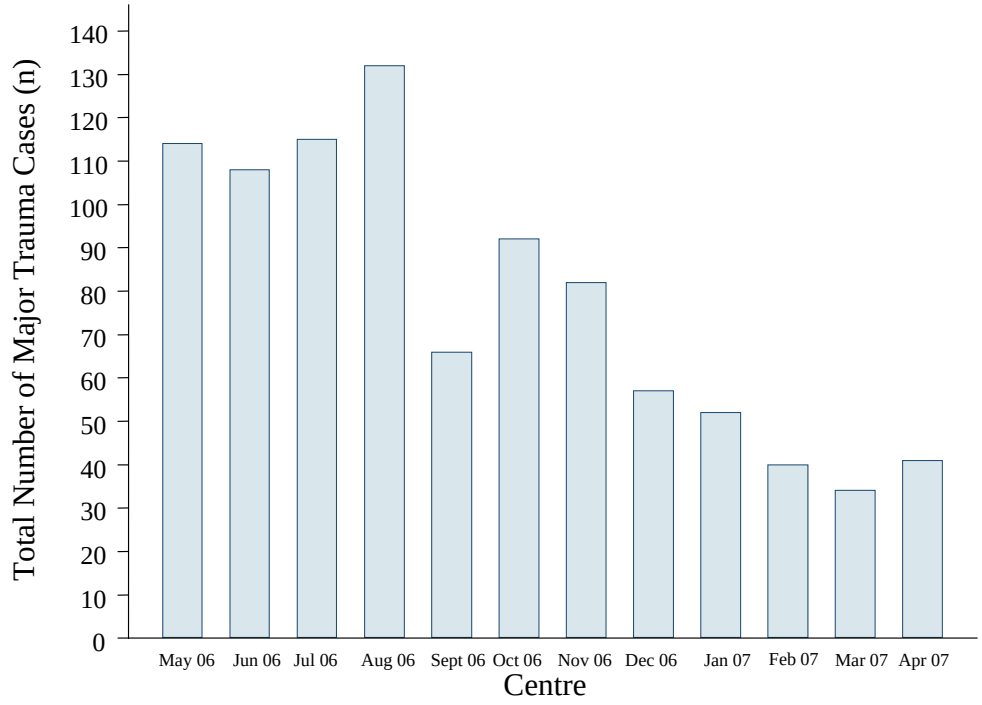


Table 1.3. Seasonal trend of Major Trauma Cases by Month

Month	**No**	**%**
May 06	114	12.22
June 06	108	11.58
July 06	115	12.33
August 06	132	14.15
September 06	66	7.07
October 06	92	9.86
November 06	82	8.79
December 06	57	6.11
January 07	52	5.57
February 07	40	4.29
March 07	34	3.64
April 07	41	4.39
TOTAL	933	100.00

Figure 1.4. Seasonal trend of Deaths in Major Trauma Cases by Month

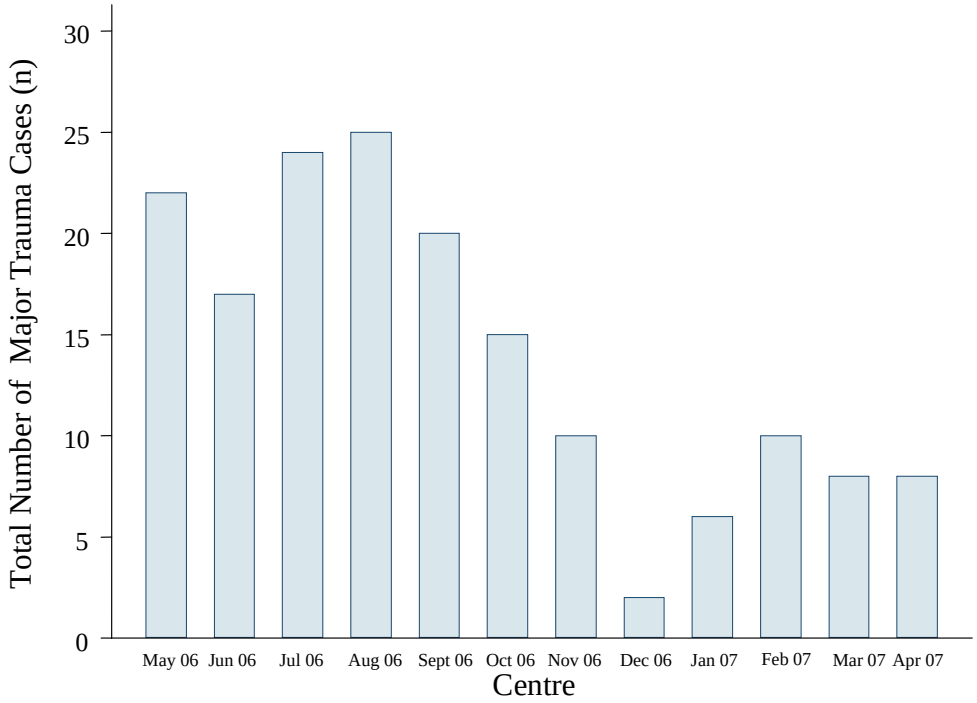


Table 1.4. Total Major Trauma Death Cases by Month

Month	**No**	**%**
May 06	22	13.17
June 06	17	10.18
July 06	24	14.37
August 06	25	14.97
September 06	20	11.98
October 06	15	8.98
November 06	10	5.99
December 06	2	1.20
January 07	6	3.59
February 07	10	5.99
March 07	8	4.79
April 07	8	4.79
TOTAL	167	100.00

Figure 1.5. Major Trauma Cases by Gender

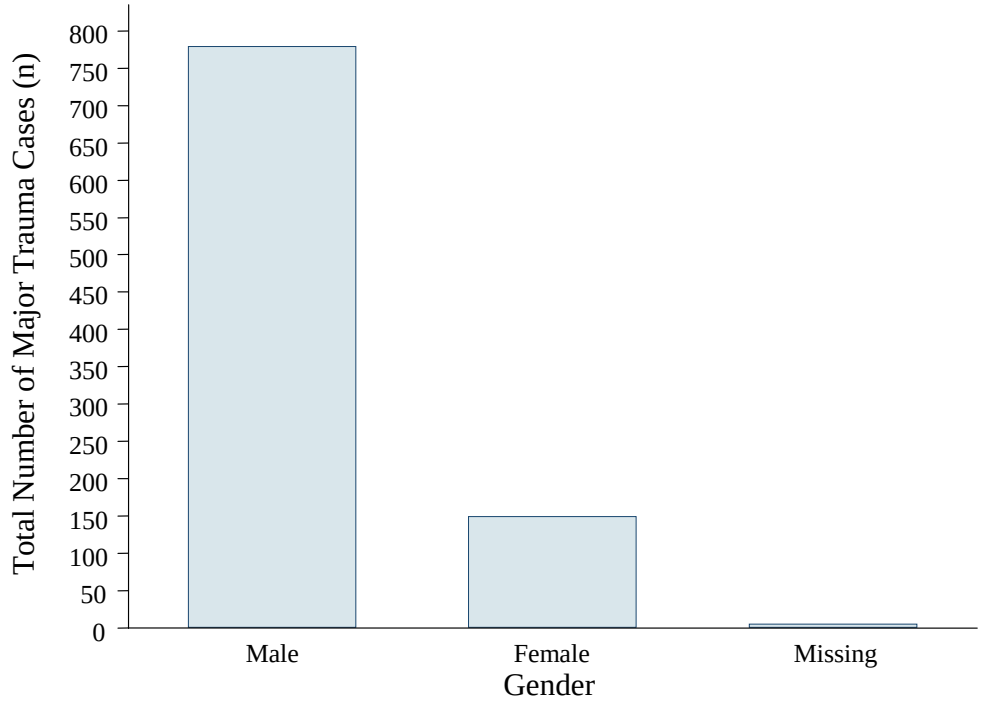


Table 1.5. Major Trauma Cases by Gender

Gender	**No**	**%**
Male	779	83.49
Female	149	15.97
Missing	5	0.54
TOTAL	933	100.00

Figure 1.6. Major Trauma Cases by Nationality

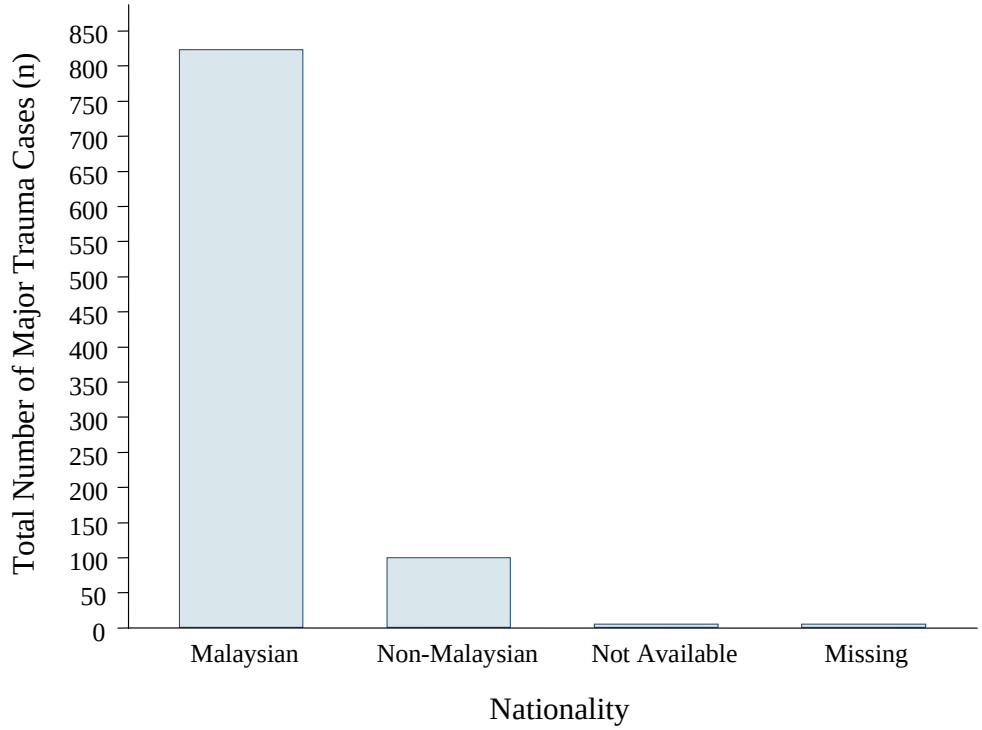


Table 1.6. Major Trauma Cases by Nationality

Nationality	**No**	**%**
Malaysian	823	88.21
Non-Malaysian	100	10.72
Not Available	5	0.54
Missing	5	0.54
TOTAL	933	100.00

Figure 1.7. Major Trauma Cases by Race

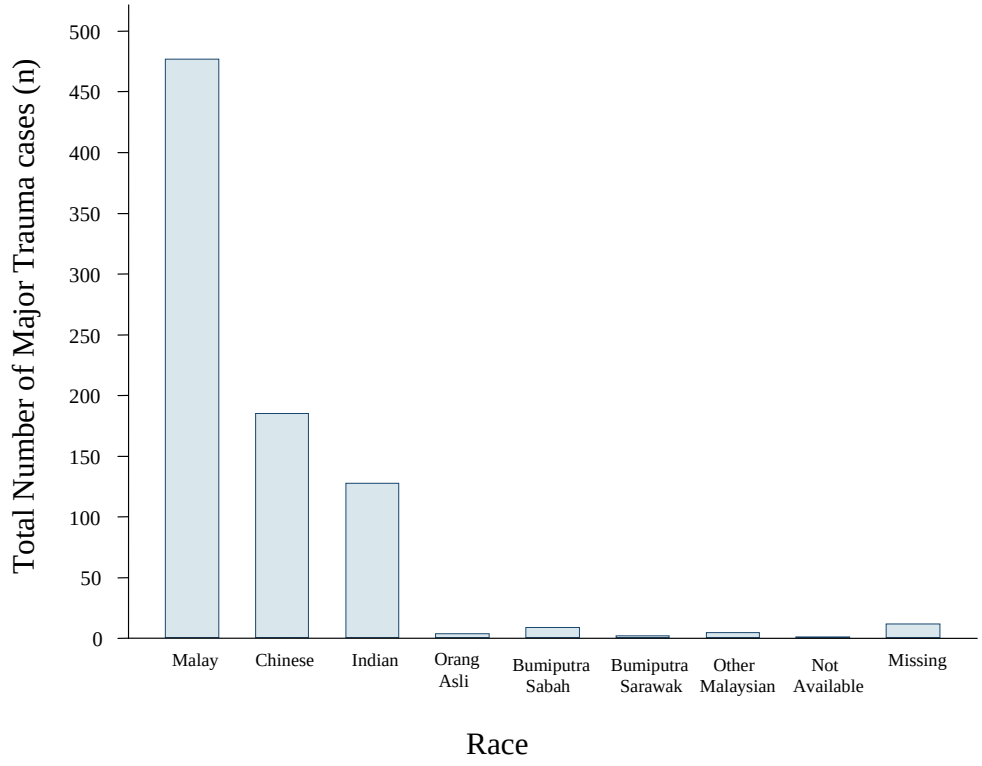


Table 1.7. Major Trauma Cases by Race

Race	**No**	**%**
Malay	477	57.96
Chinese	185	22.48
Indian	128	15.55
Orang Asli	4	0.49
Bumiputra Sabah	9	1.09
Bumiputra Sarawak	2	0.24
Other Malaysian	5	0.61
Not Available	1	0.12
Missing	12	1.46
TOTAL	823	100.00

Figure 1.8. Major Trauma Cases by Age Group

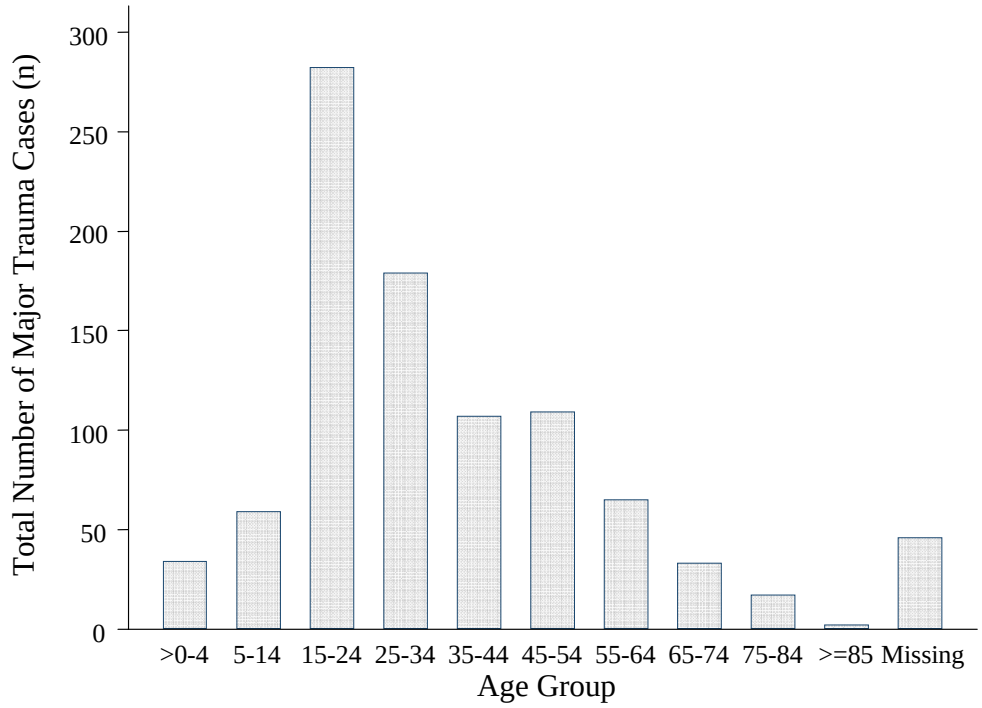


Table 1.8. Major Trauma Cases by Age Group

Age group	No	%
>0-4	34	3.64
5-14	59	6.32
15-24	282	30.23
25-34	179	19.19
35-44	107	11.47
45-54	109	11.68
55-64	65	6.97
65-74	33	3.54
75-84	17	1.82
>=85	2	0.21
Missing	46	4.93
TOTAL	933	100.00

Chapter 2: Characteristic of Major Trauma Admission

Figure 2.1. Time of Admission for Major Trauma Cases

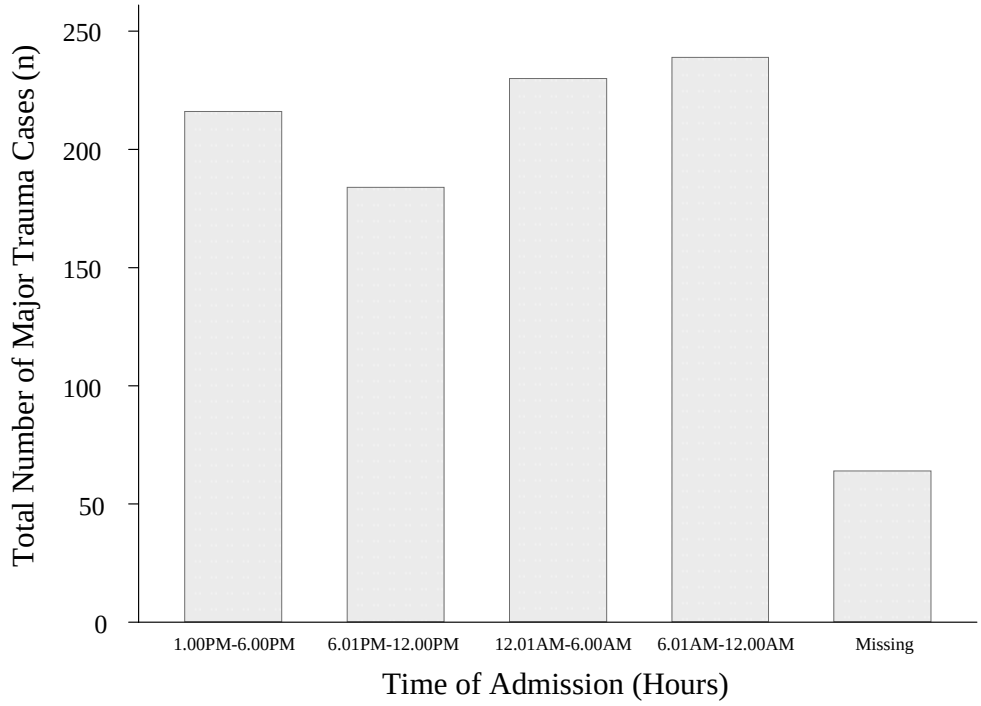


Figure 2.1a. Time of Admission for Major Trauma Cases

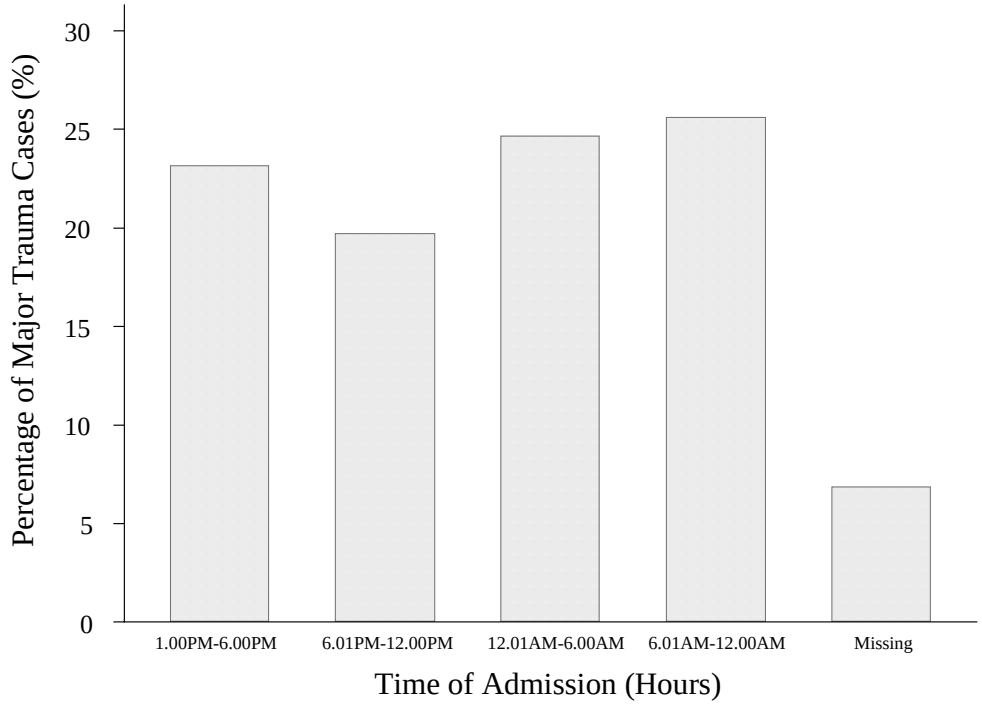


Table 2.1. Time of Admission for Major Trauma Cases

Time of Admission (Hours)	No	%
1.00PM-6.00PM	216	23.15
6.01PM-12.00PM	184	19.72
12.01AM-6.00AM	230	24.65
6.01AM-12.00AM	239	25.62
Missing	64	6.86
TOTAL	933	100.00

Figure 2.2. Day of Admission for Major Trauma Cases

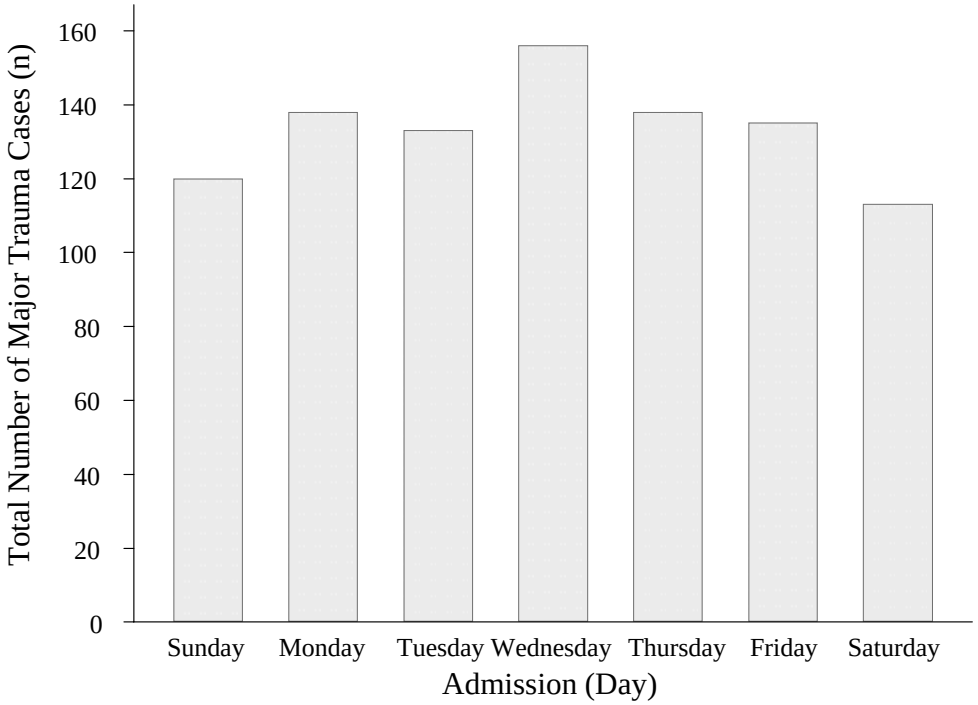


Figure 2.2a. Day of Admission for Major Trauma Cases

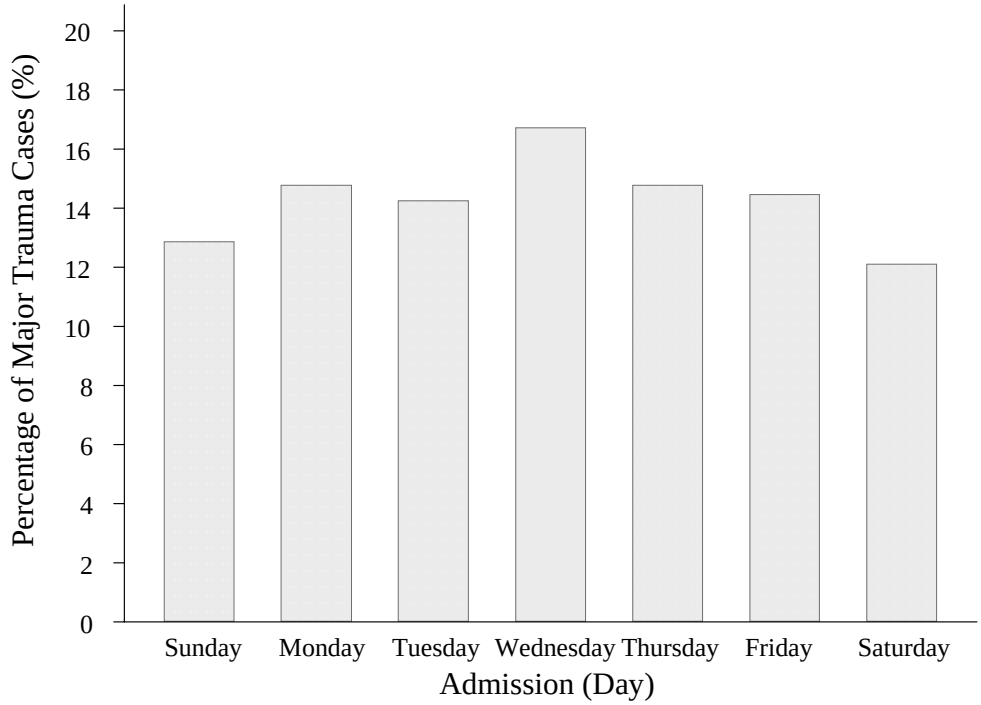


Table 2.2. Day of Admission for Major Trauma Cases

Admission (days)	**No**	**%**
Sunday	120	12.86
Monday	138	14.79
Tuesday	133	14.26
Wednesday	156	16.72
Thursday	138	14.79
Friday	135	14.47
Saturday	113	12.11
TOTAL	933	100.00

Figure 2.3. Type of Admission for Total Major Trauma Cases

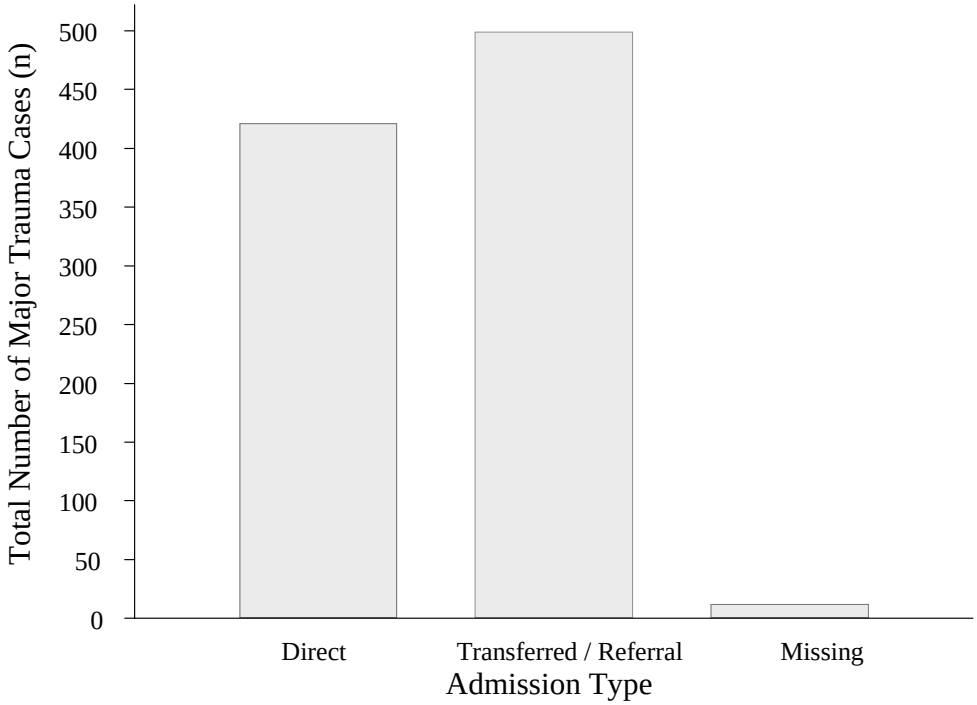


Figure 2.3a. Type of Admission for Major Trauma Cases by Centre

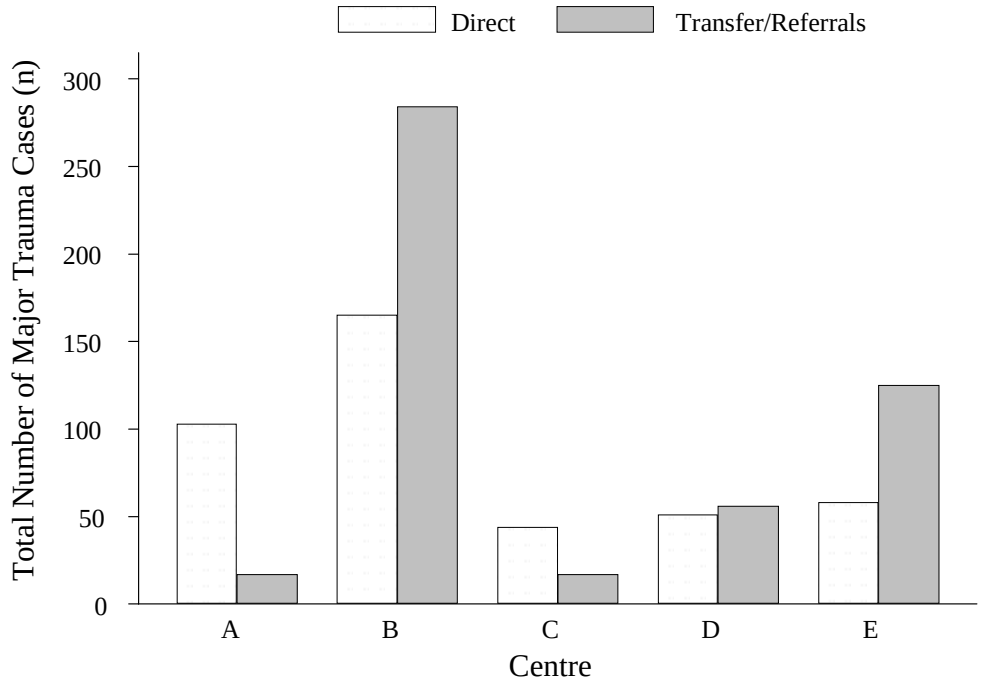


Figure 2.3b. Type of Admission for Major Trauma Cases by Centre

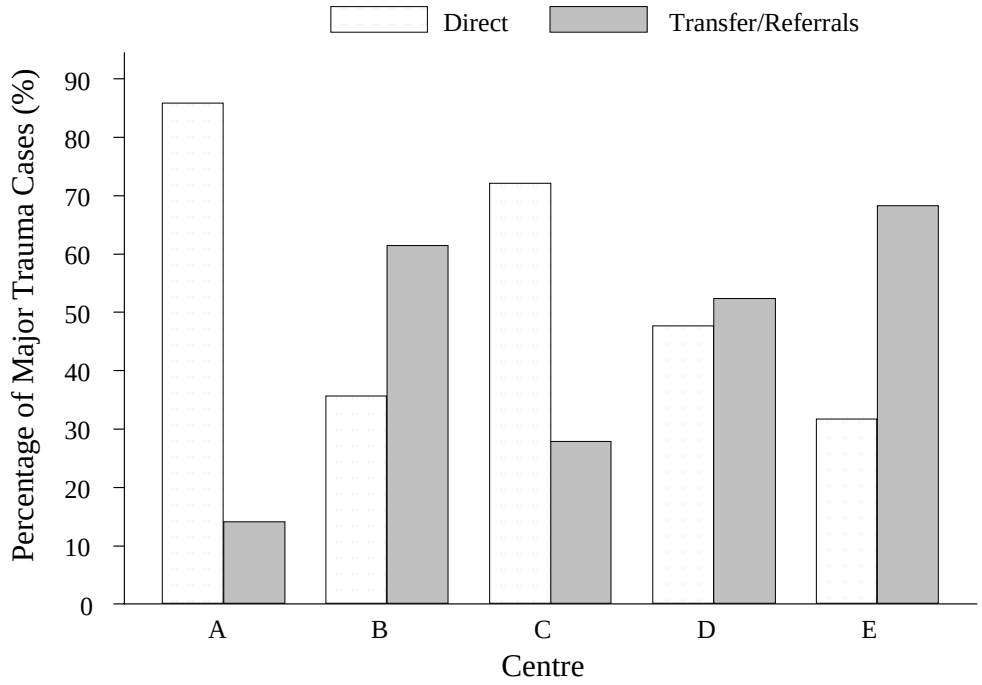


Table 2.3. Type of Admission for Major Trauma Cases by Centre

Centre	Total	Direct		Transfer / Referrals	
		No	%	No	%
A	120	103	85.83	17	14.17
B	462	165	35.71	284	61.47
C	61	44	72.13	17	27.87
D	107	51	47.66	56	52.34
E	183	58	31.69	125	68.31
TOTAL	933	421	45.12	499	53.48

Chapter 3: Pattern of Injury

Figure 3.1. Mechanism of Injury for Major Trauma Cases

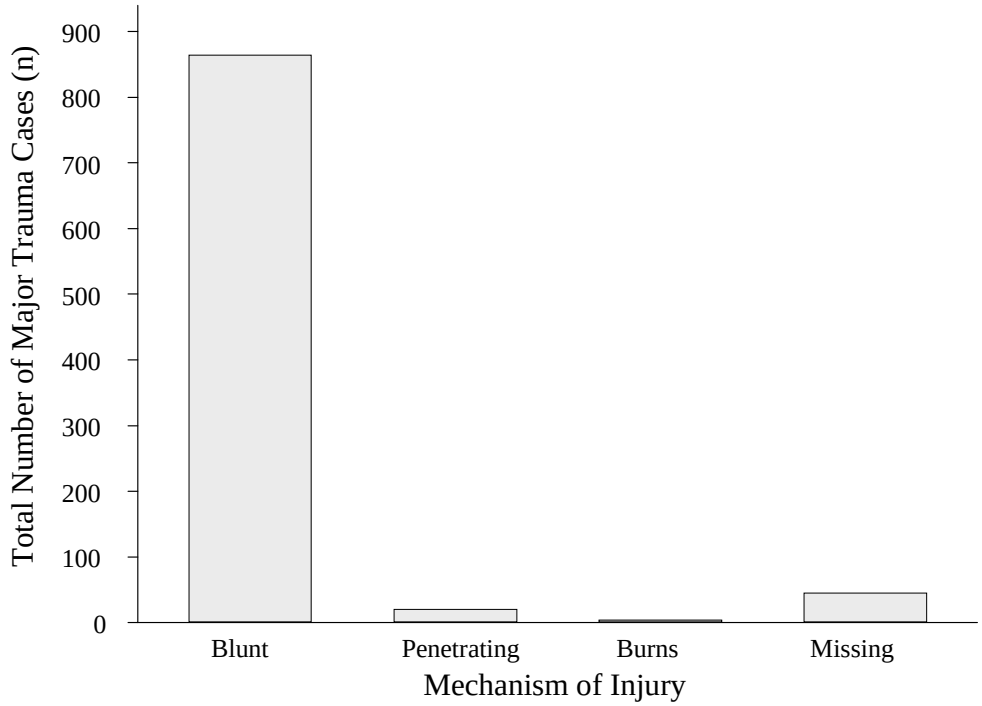


Figure 3.1a. Mechanism of Injury for Major Trauma Cases by Gender

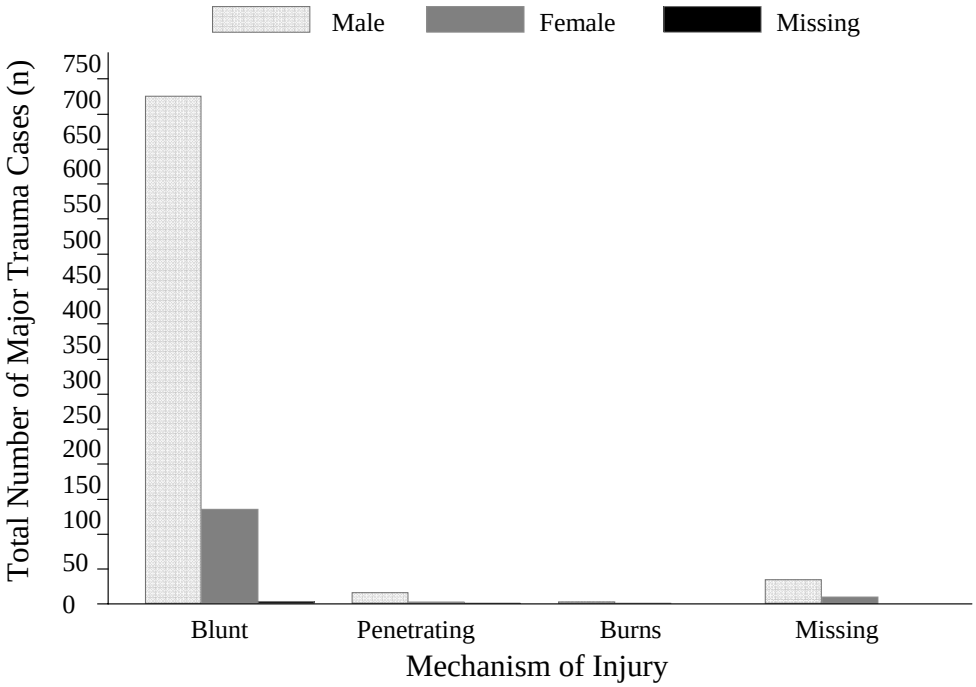


Figure 3.1b. Mechanism of Injury for Major Trauma Cases by Gender

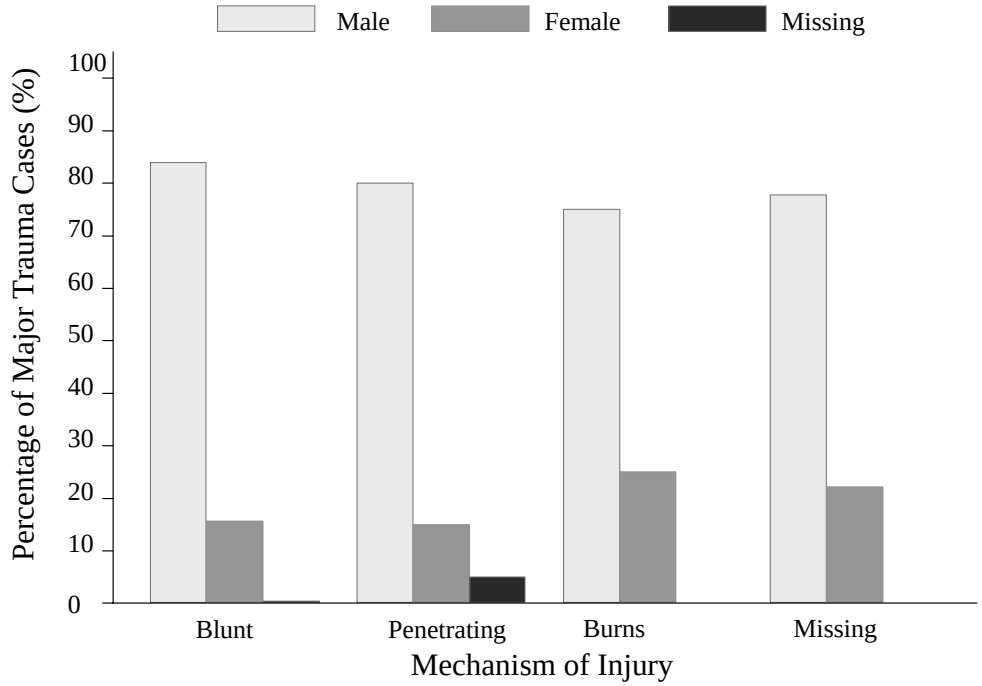


Table 3.1. Mechanism of Injury for Major Trauma Cases by Gender

Mechanism of Injury	Total	Male		Female		Missing	
		No	%	No	%	No	%
Blunt	864	725	83.91	135	15.63	4	0.46
Penetrating	20	16	80.00	3	15.00	1	5.00
Burns	4	3	75.00	1	25.00	0	0.00
Missing	45	35	77.78	10	22.22	0	0.00
TOTAL	933	779	83.49	149	15.97	5	0.54

Figure 3.2. Major Trauma Cases by Intent of Injury

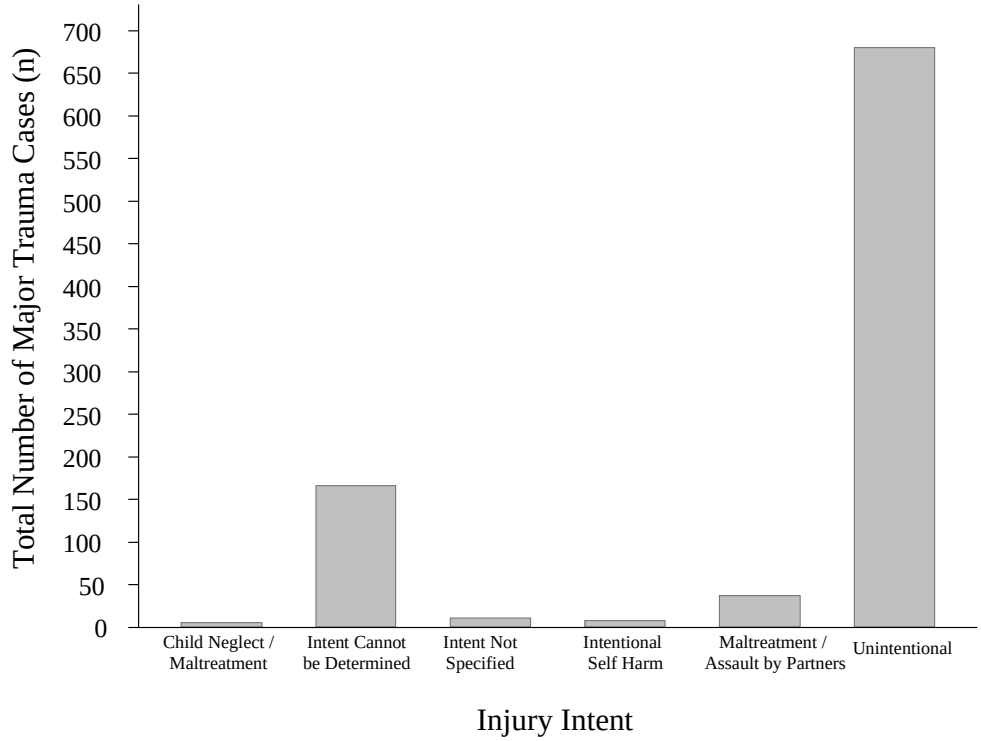


Figure 3.2a. Major Trauma Cases by Intent of Injury

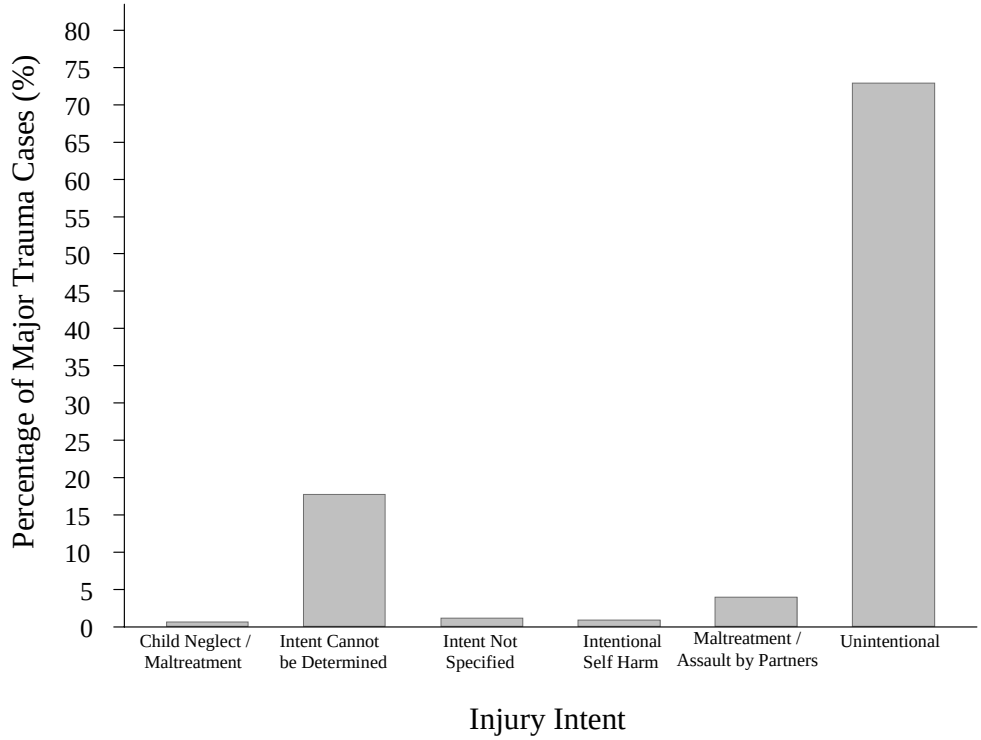


Table 3.2. Major Trauma Cases by Injury Intent

Injury Intent	**No**	**%**
Child Neglect / Maltreatment	6	0.64
Intent Cannot be Determined	166	17.79
Intent Not Specified	11	1.18
Intentional Self Harm	8	0.86
Maltreatment / Assault by Partners	37	3.97
Unintentional	680	72.88

Figure 3.3. Major Trauma Cases by Injury Site

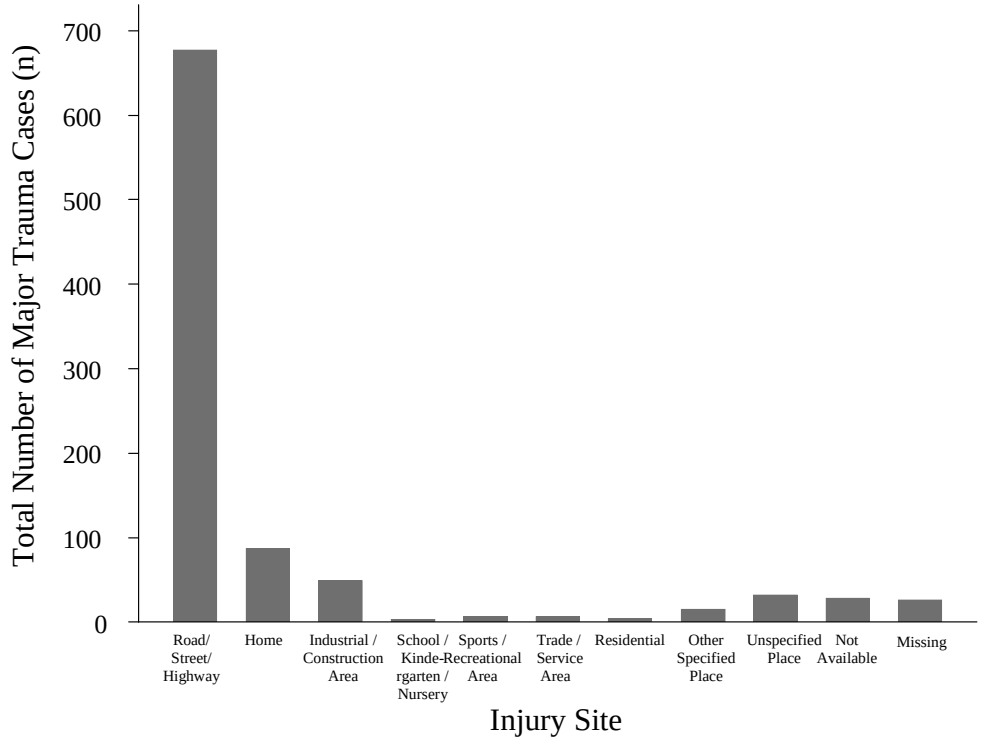


Figure 3.3a Major Trauma Cases by Injury Site

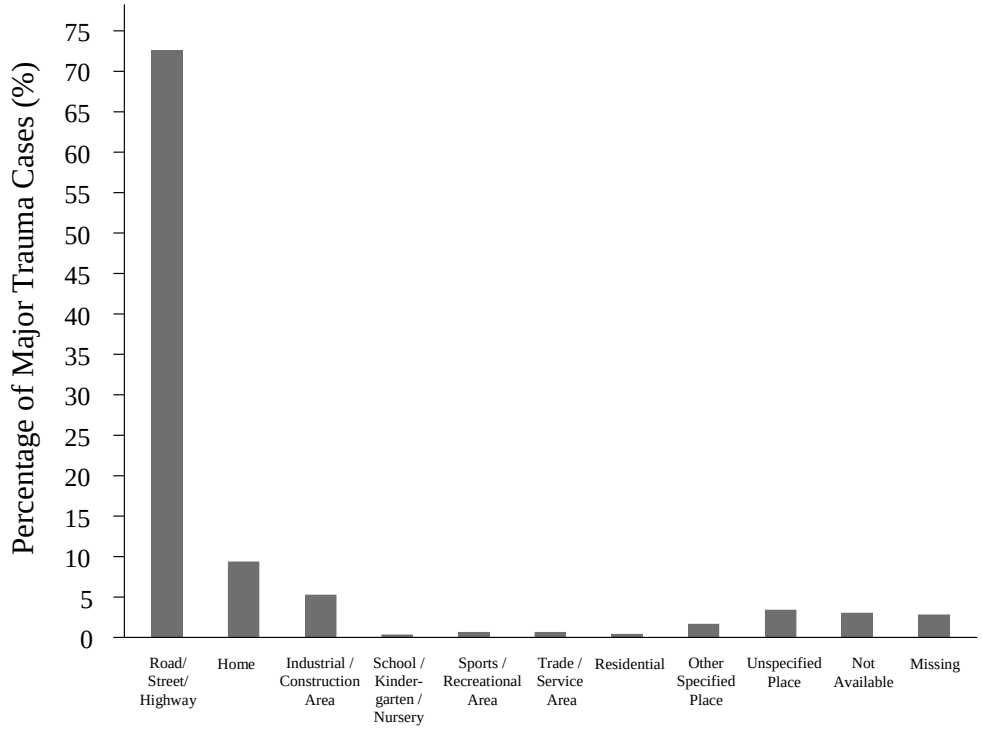


Table 3.3. Major Trauma Cases by Injury Site

Injury Site	**No**	**%**
Road/Street/Highway	677	72.56
Home	87	9.32
Industrial / Construction Area	49	5.25
School / Kindergarten / Nursery	3	0.32
Sports / Recreational Area	6	0.64
Trade / Service Area	6	0.64
Residential	4	0.43
Other Specified Place	15	1.61
Unspecified Place	32	3.43
Not Available	28	3.01
Missing	26	2.79
TOTAL	933	100.00

Chapter 4: Clinical Parameters

Figure 4.1. Major Trauma Cases by Systolic BP

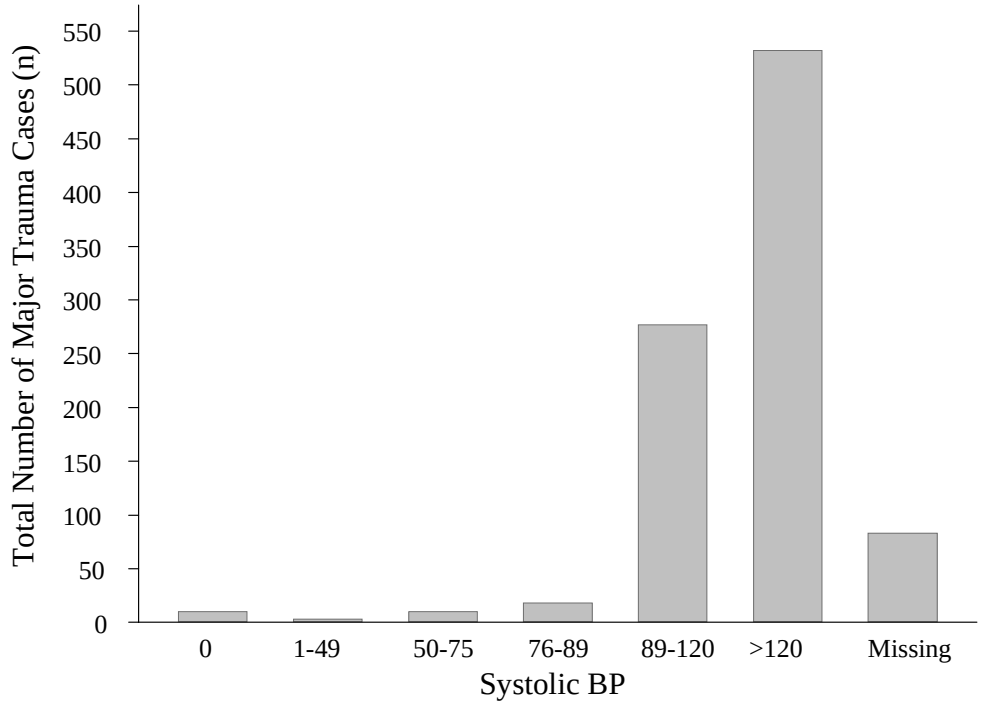


Figure 4.1a. Major Trauma Cases by Systolic BP

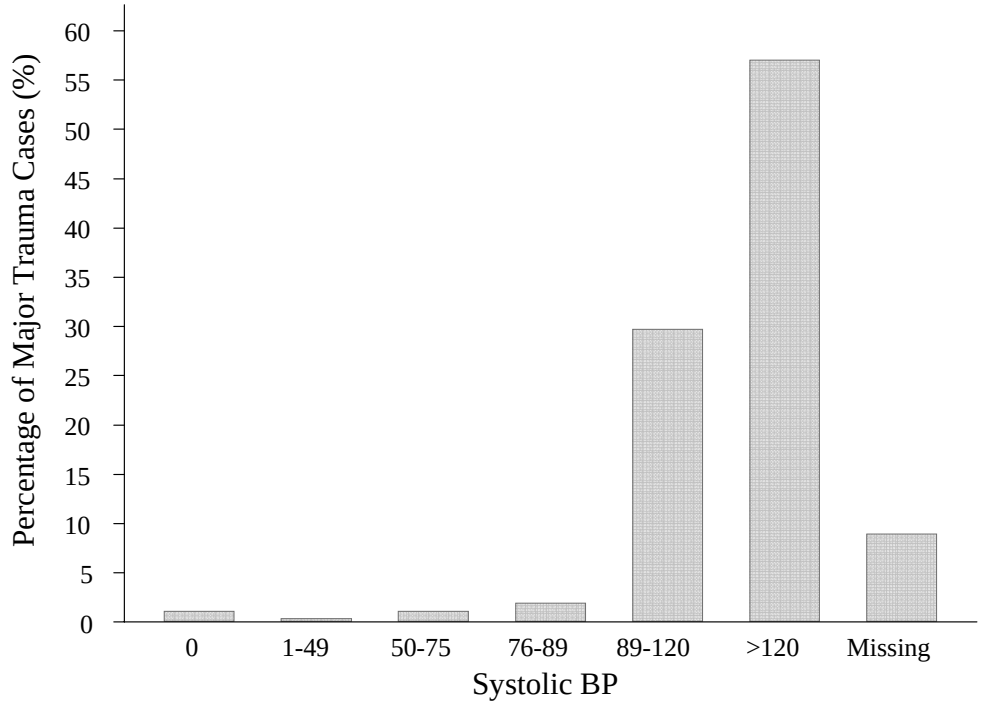


Table 4.1. Major Trauma Cases by Systolic BP

Systolic BP	No	%
0	10	1.07
1-49	3	0.32
50-75	10	1.07
76-89	18	1.93
89-120	277	29.69
>120	532	57.02
Missing	83	8.90
TOTAL	933	100.00

Figure 4.2. Major Trauma Cases by Respiratory Rate

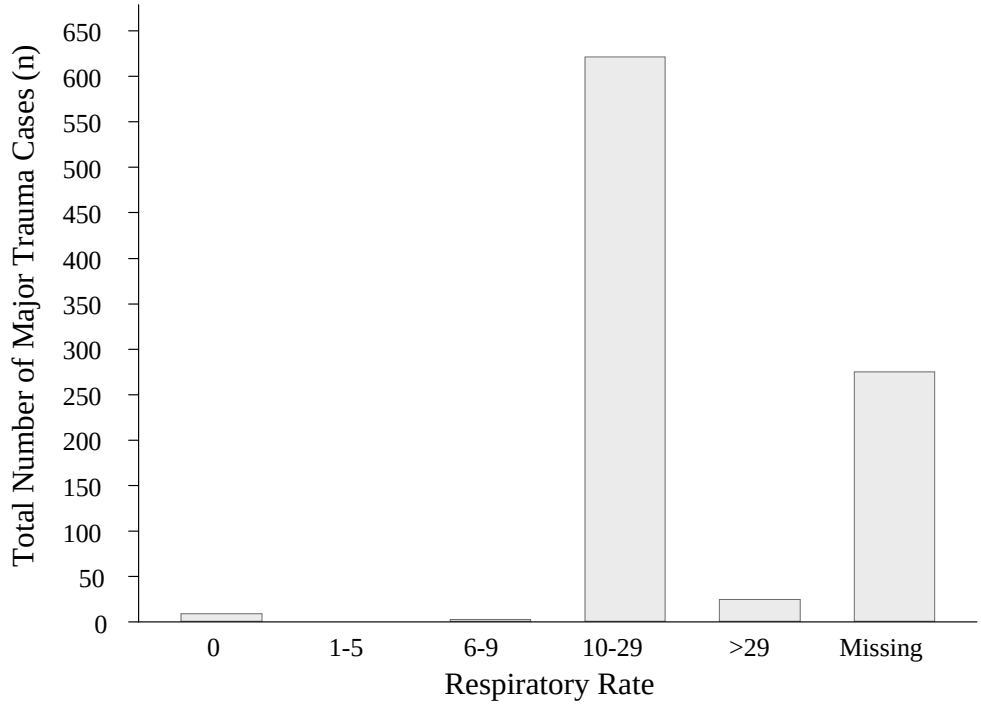


Figure 4.2a. Major Trauma Cases by Respiratory Rate

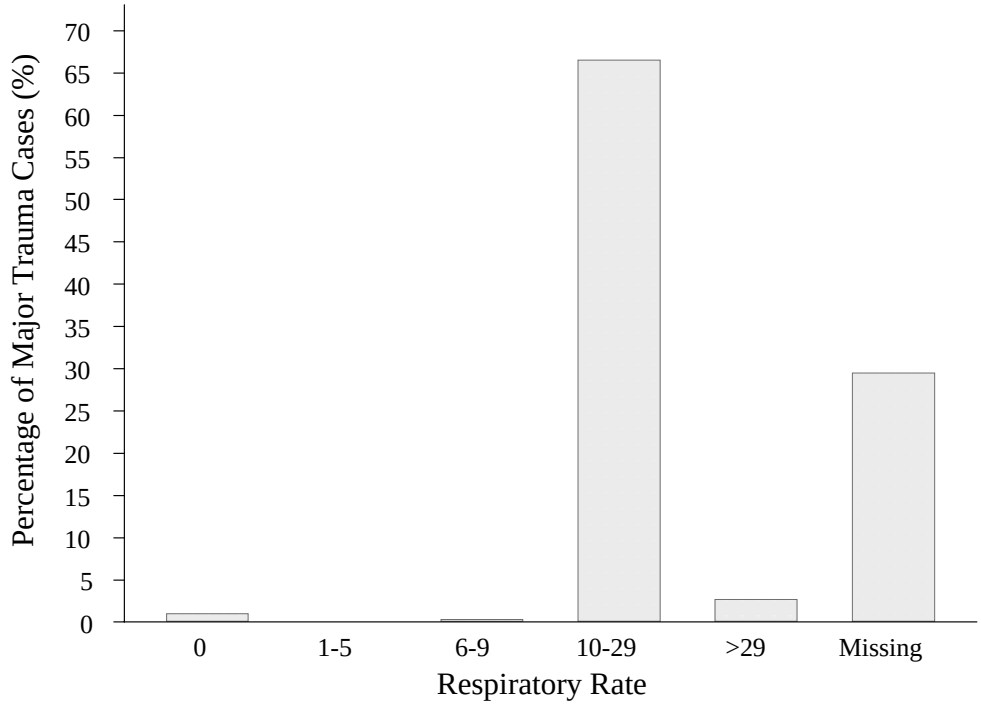


Table 4.2. Major Trauma Cases by Respiratory Rate

Respiratory Rate	**No**	**%**
0	9	0.96
1-5	0	0.00
6-9	3	0.32
10-29	621	66.56
>29	25	2.68
Missing	275	29.48
TOTAL	933	100.00

Figure 4.3. Major Trauma Cases by Glasgow Coma Scale (GCS)

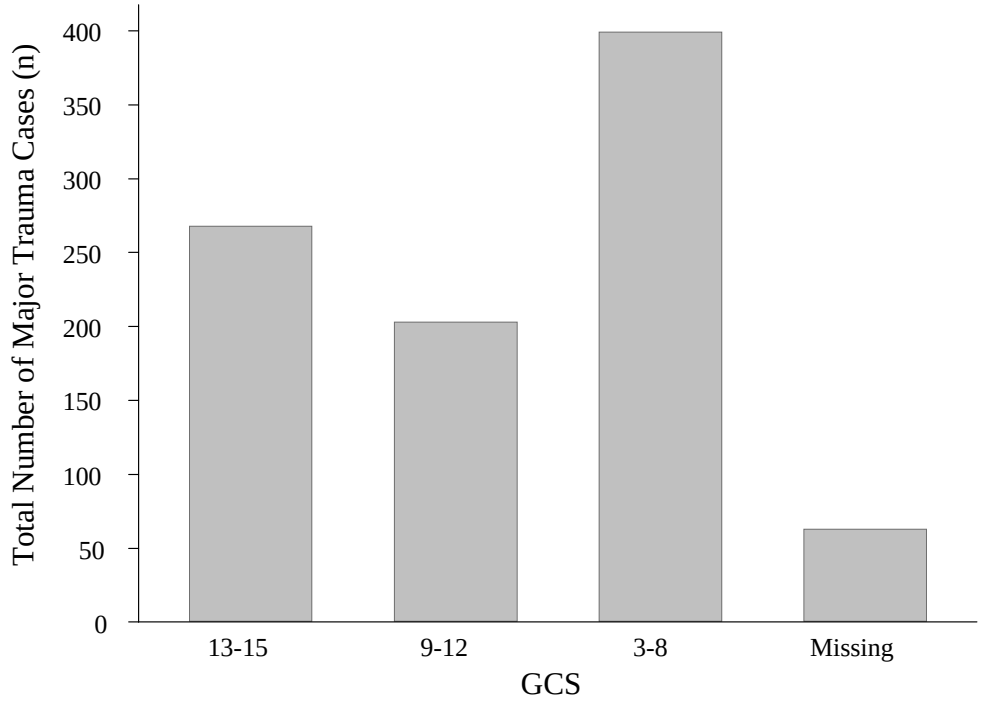


Figure 4.3a. Major Trauma Cases by Glasgow Coma Scale (GCS)

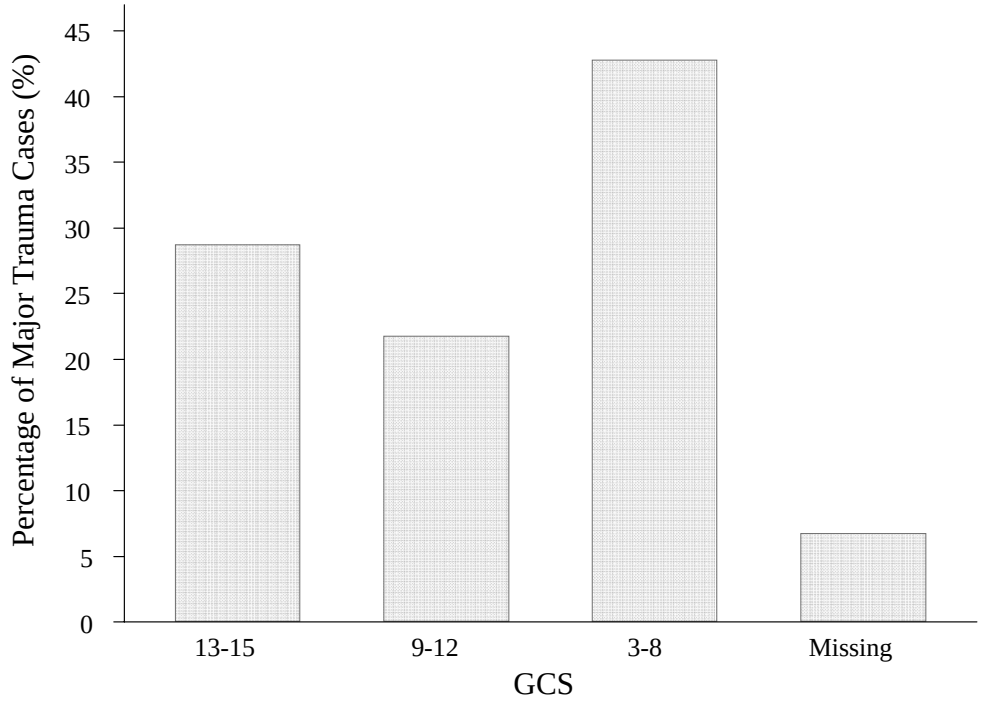


Table 4.3. Major Trauma Cases by Glasgow Coma Scale (GCS)

Glasgow Coma Scale (GCS)	**No**	**%**
13-15	268	28.72
9-12	203	21.76
3-8	399	42.77
Missing	63	6.75
TOTAL	933	100.00

Figure 4.4. Glasgow Coma Scale (GCS) for Major Trauma Cases by Centre.

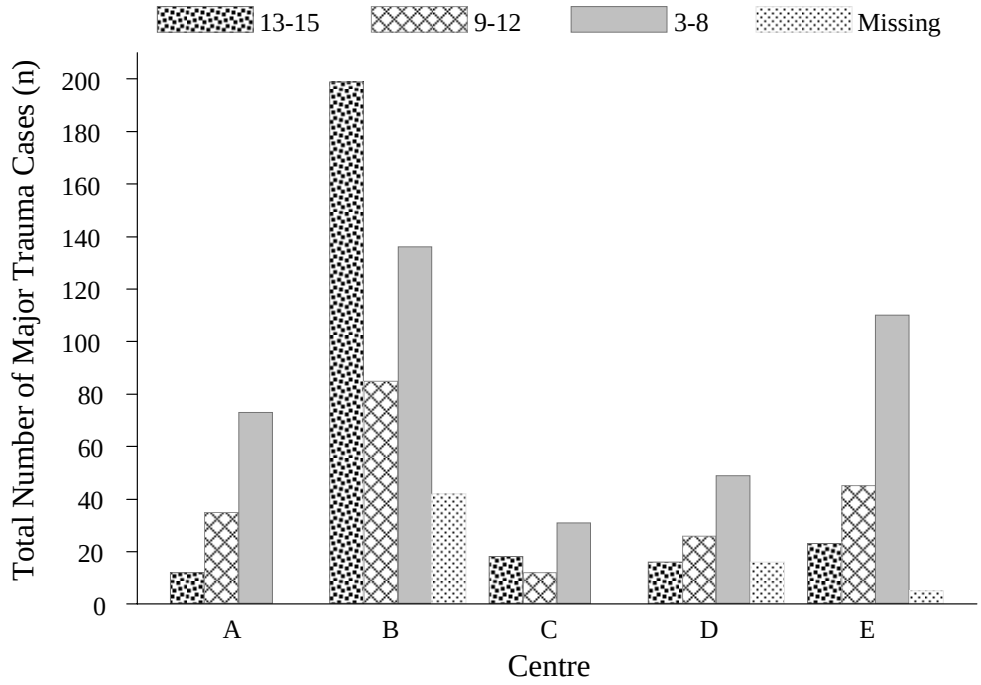


Figure 4.4a Glasgow Coma Scale (GCS) for Major Trauma Cases by Centre.

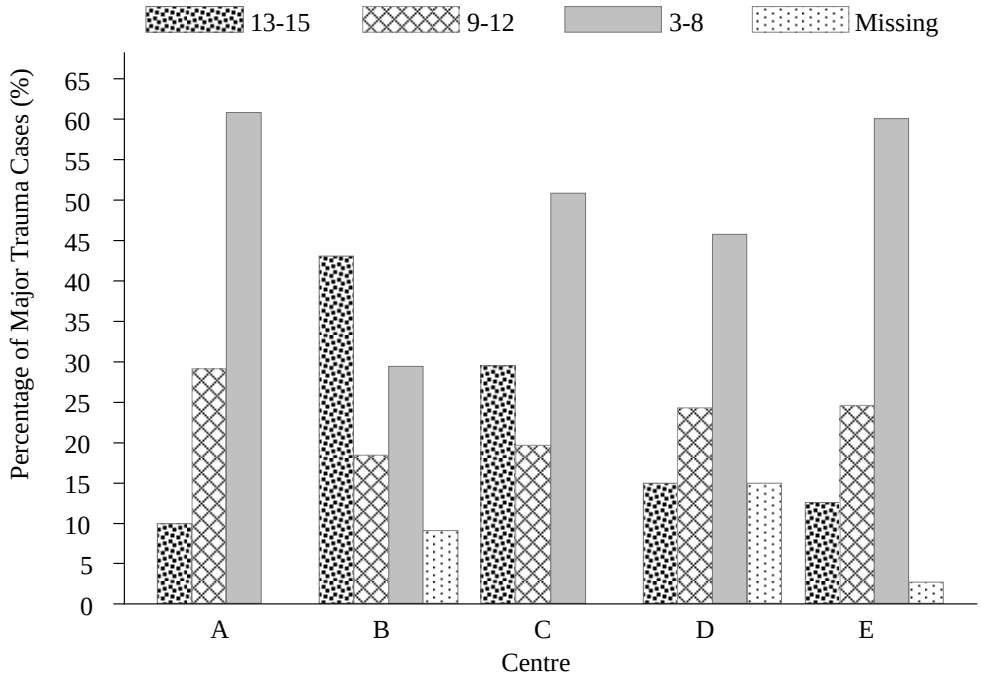


Table 4.4. Glasgow Coma Scale (GCS) for Major Trauma Cases by Centre.

Centre	Total	GSC Score							
		13-15		9-12		8-3		Missing	
		No	%	No	%	No	%	No	%
A	120	12	10	35	29.17	73	60.83	0	0
B	462	199	43.07	85	18.4	136	29.44	42	9.09
C	61	18	29.51	12	19.67	31	50.82	0	0
D	107	16	14.95	26	24.3	49	45.79	16	14.96
E	183	23	12.57	45	24.59	110	60.11	5	2.73
TOTAL	933	268	28.72	203	21.76	399	42.77	63	6.75

Figure 4.5. Non-Major Trauma Cases with Moderate Head Injury (GCS 9 – 12) by Centre.

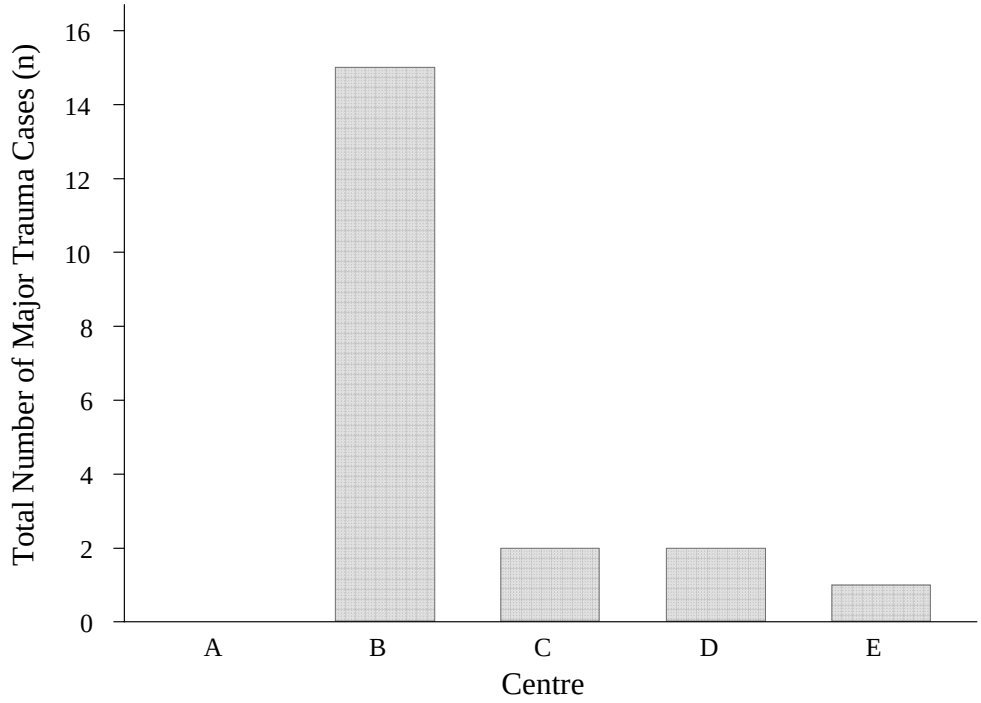


Figure 4.5a. Non-Major Trauma Cases with Moderate Head Injury (GCS 9 – 12) by Centre.

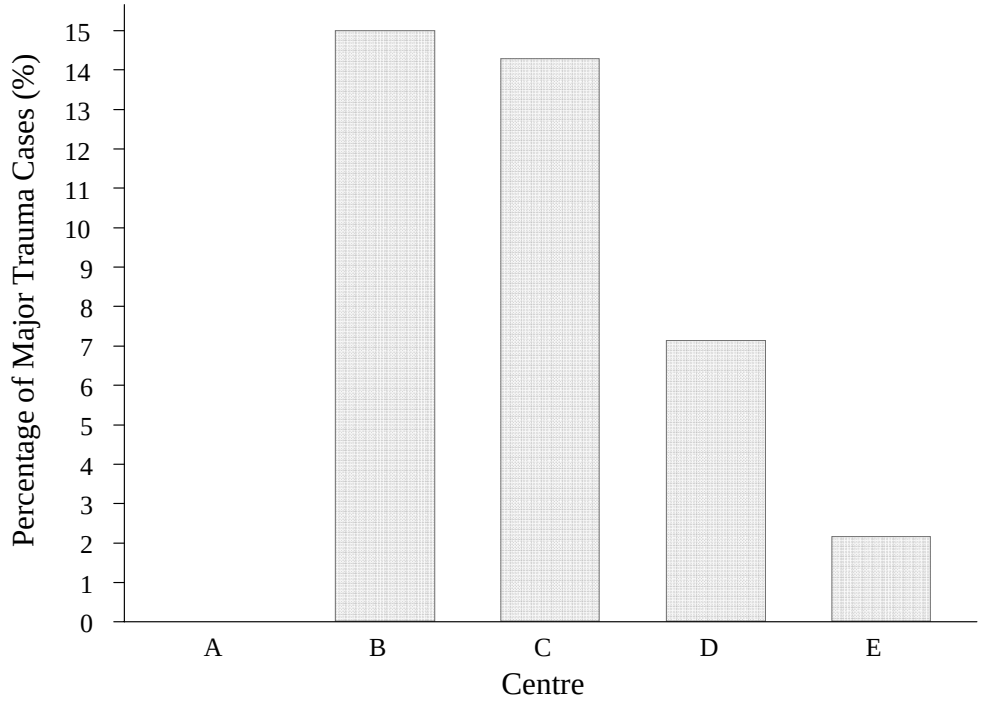


Table 4.5. Non-Major Trauma Cases with Moderate Head Injury (GCS 9 – 12) by Centre.

Centre	Total	Moderate Head Injury + Major Trauma		Moderate Head Injury + Non-Major Trauma	
		No	%	No	%
A	35	35	100.00	0	0.00
B	100	85	85.00	15	15.00
C	14	12	85.71	2	14.29
D	28	26	92.86	2	7.14
E	46	45	97.83	1	2.17
TOTAL	223	203	91.03	20	8.97

Moderate injury is defined as total GCS of between 9 and 12.
Major trauma cases is defined as

- Total ISS > 15 or
- Total ISS < 16 but any of the subsequent boxes (item 37 on the Notification CRF) is checked

Figure 4.6. Major Trauma Cases by RTS

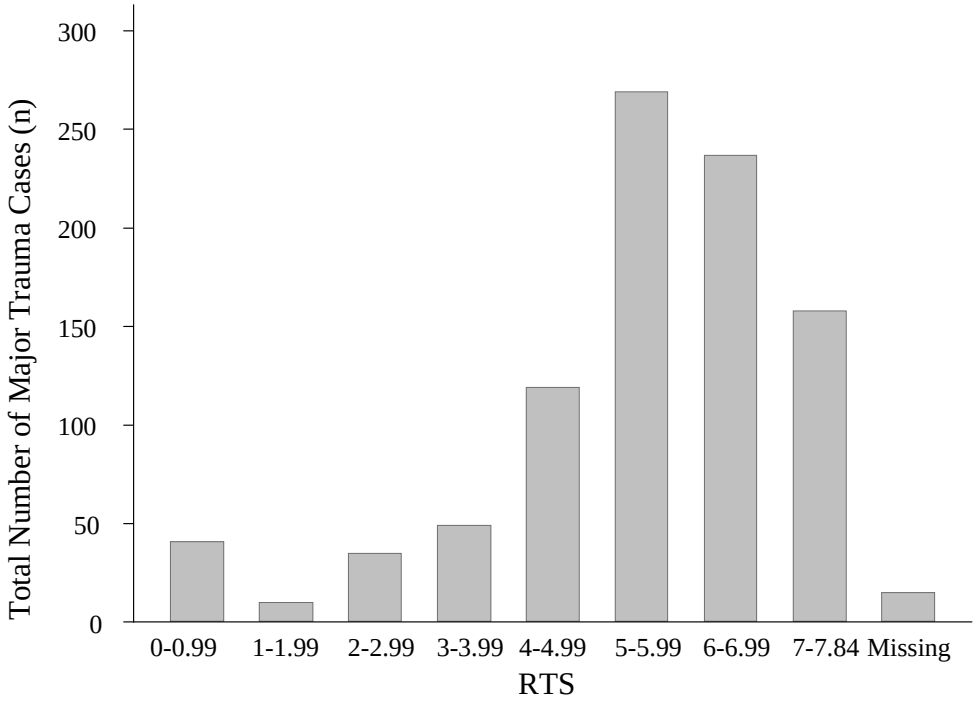


Figure 4.6a. Major Trauma Cases by RTS

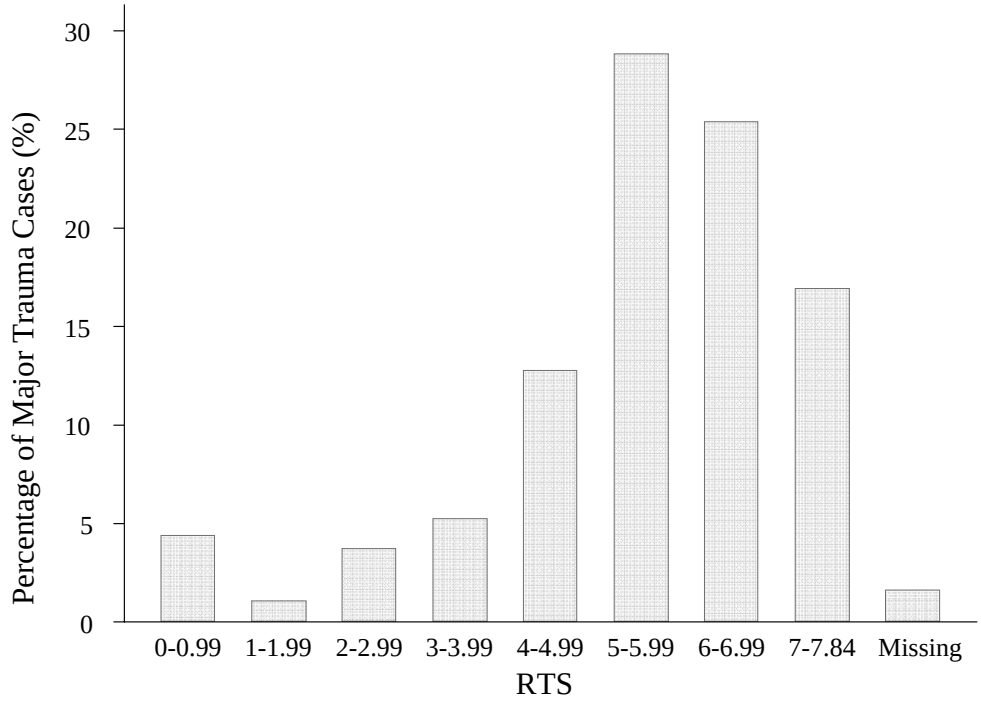


Table 4.6. Major Trauma Cases by RTS

RTS	**No**	**%**
0-0.99	41	4.39
1-1.99	10	1.07
2-2.99	35	3.75
3-3.99	49	5.25
4-4.99	119	12.75
5-5.99	269	28.83
6-6.99	237	25.40
7-7.84	158	16.93
Missing	15	1.63
TOTAL	933	100.00

Figure 4.7. RTS for Major Trauma Cases by Centre.

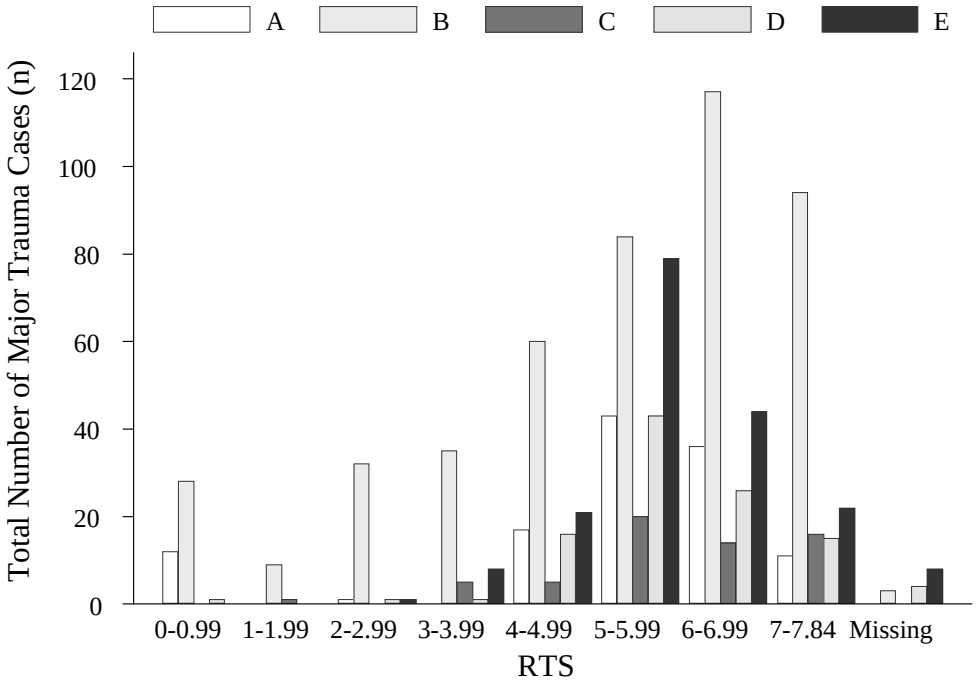


Figure 4.7a. RTS for Major Trauma Cases by Centre.

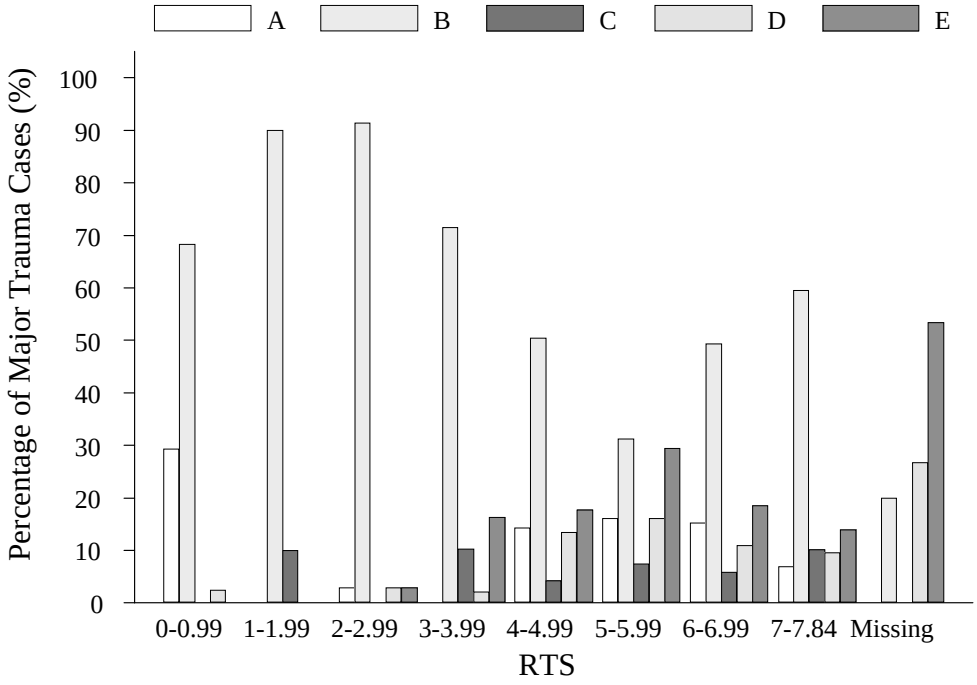


Table 4.7. RTS for Major Trauma Cases by Centre.

RTS	Total	Centre									
		A		B		C		D		E	
		No	%	No	%	No	%	No	%	No	%
0-0.99	41	12	29.27	28	68.29	0	0	1	2.44	0	0
1-1.99	10	0	0	9	90	1	10	0	0	0	0
2-2.99	35	1	2.86	32	91.43	0	0	1	2.86	1	2.86
3-3.99	49	0	0	35	71.43	5	10.2	1	2.04	8	16.33
4-4.99	119	17	14.29	60	50.42	5	4.2	16	13.45	21	17.65
5-5.99	269	43	15.99	84	31.23	20	7.43	43	15.99	79	29.37
6-6.99	237	36	15.19	117	49.37	14	5.91	26	10.97	44	18.57
7-7.84	158	11	6.96	94	59.49	16	10.13	15	9.49	22	13.92
Missing	15	0	0	3	20	0	0	4	26.67	8	53.33
TOTAL	933	120	12.86	462	49.52	61	6.54	107	11.47	183	19.61

Figure 4.8. Major Trauma Cases by Case-Reviewing Officer

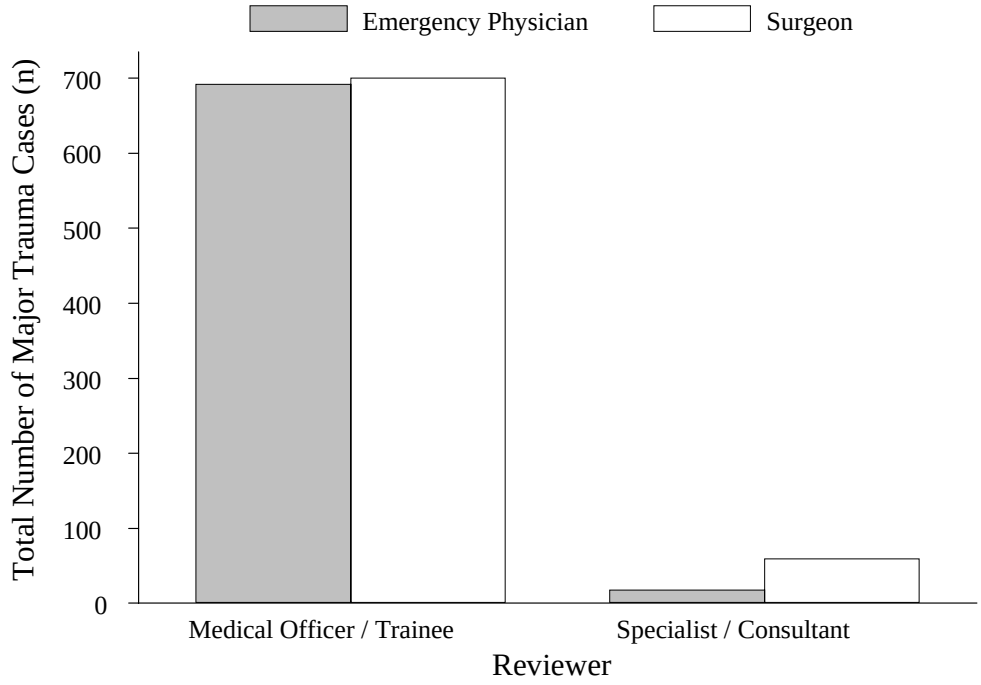


Figure 4.8a. Major Trauma Cases by Case-Reviewing Officer

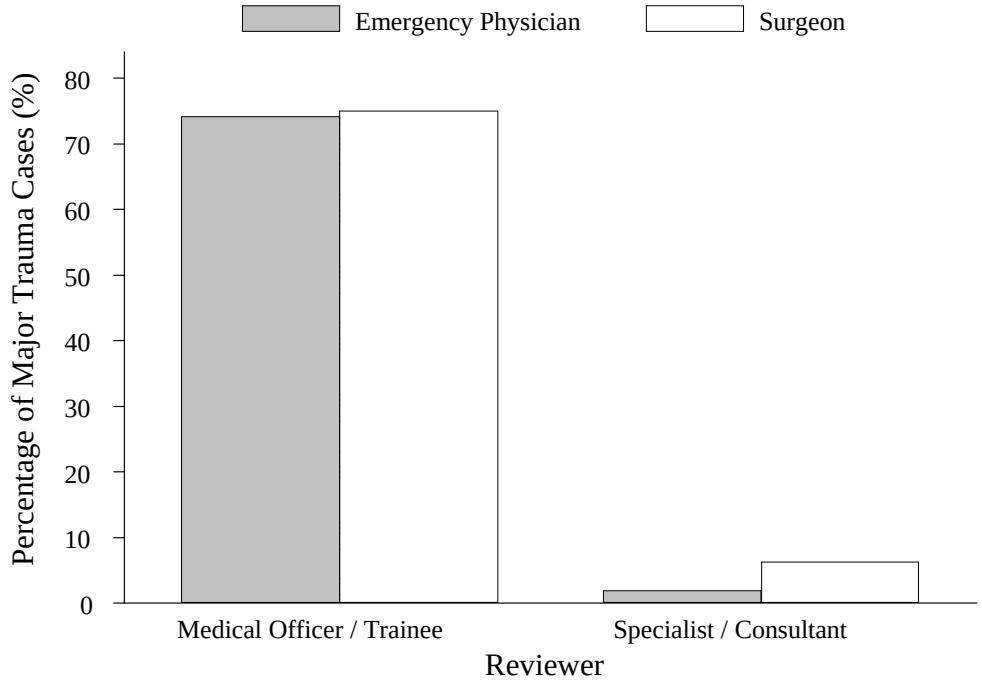


Table 4.8. Major Trauma Cases by Case-Reviewing Officer

Reviewed By	Emergency Physician		Surgeon	
	No	%	No	%
Medical Officer/Trainee	692	74.17	700	75.03
Specialist/Consultant	18	1.93	59	6.32
TOTAL	710	76.1	744	79.74

Figure 4.9. Disposition of Major Trauma Cases from ED

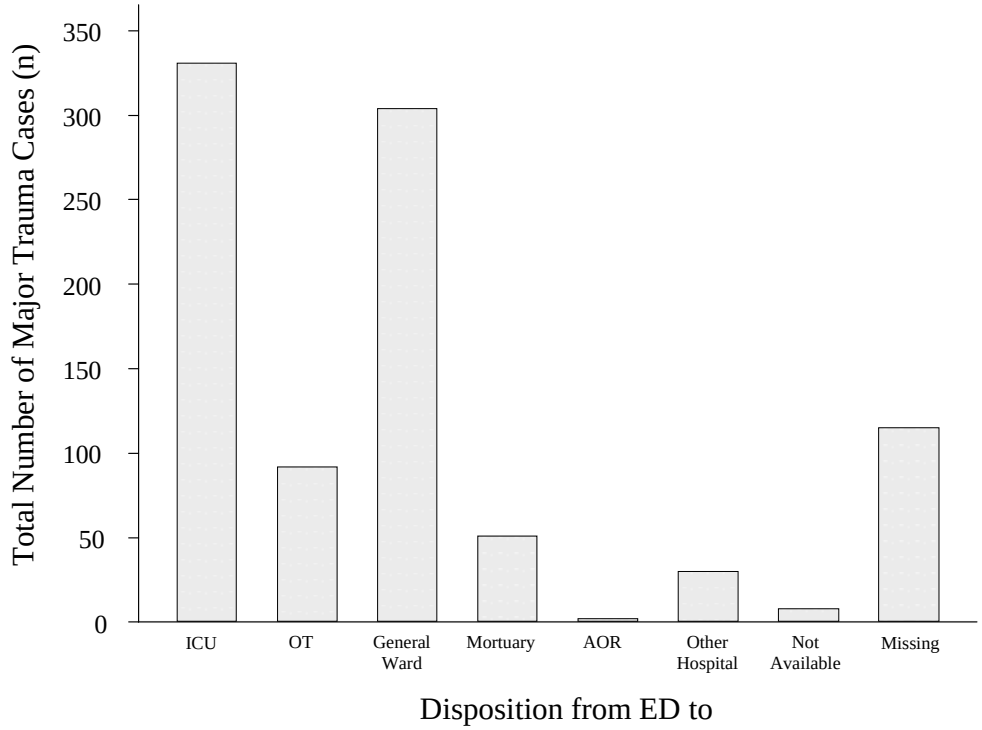


Figure 4.9a. Disposition of Major Trauma Cases from ED

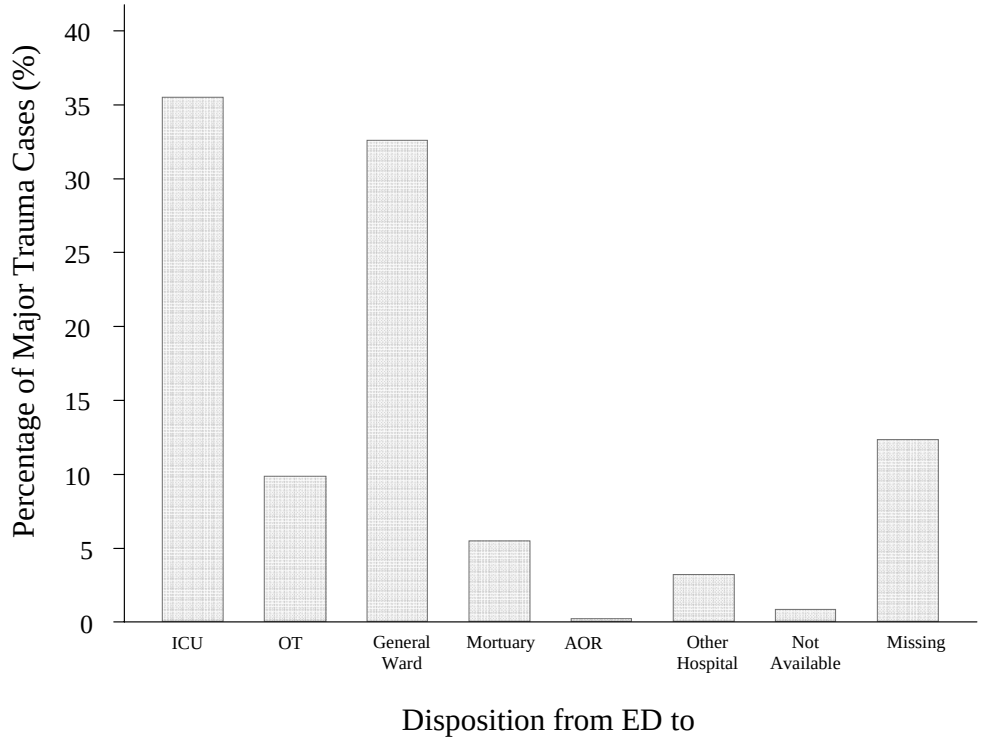


Table 4.9. Disposition of Major Trauma Cases from ED

Disposition From ED	**No**	**%**
ICU	331	35.48
OT	92	9.86
General Ward	304	32.58
Mortuary	51	5.47
AOR	2	0.21
Other Hospital	30	3.22
Not Available	8	0.86
Missing	115	12.32
TOTAL	933	100.00

Figure 4.10. Operative Management for Major Trauma Cases

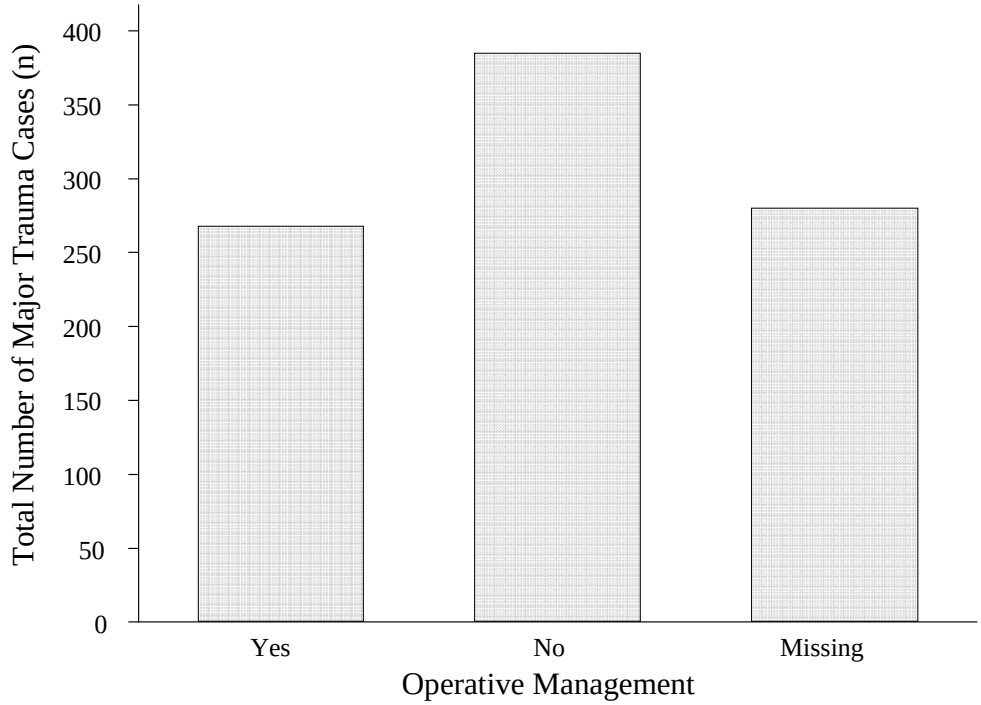


Figure 4.10a. Operative Management for Major Trauma Cases

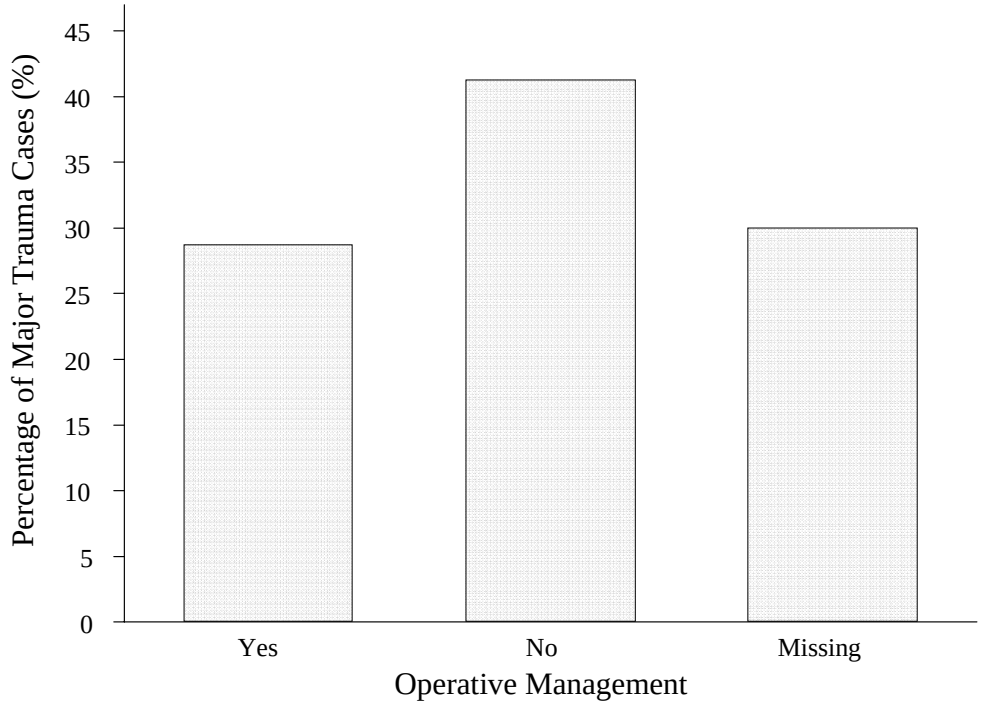


Table 4.10. Operative Management for Major Trauma Cases

Operative Management	**No**	**%**
Yes	268	28.72
No	385	41.26
Missing	280	30.02
TOTAL	933	100.00

Figure 4.11. Operative Procedure for Major Trauma Cases

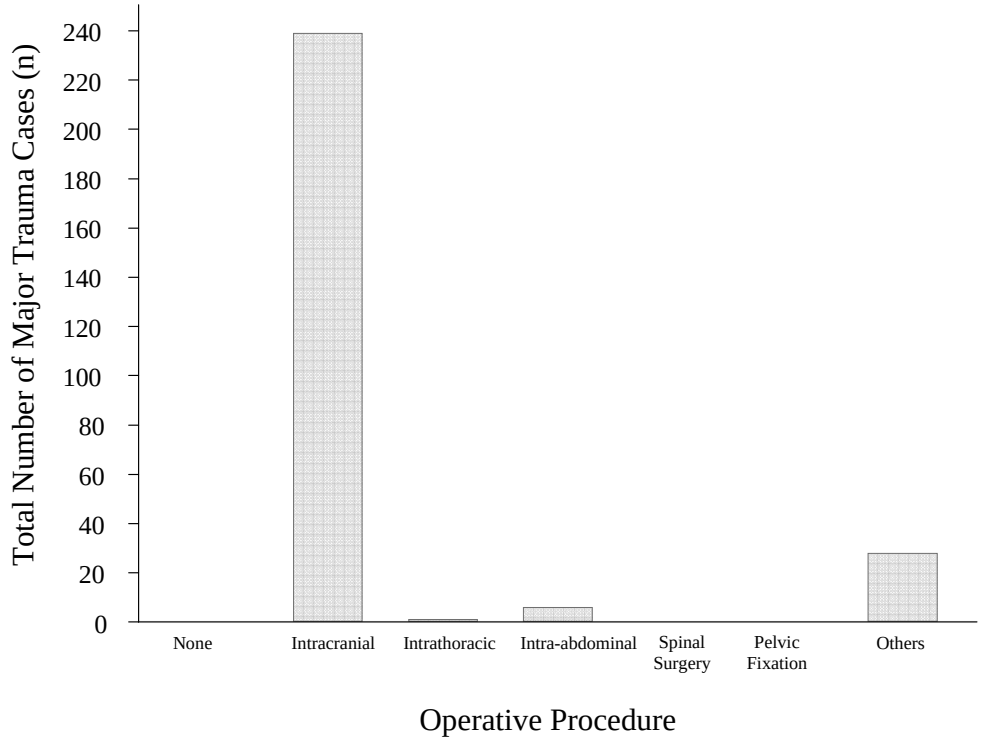


Figure 4.11a. Operative Procedure for Major Trauma Cases

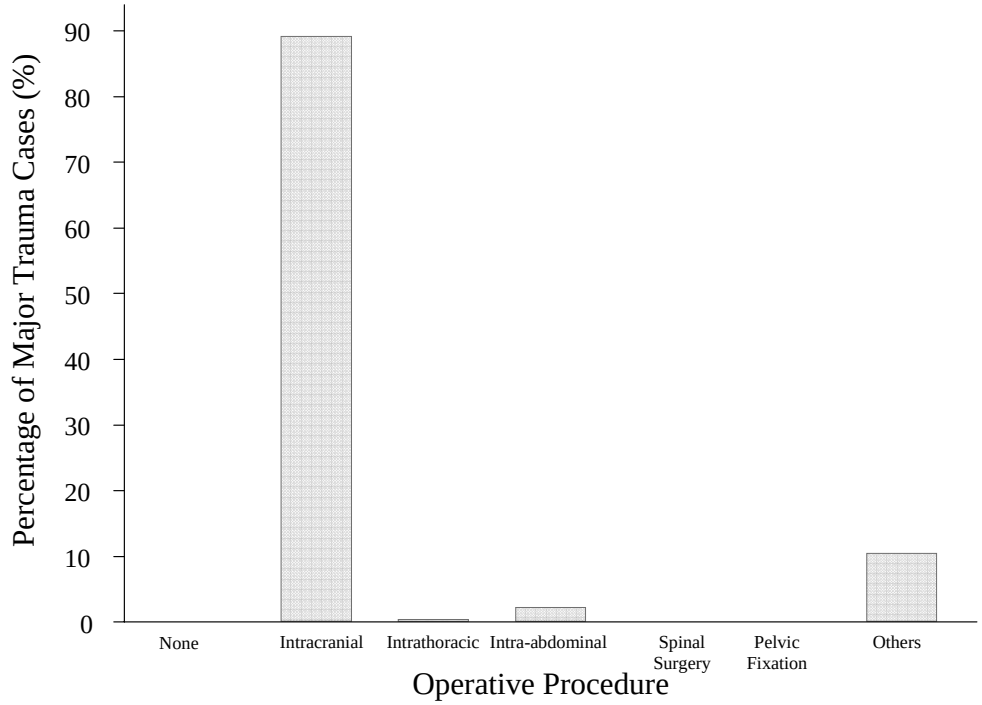


Table 4.11. Operative Procedure for Major Trauma Cases

Operative Procedure	**No**	**%**
None	0	0
Intracranial	239	87.23
Intrathoracic	1	0.36
Intra-abdominal	6	2.19
Spinal Surgery	0	0
Pelvic Fixation	0	0
Others	28	10.22
TOTAL	274	100

Figure 4.12. Traumatic Brain Injuries for Major Trauma Cases by Centre

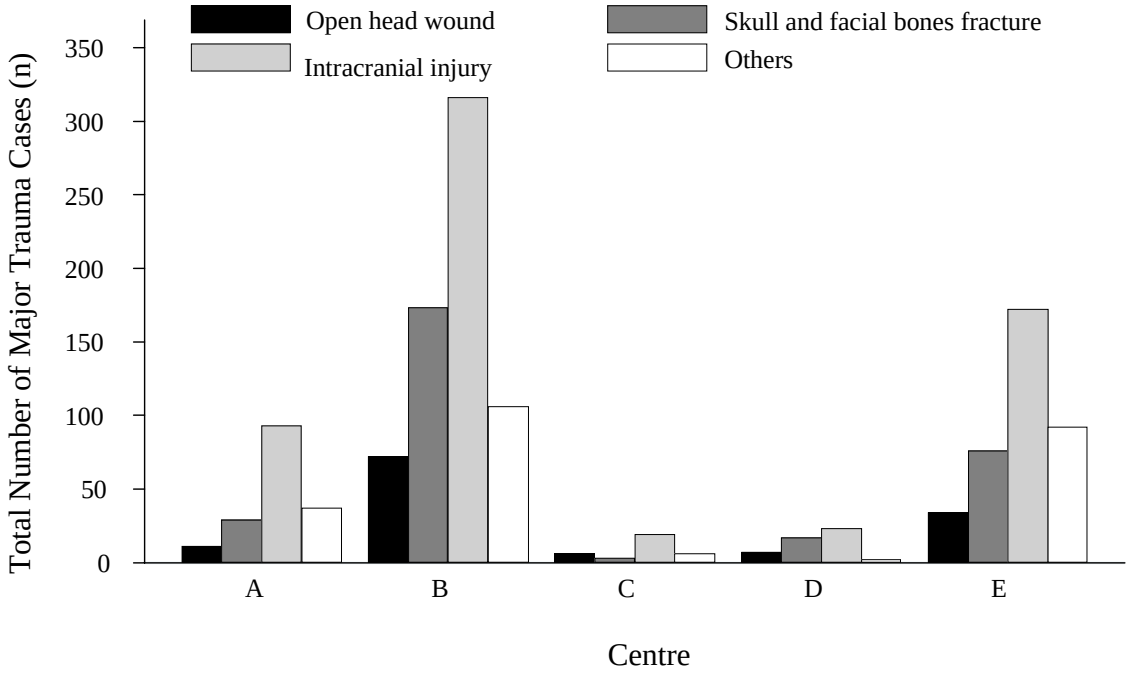


Figure 4.12a. Traumatic Brain Injuries for Major Trauma Cases by Centre

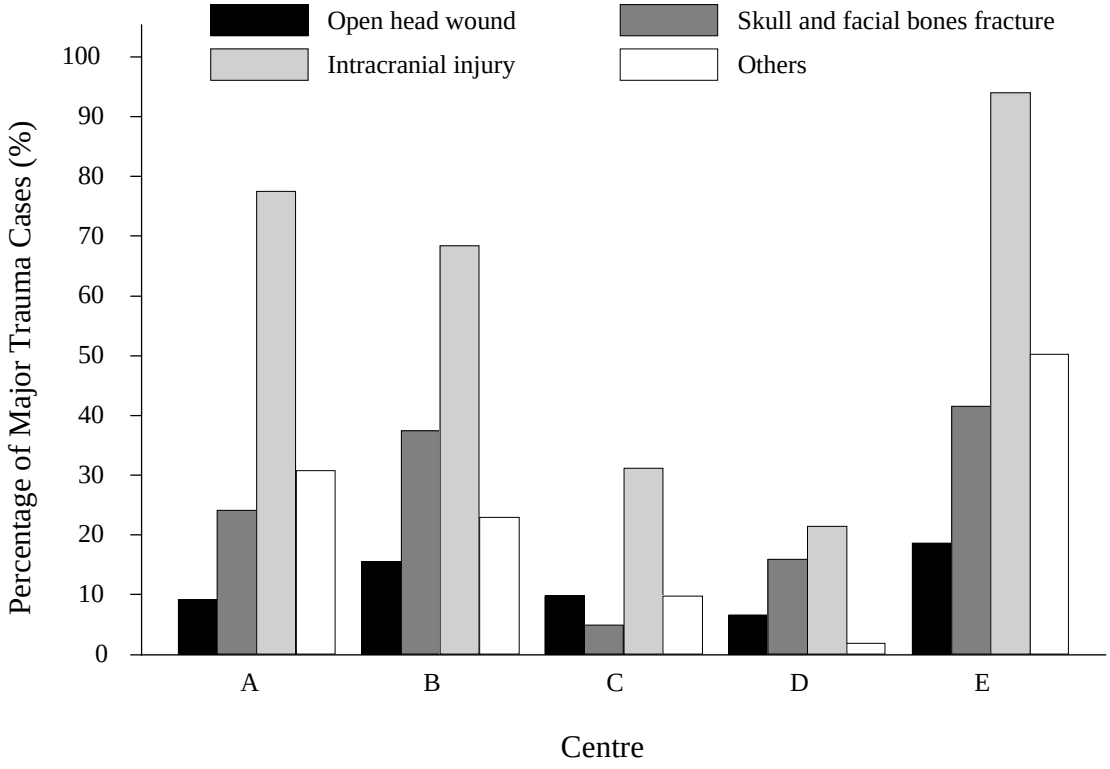


Table 4.12. Traumatic Brain Injuries for Major Trauma Cases by Centre

Traumatic Brain Injuries		Open head wound		Skull and facial bones fracture		Intracranial injury		Others	
Centre	**Total**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
A	120	11	9.17	29	24.17	93	77.50	37	30.83
B	462	72	15.58	173	37.45	316	68.40	106	22.94
C	61	6	9.84	3	4.92	19	31.15	6	9.84
D	107	7	6.54	17	15.89	23	21.50	2	1.87
E	183	34	18.58	76	41.53	172	93.99	92	50.27
TOTAL	933	130	13.93	298	31.94	623	66.77	243	26.05

Table 4.13. Intracranial Injury for Major Trauma Cases by Centre

Intracranial Injury		Concussion		Traumatic cerebral oedema		Diffuse brain injury		Focal brain injury		Epidural haemorrhage		Traumatic subdural haemorrhage		Traumatic subarachnoid haemorrhage		Prolonged coma		Others		Unspecified	
Centre	**Total**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
A	120	16	13.33	20	16.67	8	6.67	3	2.50	1	0.83	30	25.00	19	15.83	0	0.00	3	2.50	0	0.00
B	462	16	3.46	9	1.95	13	2.81	56	12.12	92	19.91	108	23.38	29	6.28	0	0.00	15	3.25	4	0.87
C	61	4	6.56	4	6.56	1	1.64	0	0.00	0	0.00	3	4.92	4	6.56	0	0.00	3	4.92	1	1.64
D	107	4	3.74	12	11.21	1	0.93	8	7.48	7	6.54	7	6.54	6	5.61	1	0.93	5	4.67	0	0.00
E	183	10	5.46	15	8.20	43	23.50	2	1.09	41	22.40	45	24.59	15	8.20	3	1.64	5	2.73	3	1.64
TOTAL	933	50	5.36	60	6.43	66	7.07	69	7.40	141	15.11	193	20.69	73	7.82	4	0.43	31	3.32	8	0.86

Figure 4.14. Types of Intracranial Procedures for Major Trauma Cases

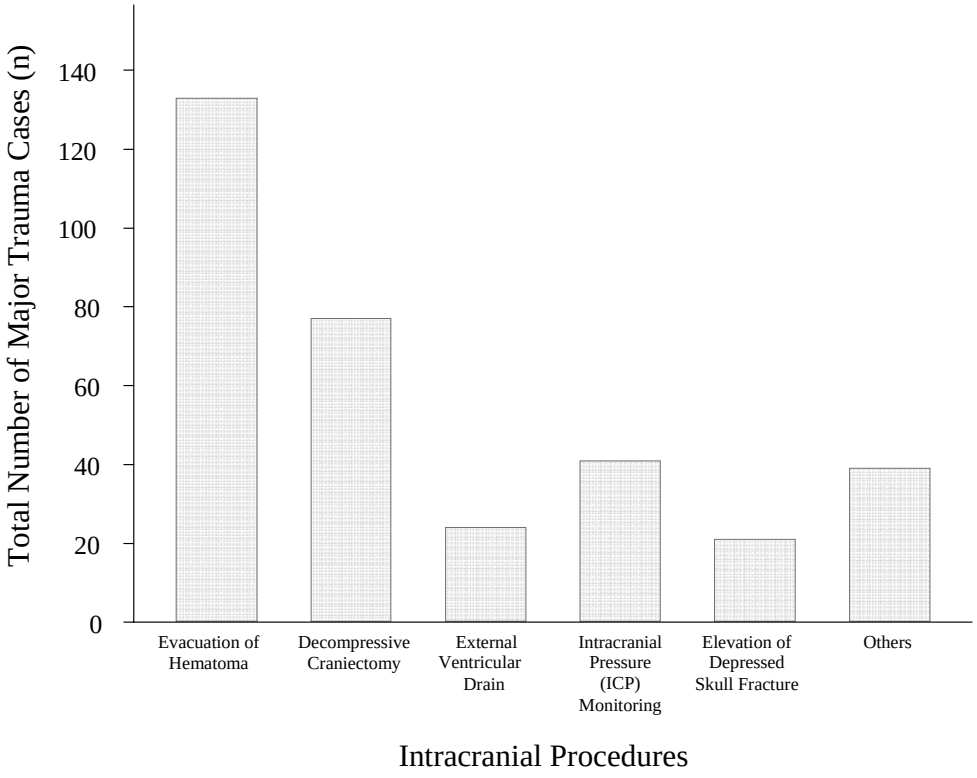


Figure 4.14a. Types of Intracranial Procedures for Major Trauma Cases

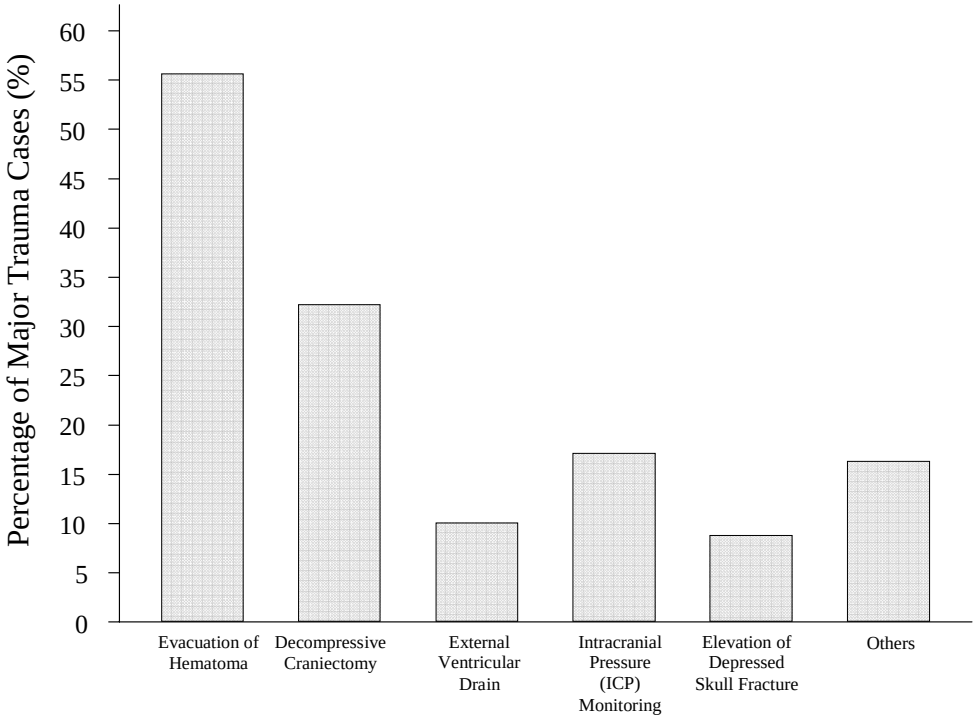


Table 4.14. Operative Procedure for Major Trauma Cases

Operative Procedure	**Intracranial**	**No**	**%**
None		0	0.00
Intracranial		239	89.18
	Evacuation of Hematoma	133	55.65
	Decompressive Craniectomy	77	32.22
	External Ventricular Drain	24	10.04
	Intracranial Pressure(ICP) Monitoring	41	17.15
	Elevation of Depressed Skull Fracture	21	8.79
	Others	39	16.32
Intrathoracic		1	0.37
Intra-abdominal		6	2.24
Spinal Surgery		0	0.00
Pelvic Fixation		0	0.00
Others		28	10.45

Chapter 5: Outcome

Figure 5.1. Outcome for Major Trauma Cases by Centre

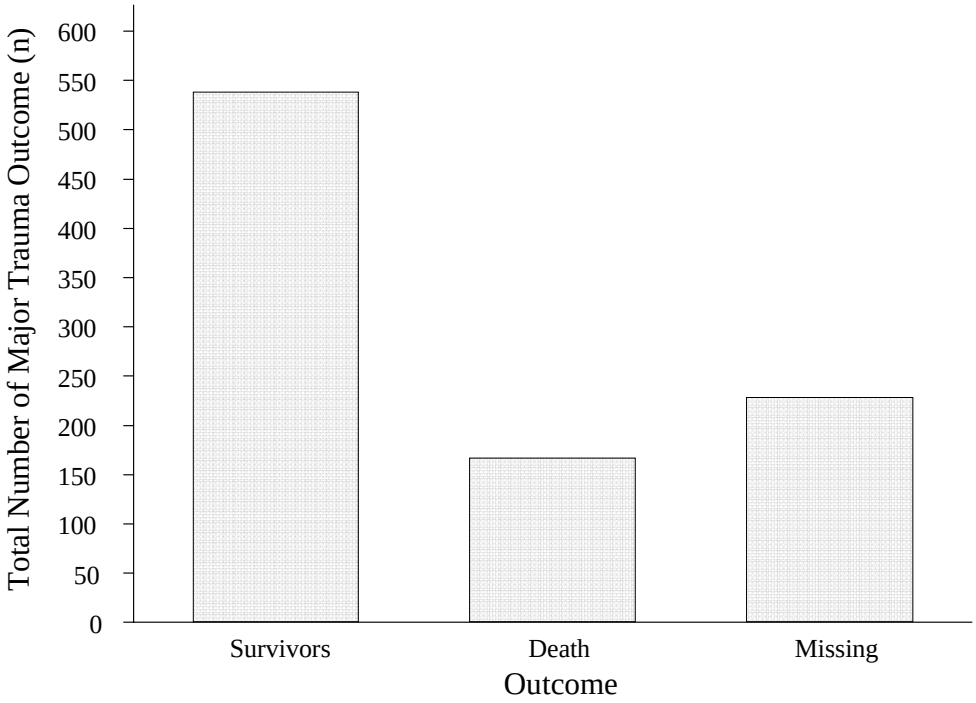


Figure 5.1a. Outcome for Major Trauma Cases by Centre

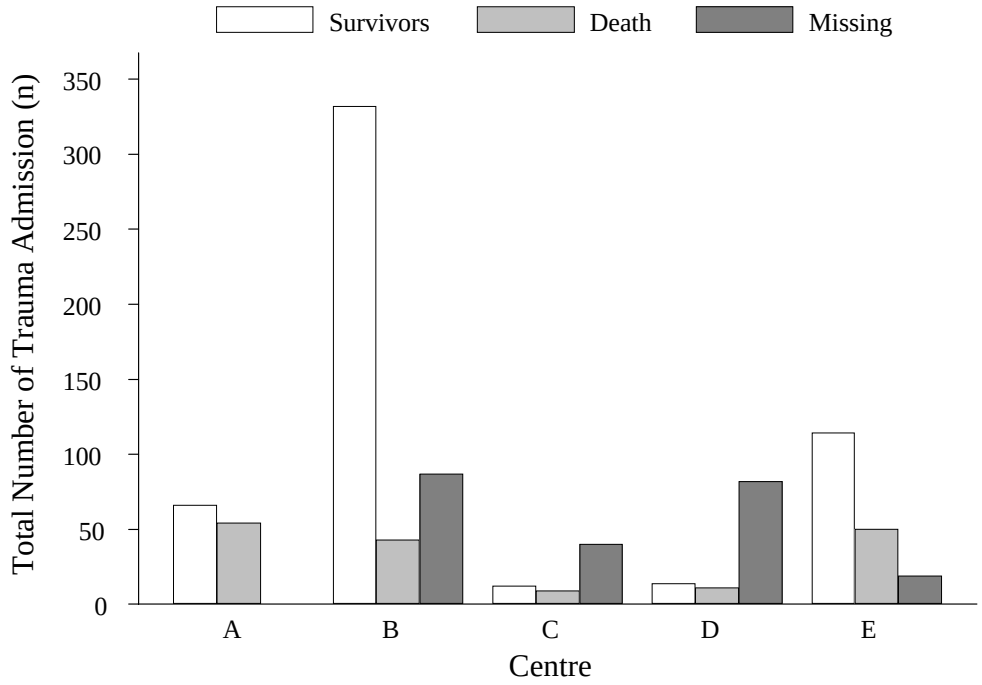


Figure 5.1b. Outcome for Major Trauma Cases by Centre

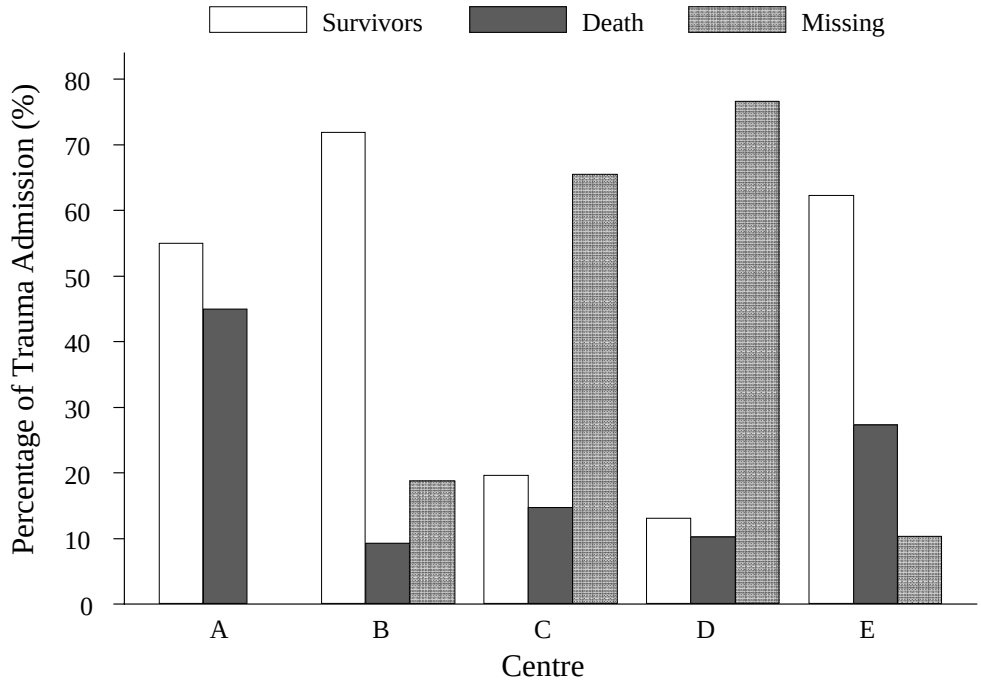


Table 5.1a. Outcome for Major Trauma Cases by Centre

Centre	Survivors		Death		Missing	
	No	%	No	%	No	%
A	66	55	54	45	0	0
B	332	71.86	43	9.31	87	18.83
C	12	19.67	9	14.75	40	65.57
D	14	13.08	11	10.28	82	76.64
E	114	62.3	50	27.32	19	10.38
TOTAL	538	57.66	167	17.9	228	24.44

Figure 5.2. Disposition of Survivors at Discharge for Major Trauma Cases

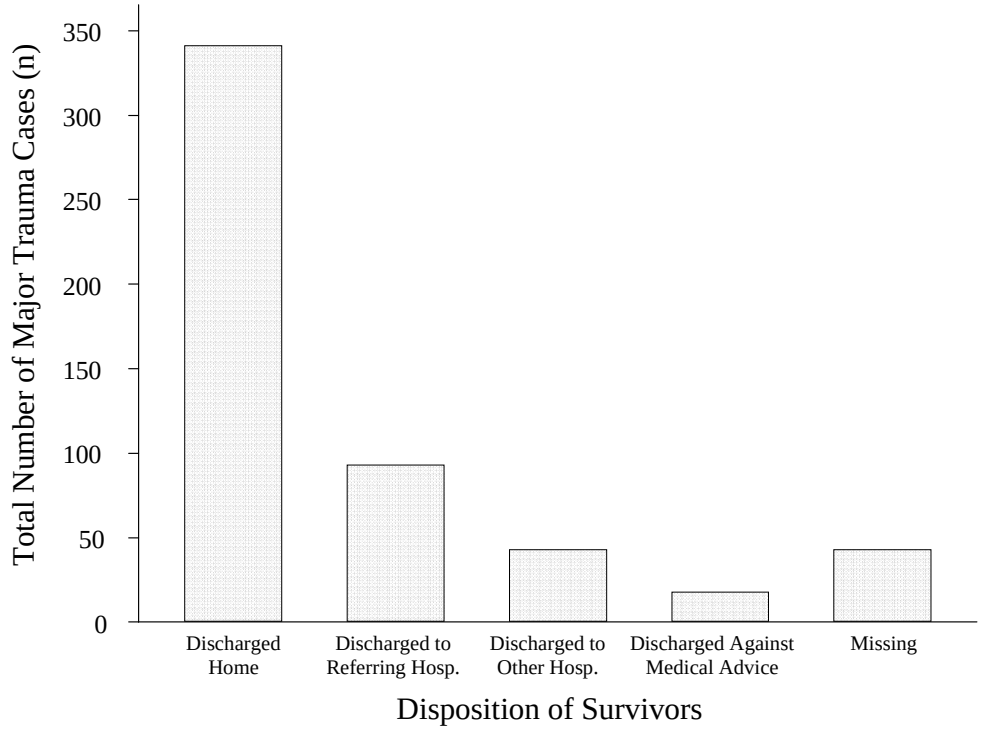


Figure 5.2a. Disposition of Survivors at Discharge for Major Trauma Cases

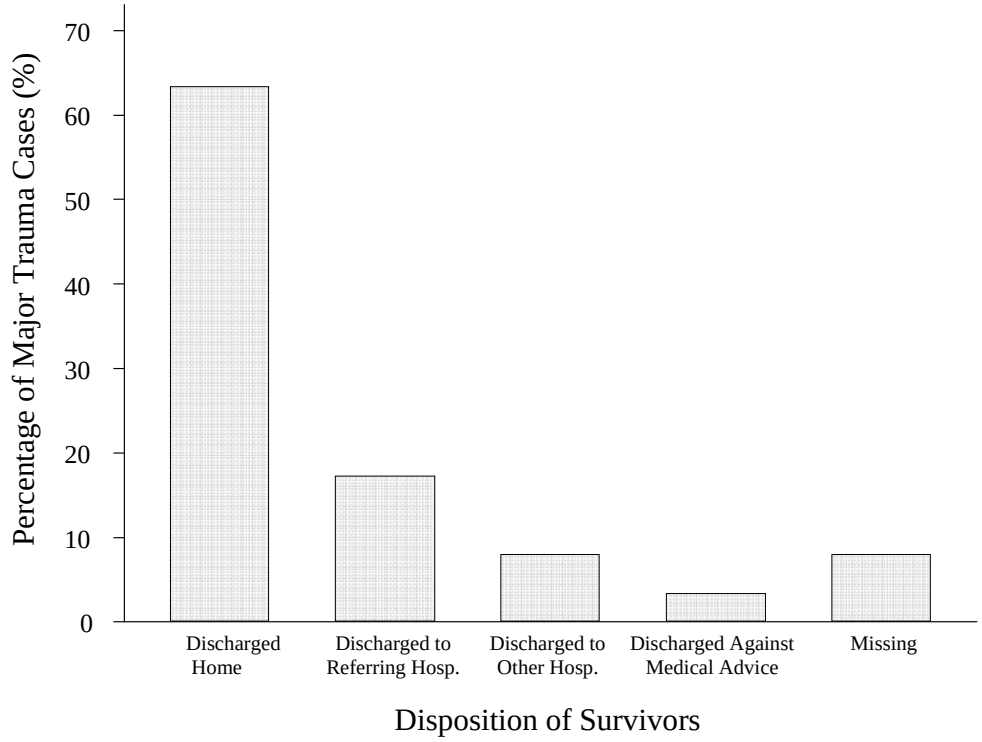


Figure 5.2b. Total Disposition of Survivors at Discharge for Major Trauma Cases

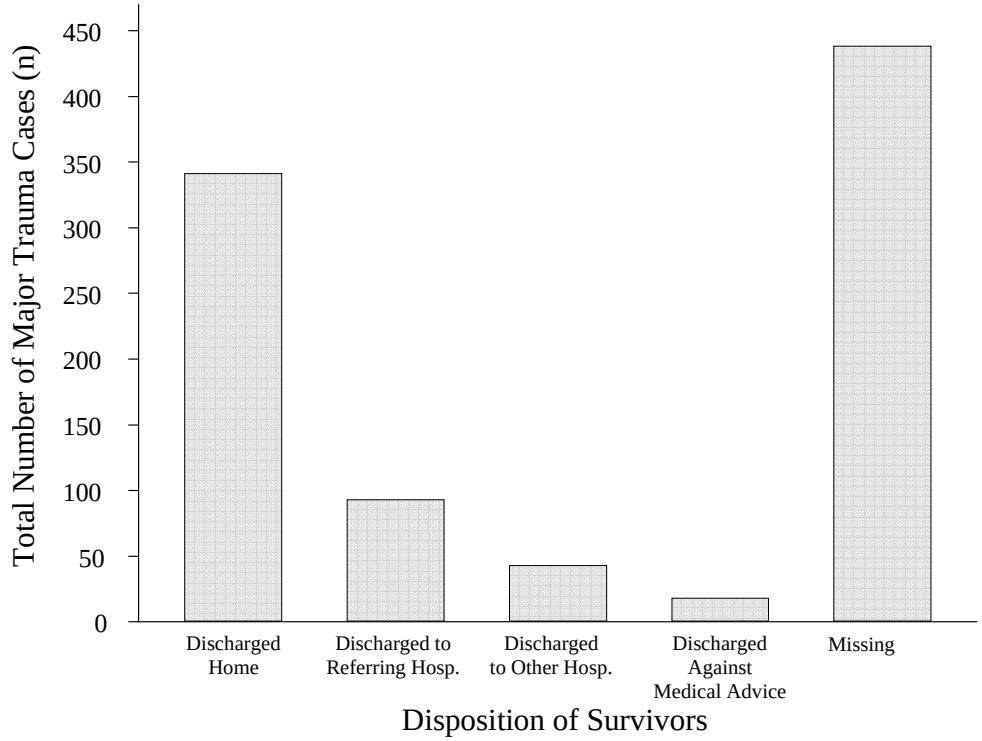


Table 5.2. Disposition of Survivors at Discharge for Major Trauma Cases

Discharge Alive Disposition	Total	Alive	
		No	%
Discharge Home	341	341	63.38
Discharge to Referring Hosp.	93	93	17.29
Discharge to Other Hosp.	43	43	7.99
Discharge Against Medical Advice	18	18	3.35
Missing	438	43	7.99
TOTAL	933	538	100.00

Figure 5.3. Outcome for Major Trauma Cases by Age Group

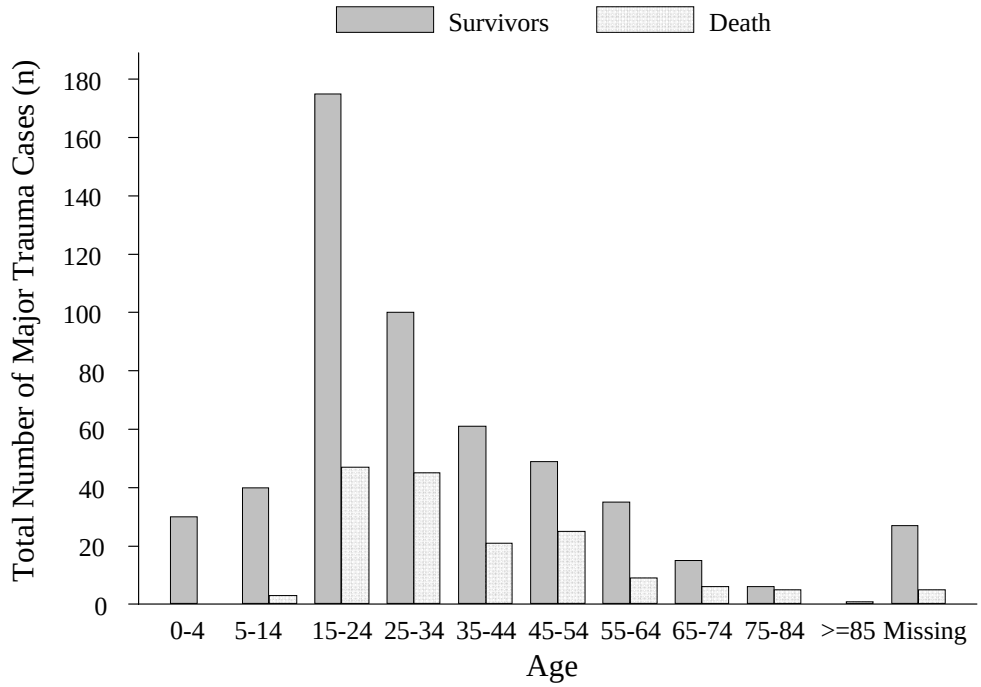


Figure 5.3a. Outcome for Major Trauma Cases by Age Group

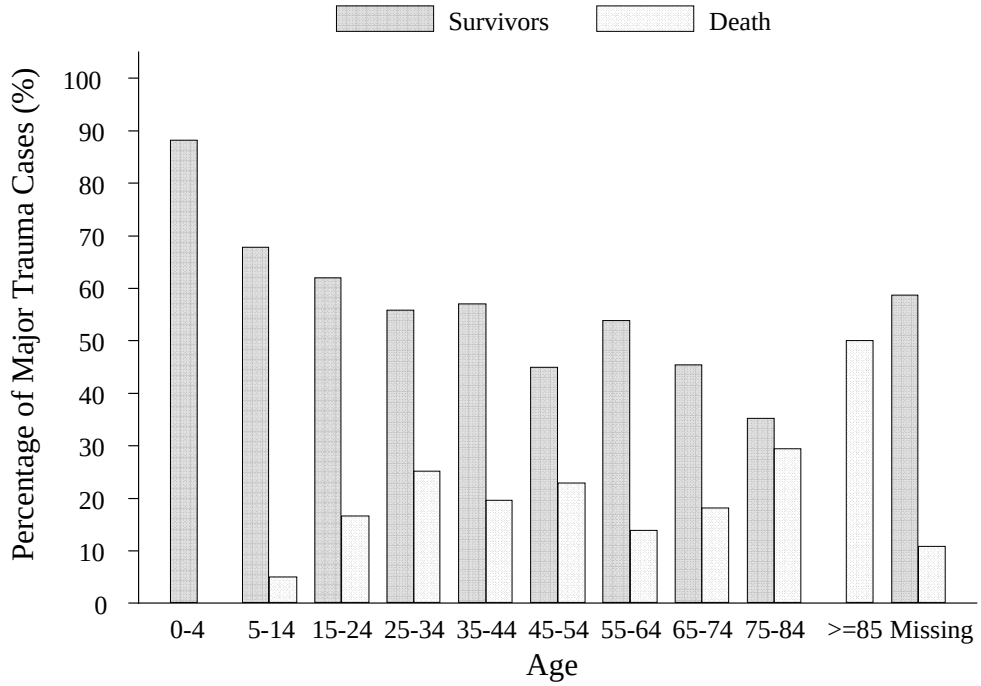


Table 5.3. Outcome for Major Trauma Cases by Age Group

Age	Total	Survivors		Death	
		No	%	No	%
0-4	34	30	88.24	0	0
5-14	59	40	67.8	3	5.08
15-24	282	175	62.06	47	16.67
25-34	179	100	55.87	45	25.14
35-44	107	61	57.01	21	19.63
45-54	109	49	44.95	25	22.94
55-64	65	35	53.85	9	13.85
65-74	33	15	45.45	6	18.18
75-84	17	6	35.29	5	29.41
>=85	2	0	0	1	50
Missing	46	27	58.7	5	10.87
TOTAL	933	538	57.66	167	17.9

Figure 5.4. Type of Road Traffic Accident for Major Trauma Cases

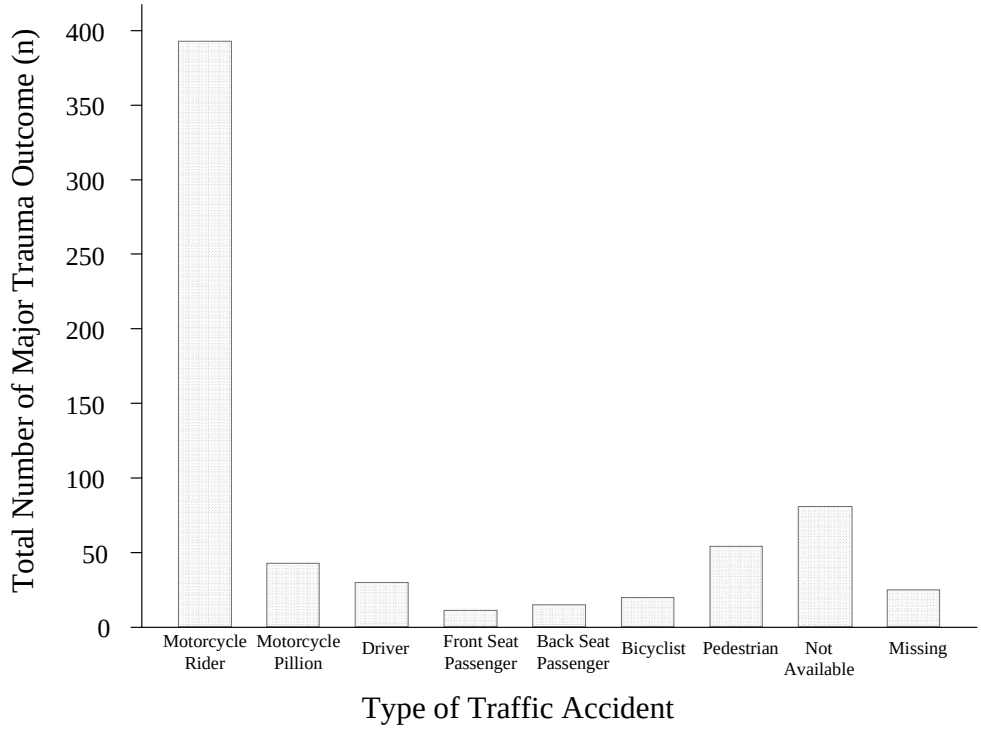


Figure 5.4a. Outcome for Major Trauma Cases by Type of Road Traffic Accident

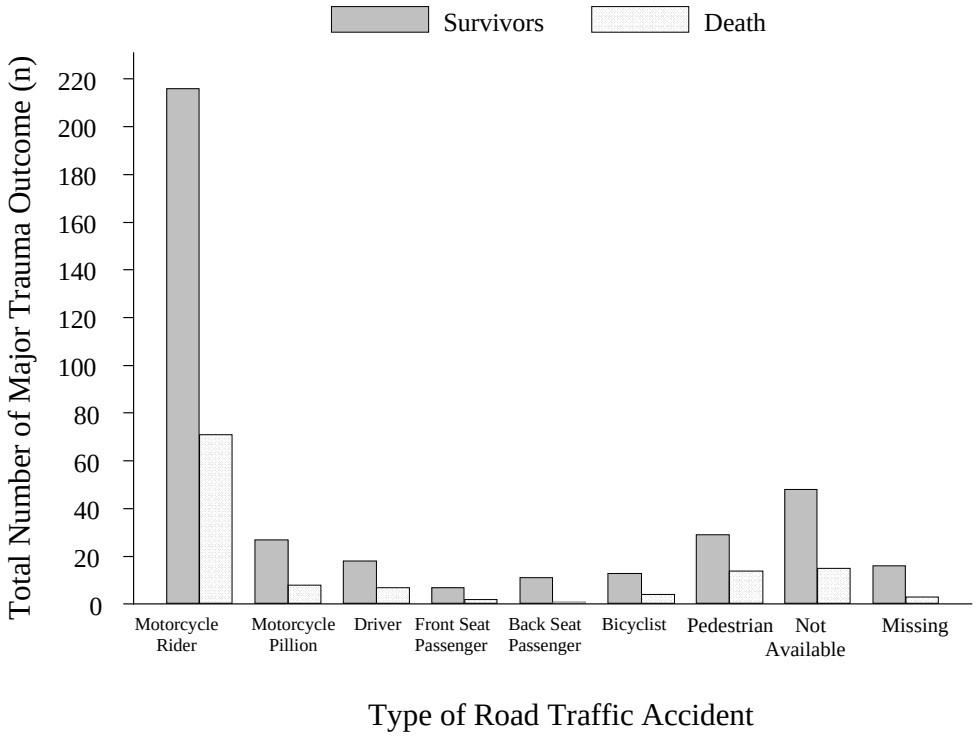


Figure 5.4b. Outcome for Major Trauma Cases by Type of Road Traffic Accident

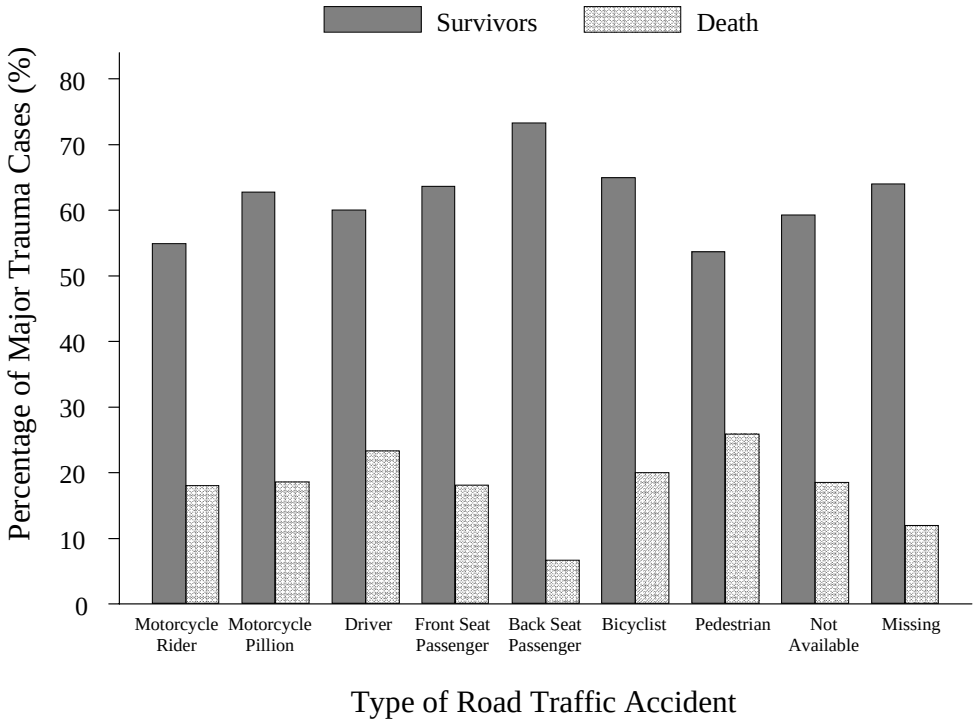


Table 5.4. Outcome for Major Trauma Cases by Type of Road Traffic Accident

Type of Road Traffic Accident	Total	Survivors		Death	
		No	%	No	%
Motorcycle Rider	393	216	54.96	71	18.07
Motorcycle Pillion	43	27	62.79	8	18.60
Driver	30	18	60.00	7	23.33
Front Seat Passenger	11	7	63.64	2	18.18
Back Seat Passenger	15	11	73.33	1	6.67
Bicyclist	20	13	65.00	4	20.00
Pedestrian	54	29	53.70	14	25.93
Not Available	81	48	59.26	15	18.52
Missing	25	16	64.00	3	12.00
TOTAL	672	385	57.29	125	18.60

Figure 5.5. Outcome for Major Trauma Cases by Admission Type

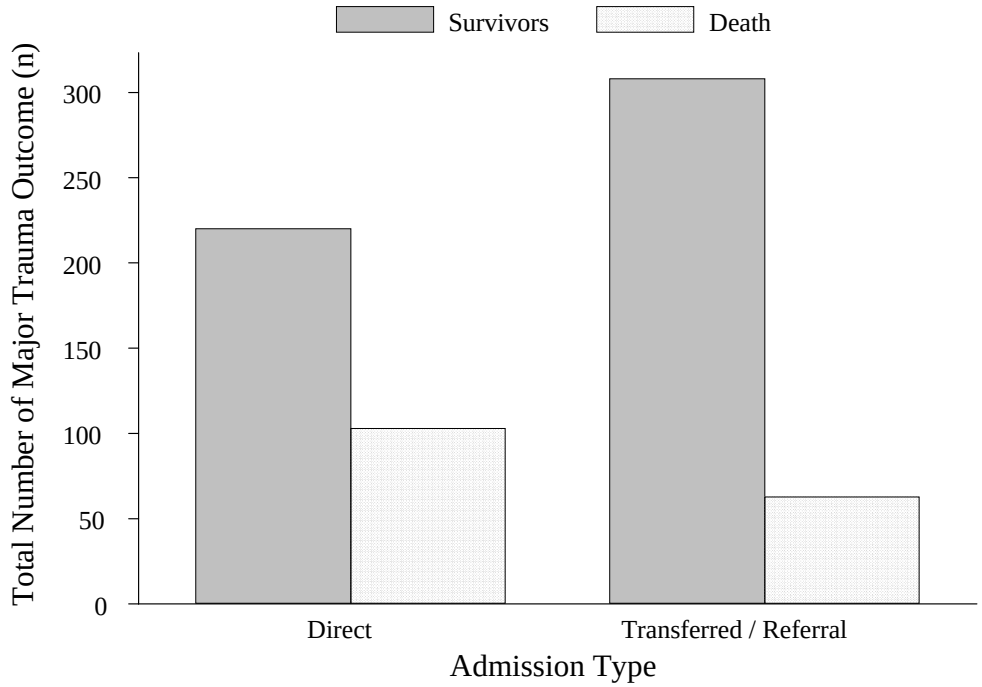


Figure 5.5a. Outcome for Major Trauma Cases by Admission Type

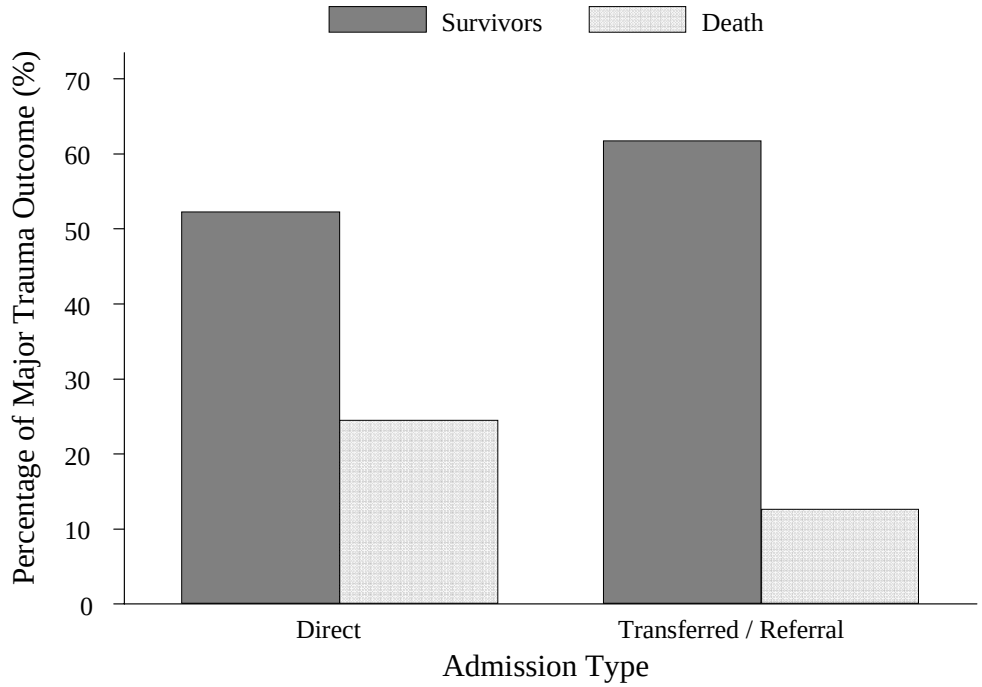


Table 5.5. Outcome for Major Trauma Cases by Admission Type

Type of Admission	Total	Survivors		Death	
		No	%	No	%
Direct	421	220	52.26	103	24.47
Transferred / Referral	499	308	61.72	63	12.63
Missing	13	10	76.92	1	7.69
TOTAL	933	538	57.66	167	17.90

Figure 5.6. Outcome for Major Trauma Cases by Injury Site

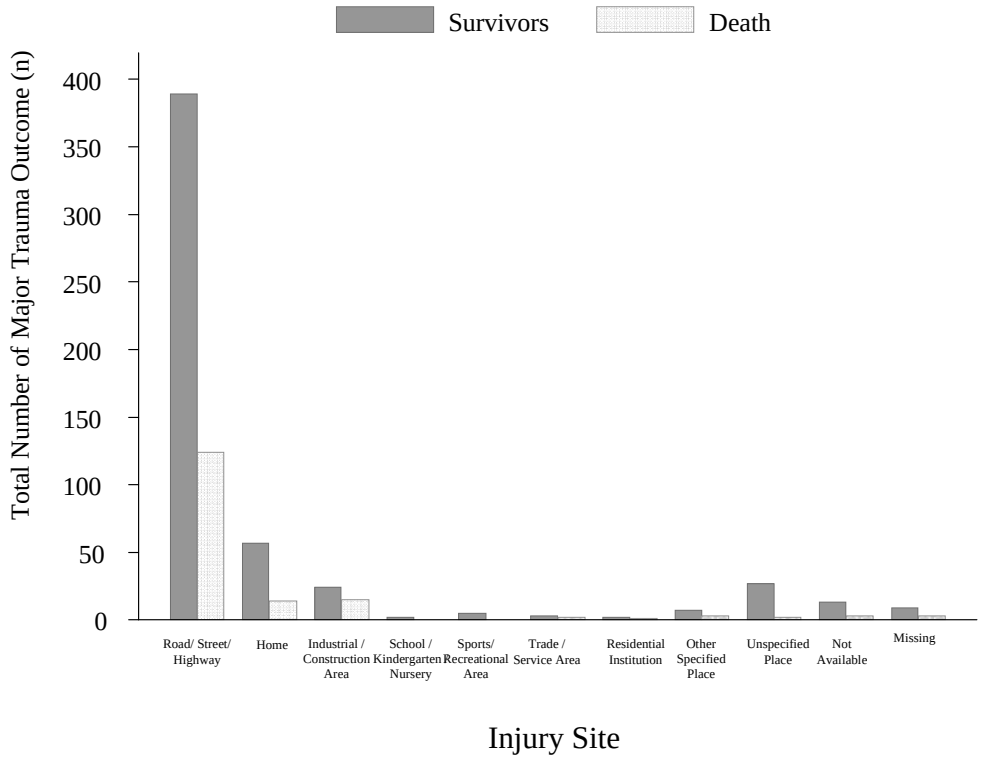


Figure 5.6a. Outcome for Major Trauma Cases by Injury Site

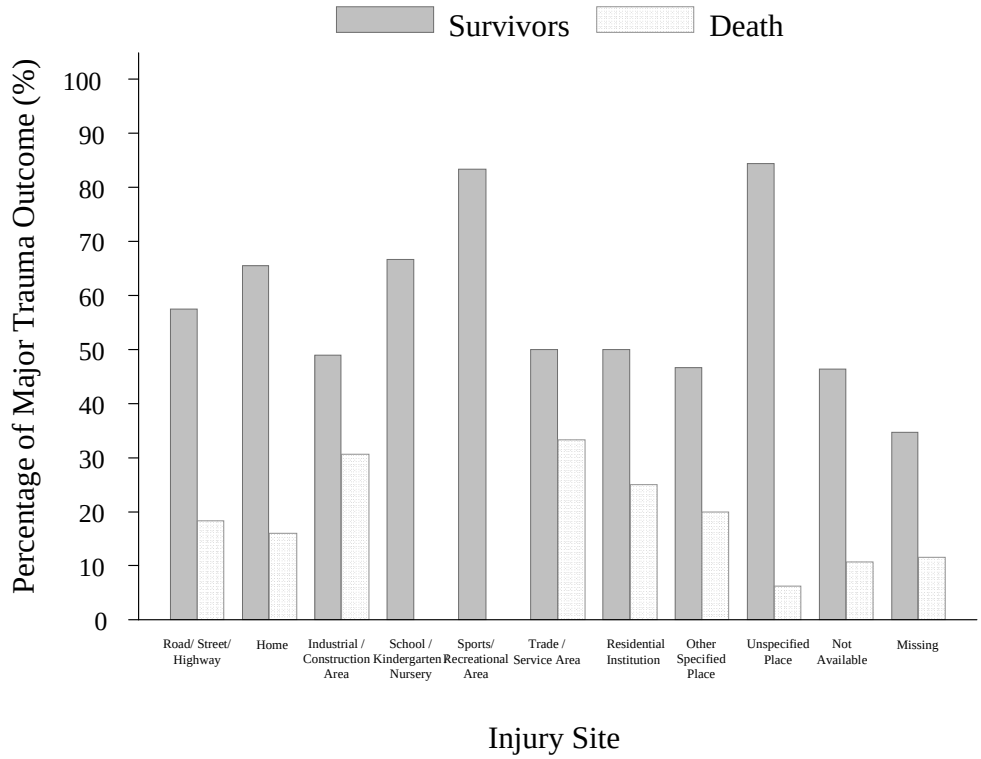


Table 5.6. Outcome for Major Trauma Cases by Injury Site

Injury Site	Total	Survivors		Death	
		No	%	No	%
Road/ Street/ Highway	677	389	57.46	124	18.32
Home	87	57	65.52	14	16.09
Industrial / Construction Area	49	24	48.98	15	30.61
School / Kindergarten / Nursery	3	2	66.67	0	0.00
Sports / Recreational Area	6	5	83.33	0	0.00
Trade / Service Area	6	3	50.00	2	33.33
Residential Institution	4	2	50.00	1	25.00
Other Specified Place	15	7	46.67	3	20.00
Unspecified Place	32	27	84.38	2	6.25
Not Available	28	13	46.43	3	10.71
Missing	26	9	34.62	3	11.54
TOTAL	933	538	57.66	167	17.90

Figure 5.7. Outcome for Major Trauma Cases by Systolic BP

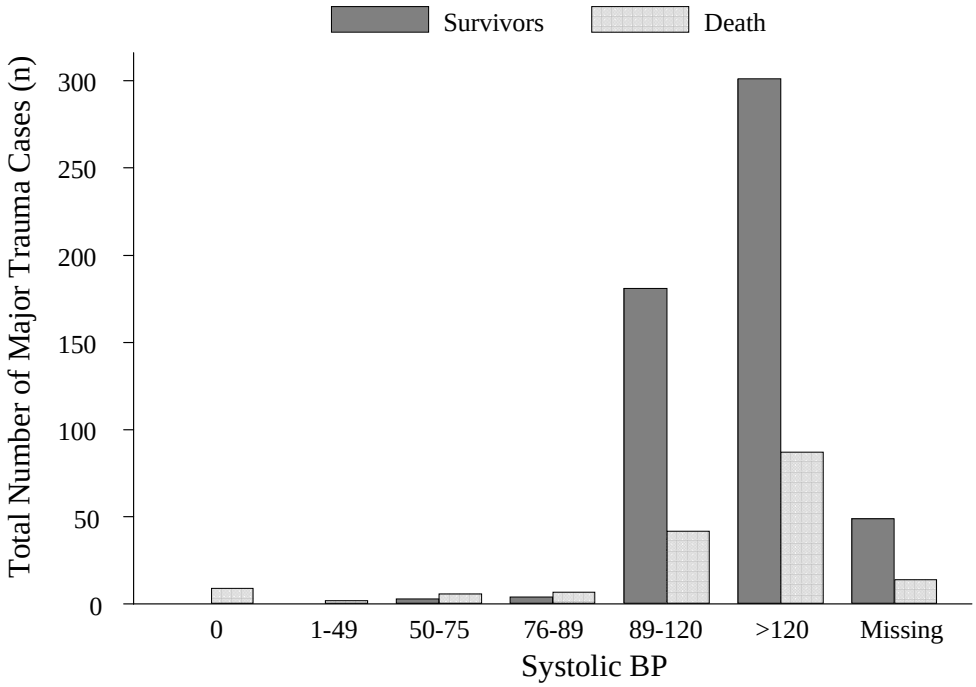


Figure 5.7a. Outcome for Major Trauma Cases by Systolic BP

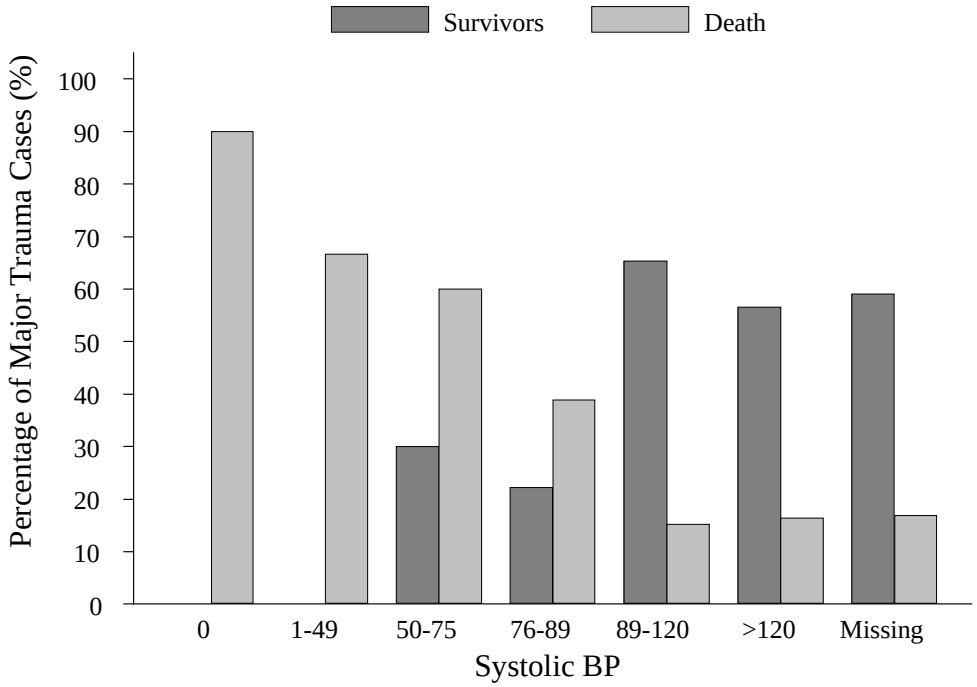


Table 5.7. Outcome for Major Trauma Cases by Systolic BP

Systolic BP	Total	Survivors		Death	
		No	%	No	%
0	10	0	0.00	9	90.00
1-49	3	0	0.00	2	66.67
50-75	10	3	30.00	6	60.00
76-89	18	4	22.22	7	38.89
89-120	277	181	65.34	42	15.16
>120	532	301	56.58	87	16.35
Missing	83	49	59.04	14	16.87
TOTAL	933	538	57.66	167	17.90

Figure 5.8. Outcome for Major Trauma Cases by Respiratory Rate

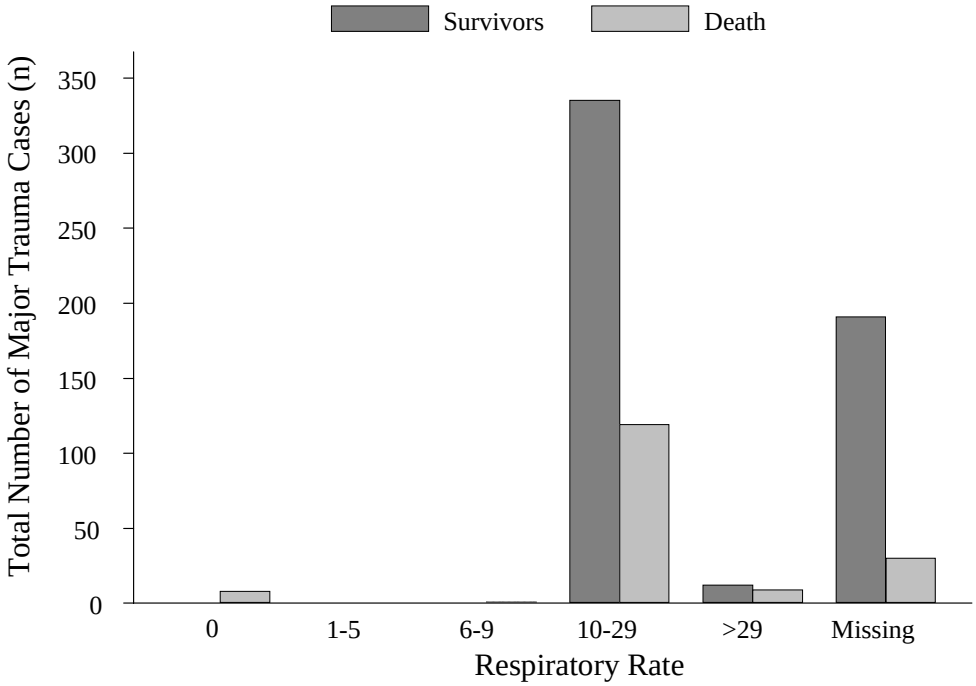


Figure 5.8a. Outcome for Major Trauma Cases by Respiratory Rate

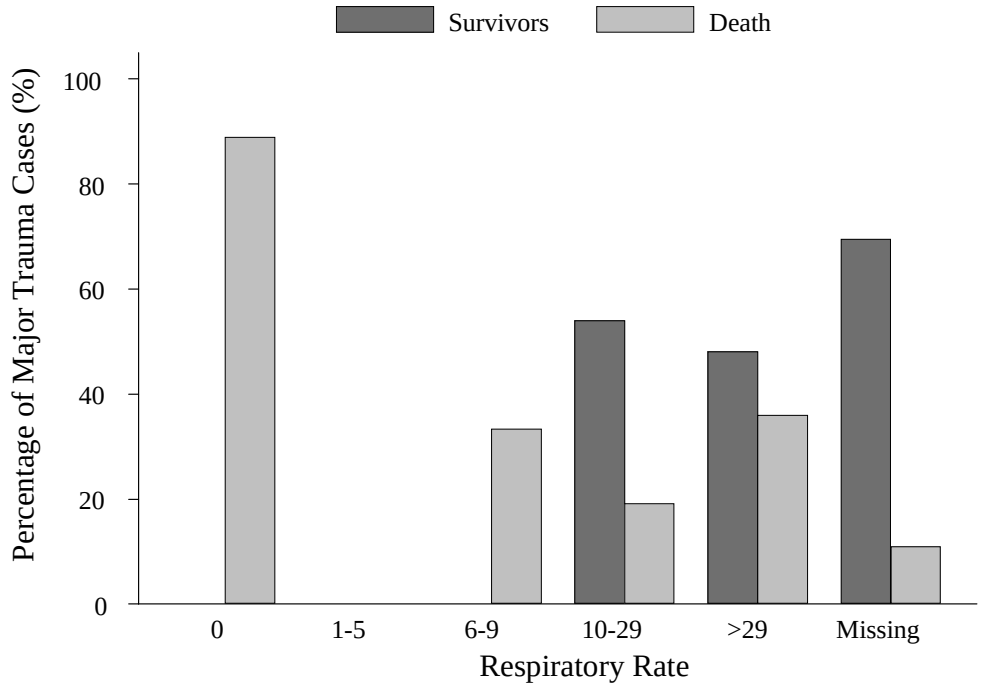


Table 5.8. Outcome for Major Trauma Cases by Respiratory Rate

Respiratory Rate	Total	Survivors		Death	
		No	%	No	%
0	9	0	0.00	8	88.89
1-5	0	0	0.00	0	0.00
6-9	3	0	0.00	1	33.33
10-29	621	335	53.95	119	19.16
>29	25	12	48.00	9	36.00
Missing	275	191	69.45	30	10.91
TOTAL	933	538	57.66	167	17.90

Figure 5.9. Outcome for Major Trauma Cases by RTS

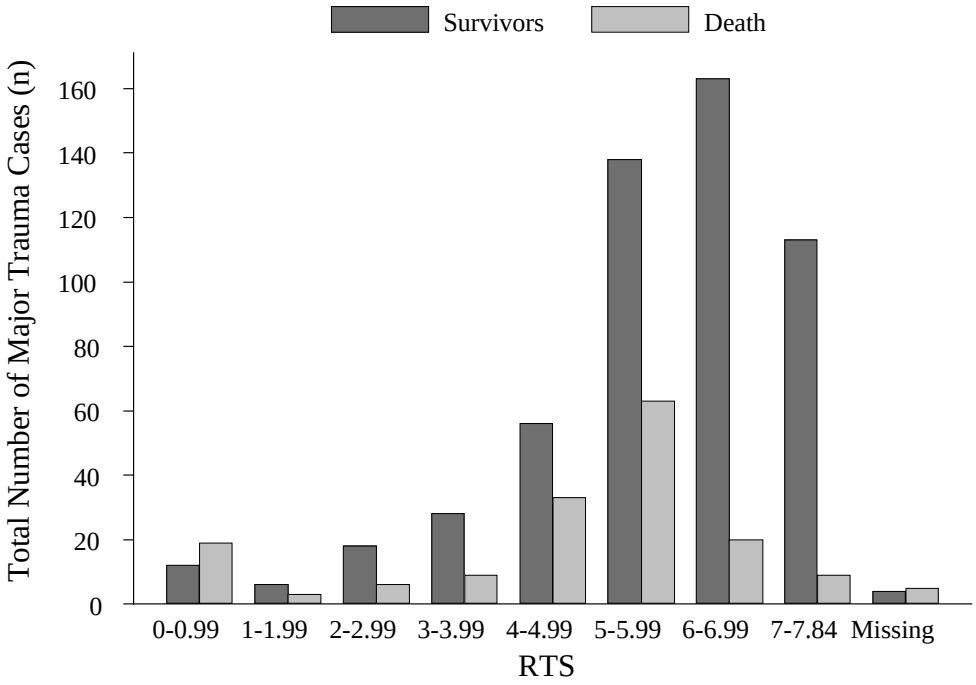


Figure 5.9a. Outcome for Major Trauma Cases by RTS

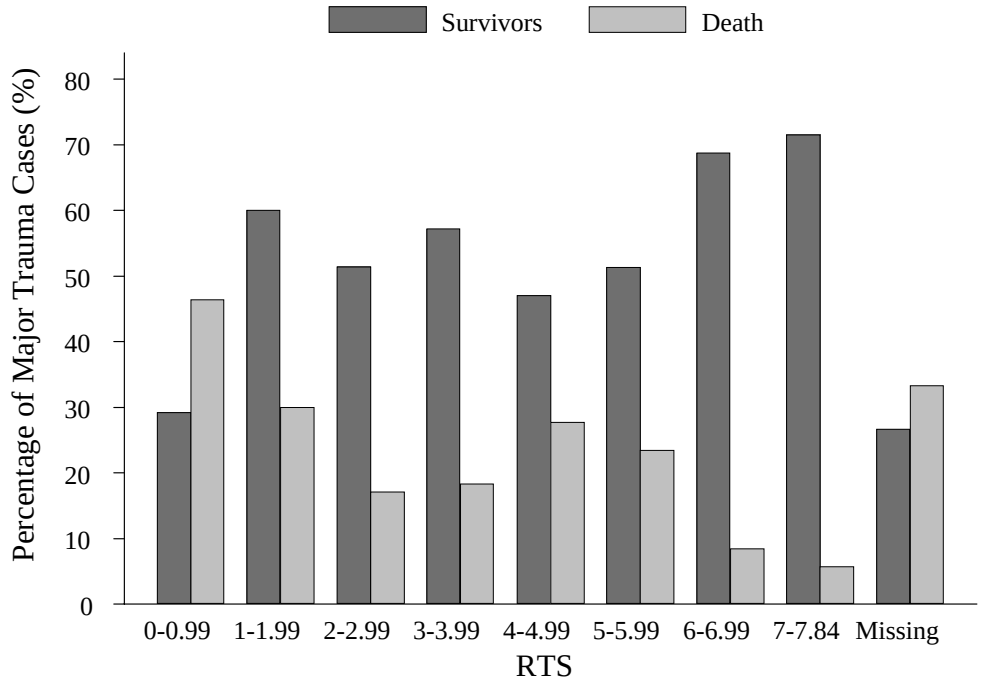


Table 5.9. Outcome for Major Trauma Cases by RTS

RTS	Total	Survivors		Death	
		No	%	No	%
0-0.99	41	12	29.27	19	46.34
1-1.99	10	6	60.00	3	30.00
2-2.99	35	18	51.43	6	17.14
3-3.99	49	28	57.14	9	18.37
4-4.99	119	56	47.06	33	27.73
5-5.99	269	138	51.30	63	23.42
6-6.99	237	163	68.78	20	8.44
7-7.84	158	113	71.52	9	5.70
Missing	15	4	26.67	5	33.33
TOTAL	933	538	57.66	167	17.90

Chapter 6: Length of Stay (LOS)

Figure 6.1 Outcome for Major Trauma Cases in Centre by Hospital Duration

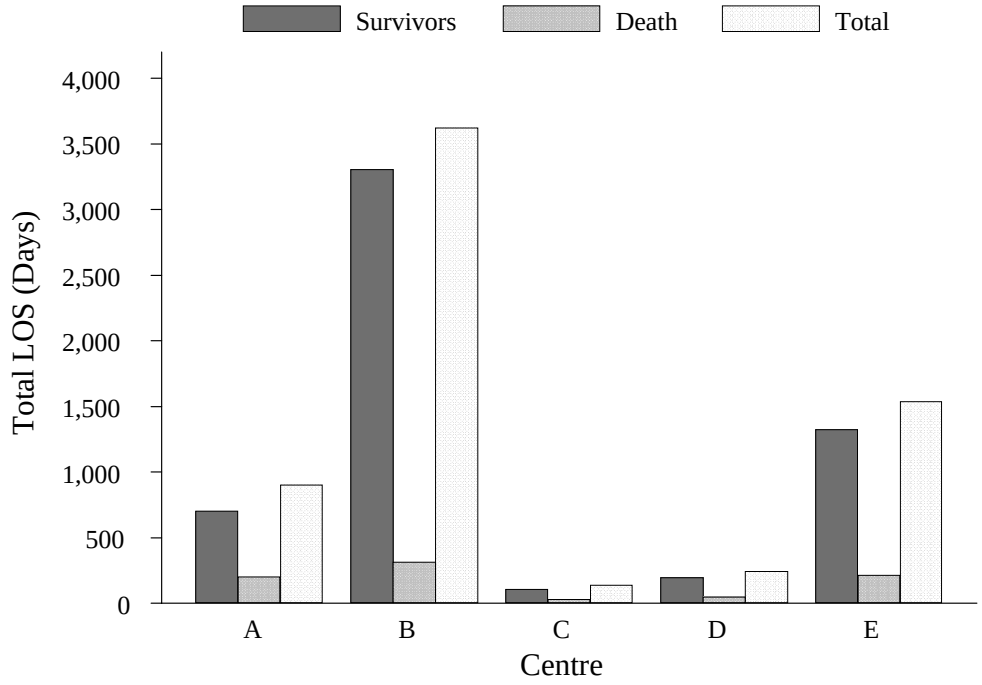


Figure 6.1a. Average Length of Hospital Stay for Major Trauma Cases by Outcome, Centre

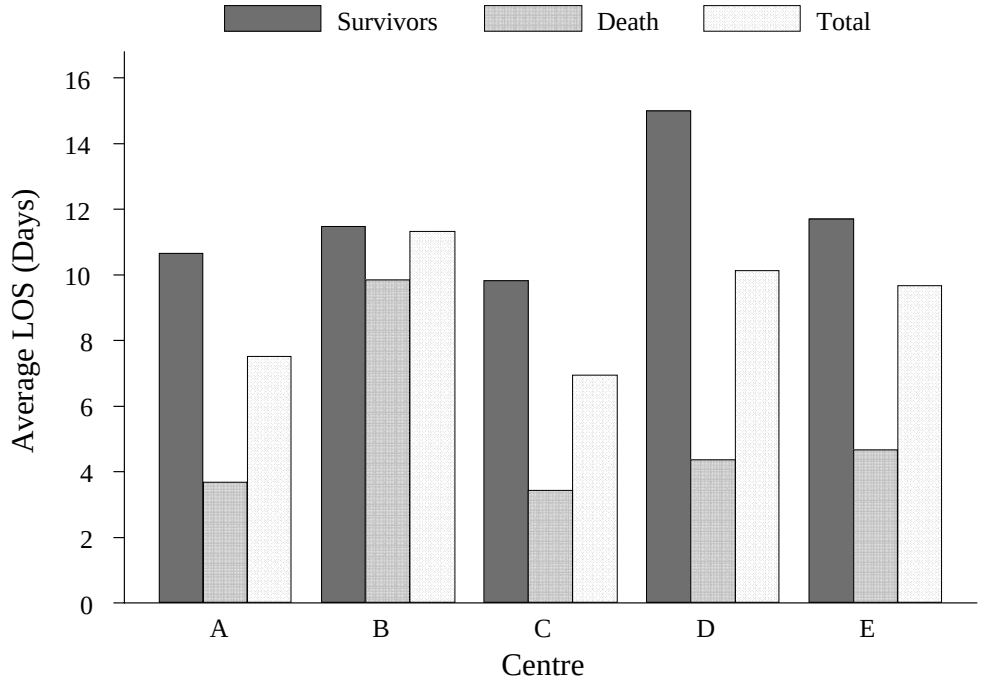


Table 6.1. Total and Average Length of Hospital Stay in Days for Major Trauma Cases by Outcome, Centre

Centre	Total			Survivors			Death		
	No of Patient	Total LOS	Average LOS	No of Patient	Total LOS	Average LOS	No of Patient	Total LOS	Average LOS
A	120	902	8	66	703	11	54	199	4
B	320	3622	11	288	3307	11	32	315	10
C	20	139	7	11	108	10	9	31	3
D	24	243	10	13	195	15	11	48	4
E	159	1537	10	113	1322	12	46	215	5

Figure 6.2. Total Length of Hospital Stay for Major Trauma Cases by Outcome, Admission Type

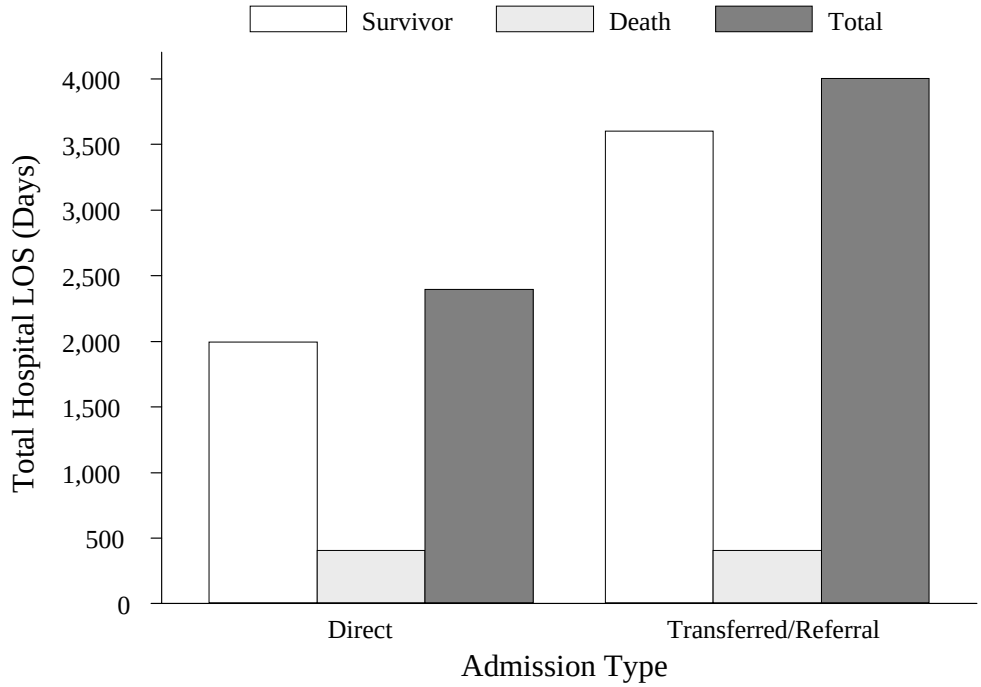


Figure 6.2a. Average Length of Hospital Stay for Major Trauma Cases by Outcome, Admission Type

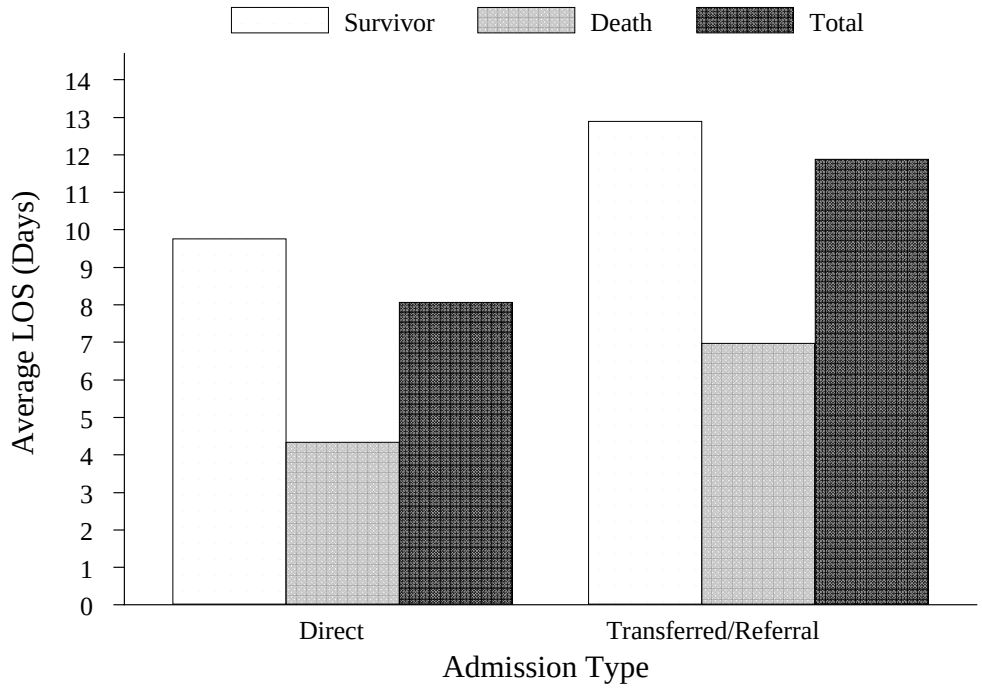


Table 6.2. Total and Average Length of Hospital Stay for Major Trauma Cases by Outcome, Admission Type

Admission Type	Total			Survivor			Death		
	No of Patient	Total LOS	Average LOS	No of Patient	Total LOS	Average LOS	No of Patient	Total LOS	Average LOS
Direct	297	2396	8	204	1992	10	93	404	4
Transfer/Referral	337	4003	12	279	3599	13	58	404	7
Not Available	1	0	0	0	0	0	1	0	0
Missing	8	44	6	8	44	6	0	0	0

Figure 6.3. Total Length of Hospital Stay in Days for Major Trauma Cases by Cause of Injury

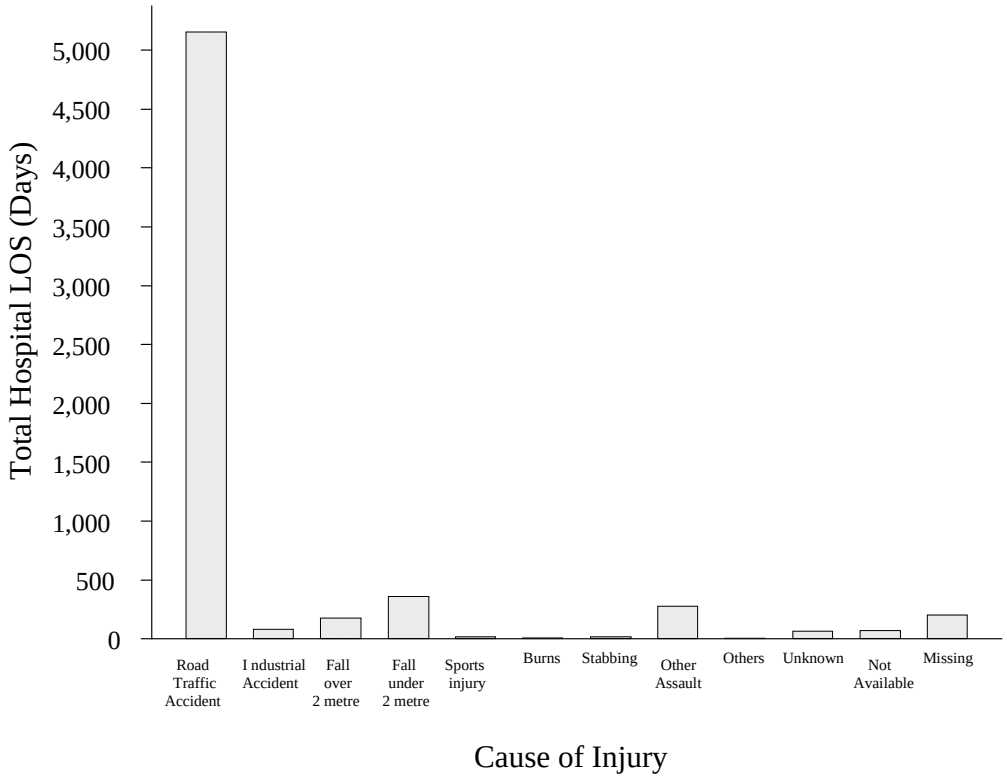


Figure 6.3a. Average Length of Hospital Stay for Major Trauma Cases by Cause of Injury

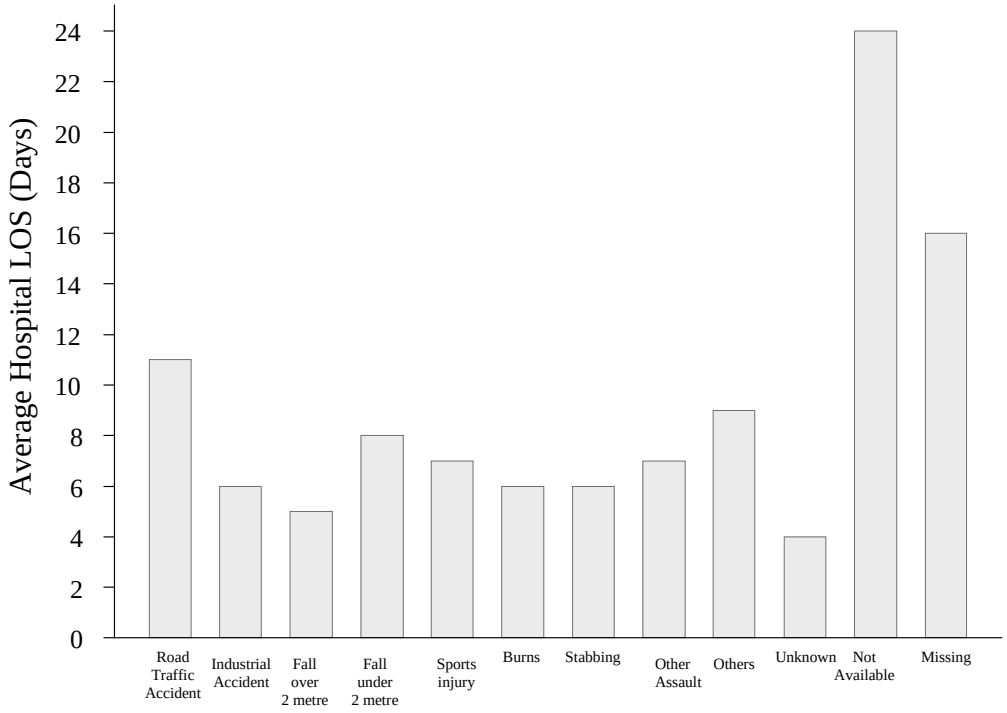


Table 6.3. Total and Average Length of Hospital Stay in Days for Major Trauma Cases by Cause of Injury

Cause of Injury	Patients		Total LOS	Average LOS
	No	%		
Road Traffic Accident	477	51.13	5153	11
Industrial Accident	14	1.50	82	6
Fall over 2 metre	35	3.75	176	5
Fall under 2 metre (about 1 door's height)	44	4.72	360	8
Sports injury	3	0.32	20	7
Burns	2	0.21	11	6
Stabbing	3	0.32	18	6
Gunshot Wound	0	0.00	0	0
Other Assault	37	3.97	274	7
Others	1	0.11	9	9
Unknown	16	1.71	63	4
Not Available	3	0.32	72	24
Missing	13	1.39	205	16

Figure 6.4. ICU Admission for Major Trauma Cases.

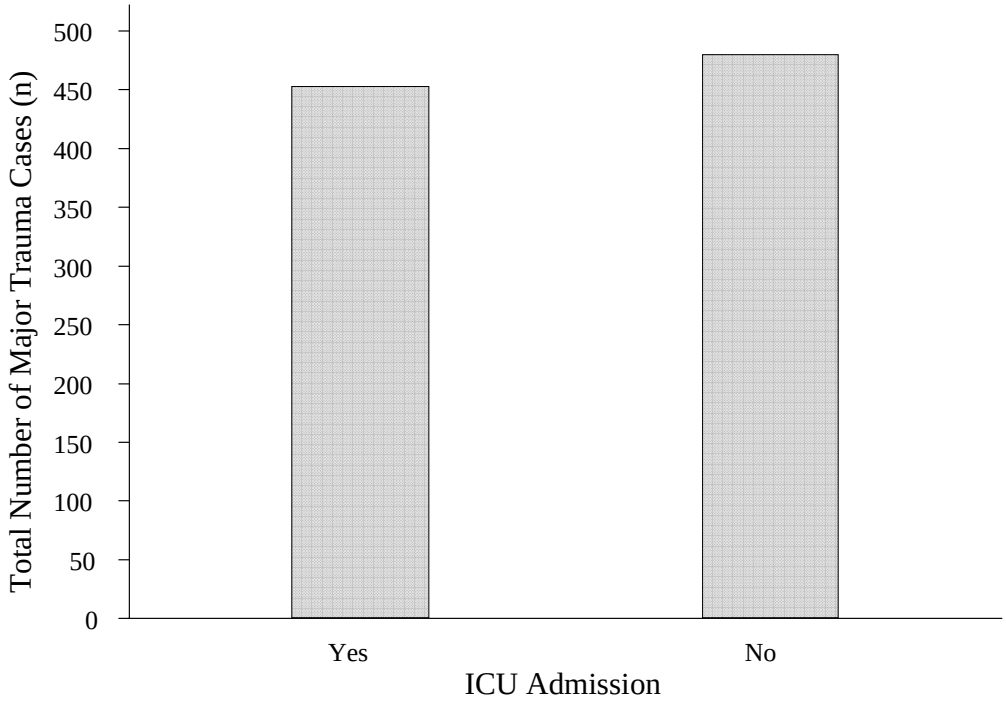


Figure 6.4a. ICU Admission for Major Trauma Cases by Centre

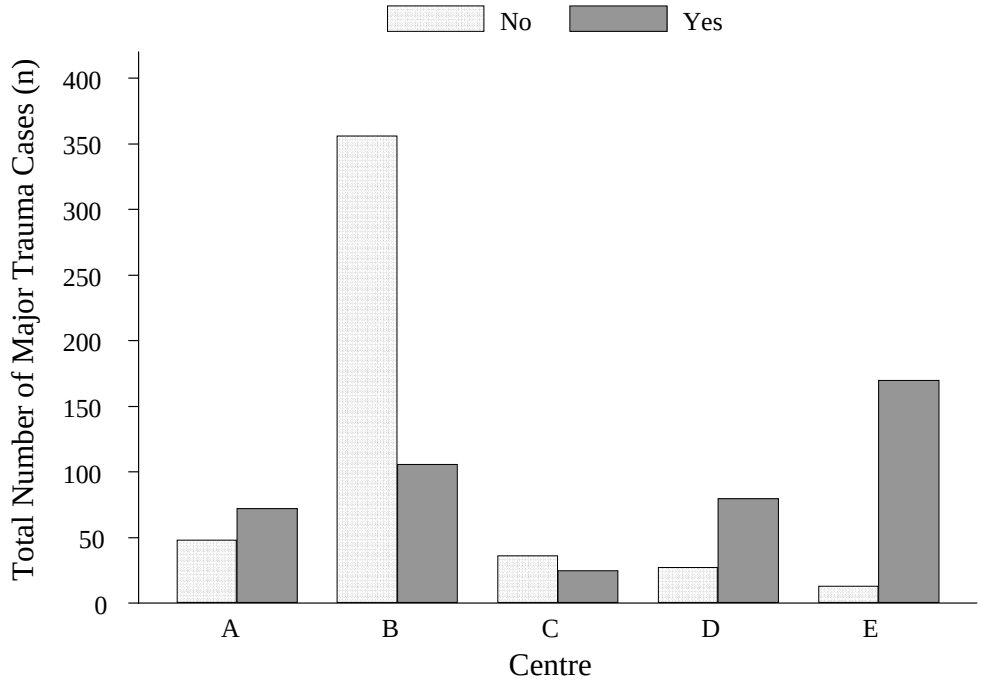


Figure 6.4b. ICU Admission for Major Trauma Cases by Centre

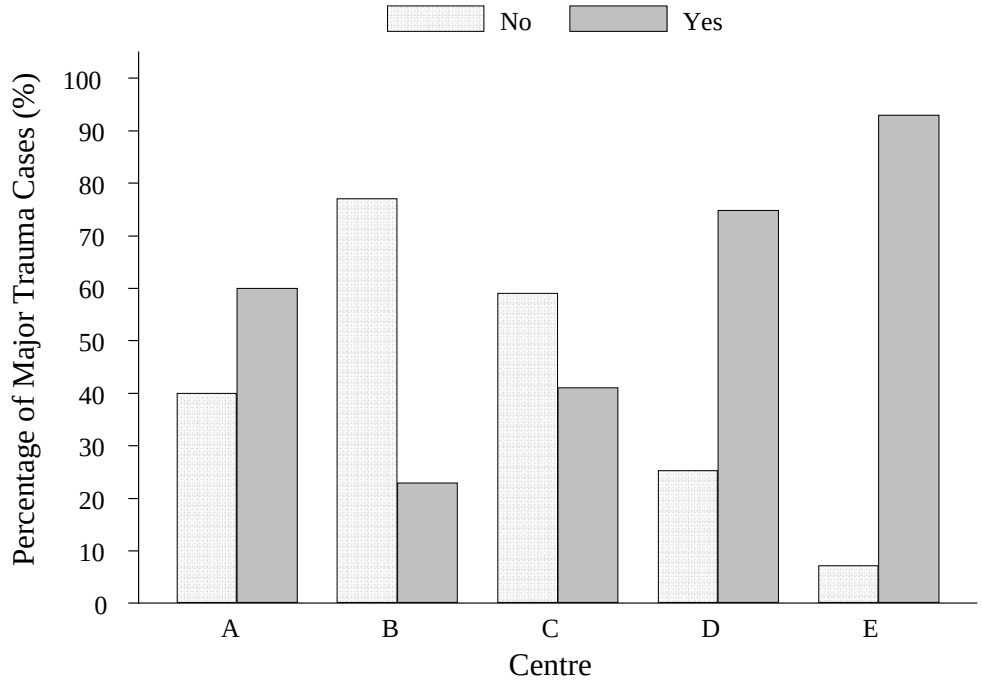


Table 6.4. ICU Admission for Major Trauma Cases by Centre

ICU Admission		No		Yes	
Centre	**Total**	**No**	**%**	**No**	**%**
A	120	48	40.00	72	60.00
B	462	356	77.06	106	22.94
C	61	36	59.02	25	40.98
D	107	27	25.23	80	74.77
E	183	13	7.10	170	92.90
TOTAL	933	480	51.45	453	48.55

Figure 6.5. ICU Admission for Major Trauma Cases by Outcome.

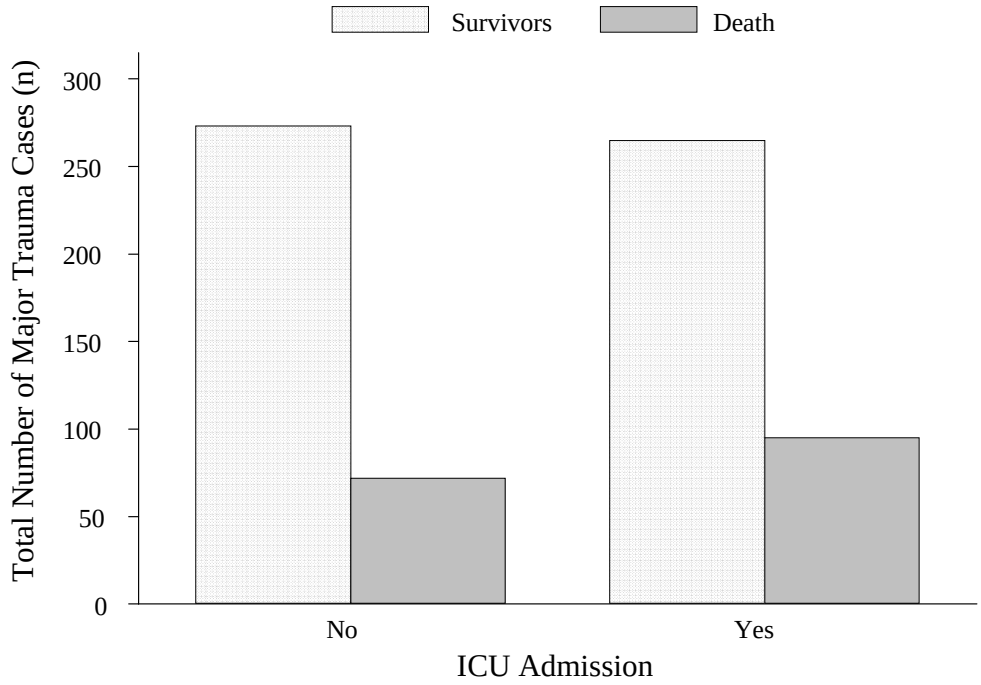


Figure 6.5a. ICU Admission for Major Trauma Cases by Outcome.

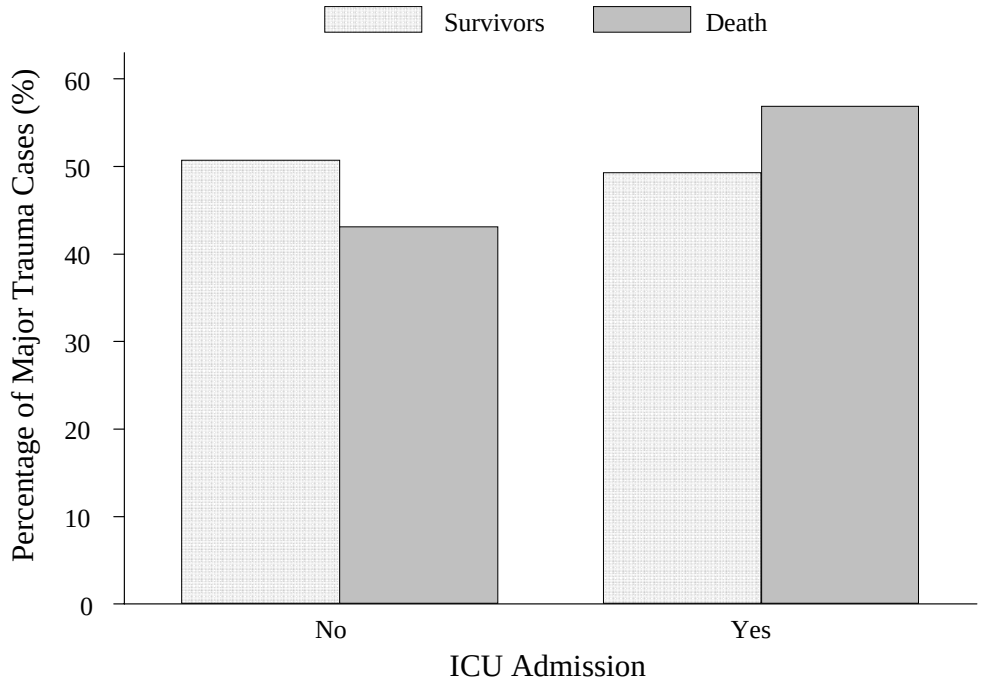


Table 6.5. Total ICU Admission for Major Trauma Cases by Outcome

ICU admission	Total	Outcome			
		Survivors		Death	
		No	%	No	%
No	348	273	50.74	72	43.11
Yes	365	265	49.26	95	56.89
TOTAL	713	538	100	167	100

Figure 6.6. Total Length of ICU Stay for Major Trauma Cases by Outcome

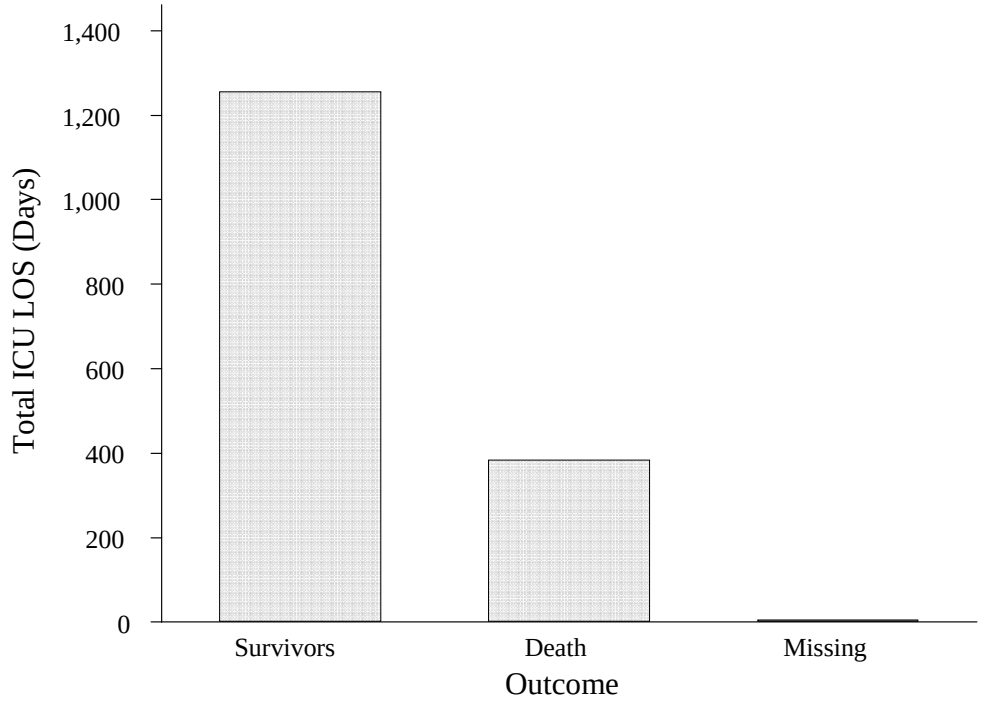


Figure 6.6a. Average Length of ICU Stay for Major Trauma Cases by Outcome

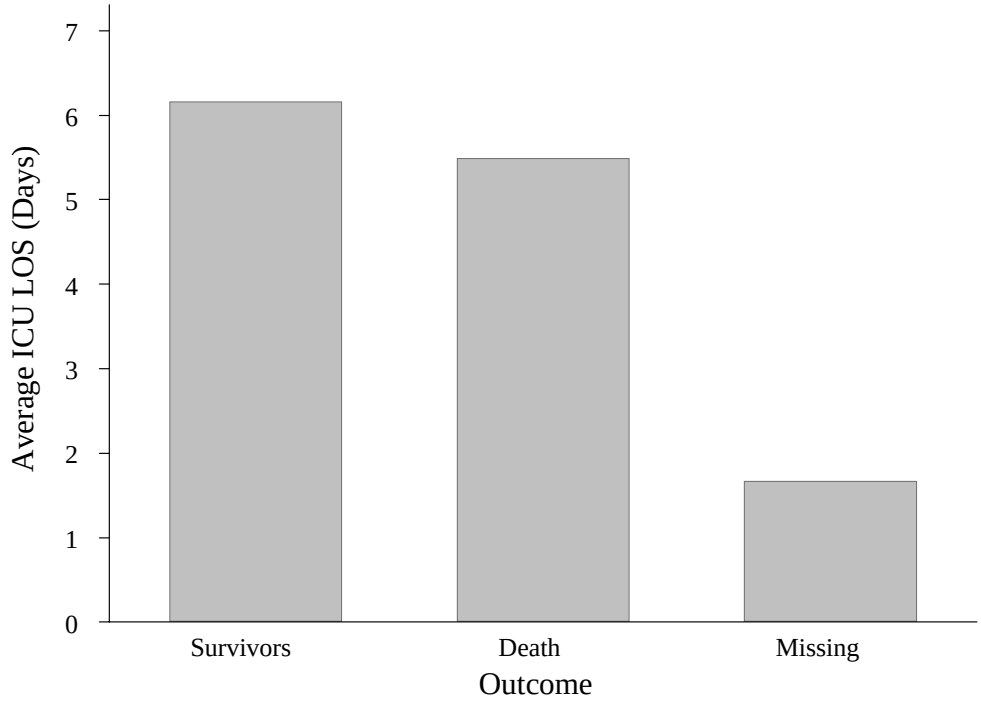


Table 6.6. Total and Average Length of ICU Stay in Days for Major Trauma Cases by Outcome

Outcome	Number of Patients	Total LOS	Average LOS
Survivors	204	1256	6
Death	70	384	5
Missing	3	5	2
TOTAL	277	1645	6

Figure 6.7. Total Length of ICU Stay in Days for Major Trauma Cases by Outcome and Centre

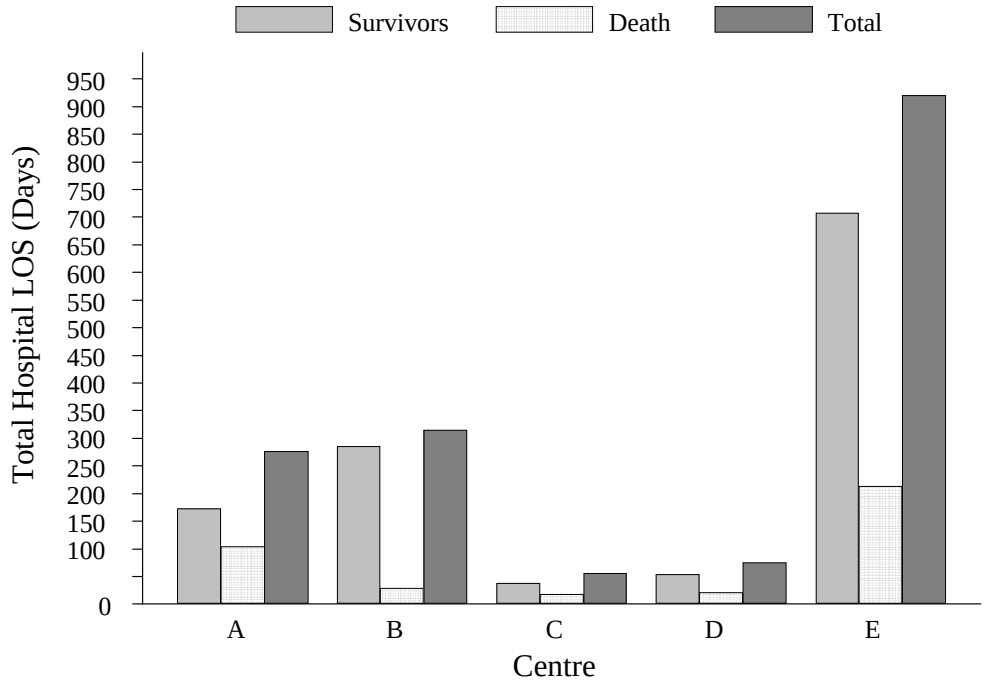


Figure 6.7a. Average Length of ICU Stay for Major Trauma Cases by Outcome and Centre

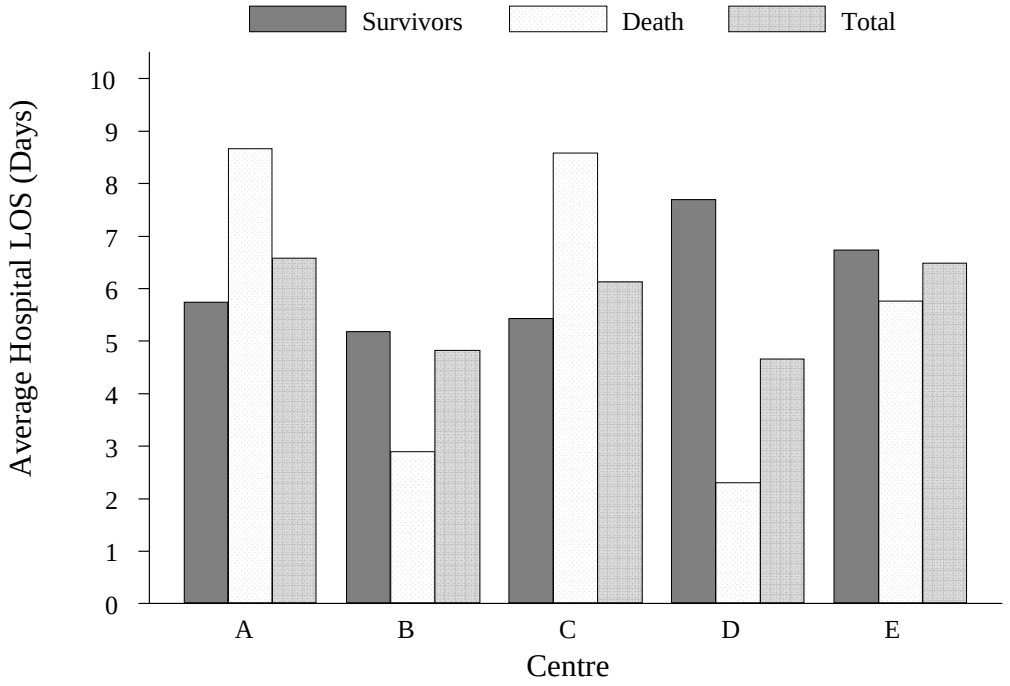


Table 6.7. Total and Average Length of ICU Stay in Days for Major Trauma Cases by Outcome and Centre

Centre	Total			Survivors			Death		
	No of Patient	Total LOS	Average LOS	No of Patient	Total LOS	Average LOS	No of Patient	Total LOS	Average LOS
A	42	276	7	30	172	6	12	104	9
B	65	314	5	55	285	5	10	29	3
C	9	55	6	7	38	5	2	17	9
D	16	75	5	7	54	8	9	21	2
E	142	920	6	105	707	7	37	213	6

APPENDIX A

ABBREVIATIONS

BP	Blood Pressure
CRC	Clinical Research Centre
CRF	Case Report Form
ED	Emergency Department
GCS	Glasgow Coma Score
ICU	Intensive Care Unit
ISS	Injury Severity Score
MOH	Ministry of Health
MTOS	Major Trauma Outcome Study
NTrD	National Trauma Database
OP	Operation Procedure
RTS	Revised Trauma Score
SDP	Source Data Providers

GLOSSARY

Disease Register	The ongoing systemic collection, analysis and interpretation of a specific disease data essential to the planning, implementation and evaluation of clinical and public health practice, closely integrated with dissemination of these data to those who need to know. The final link in the chain is the application of these data to the management, prevention and control of the disease. A registration system includes a functional capacity for data collection, analysis and dissemination linked to clinical and public health programs.
Site	The location of an SDP reporting data on registrable patients to the registry.
Source Data Providers	The individuals or institutions that report the required data to the registry.
Sponsor	The individuals or institutions that own the registry.
Advisory Committee	A committee, board, council, panel or group thereof that is established by sponsors of the registry to govern the registry. The Advisory Committee shall direct and control the activities of the designated collaborating unit, which manages the day-to-day operations of the registry.
Expert Panel	Individuals who are subject matter experts i.e. Emergency Physicians and Neurosurgeons. The expert group will keep abreast of the latest development in this area. They should be convened to decide on the initial data collection process, develop the performance and data content as well as a guide for future development. They ensure that the database have a sound technical as well as scientific basis.

APPENDIX B

Data Management

The National Trauma Database (NTrD) maintains a database that includes patient's demographic data, admission data, injury data, clinical data from emergency department, diagnosis and operative procedure data, patient's in hospital outcome data, injury severity score data and follow up data of patient's outcome and Glasgow outcome score. Data is stored in SQL Server due to the high volume of data accumulated throughout the years.

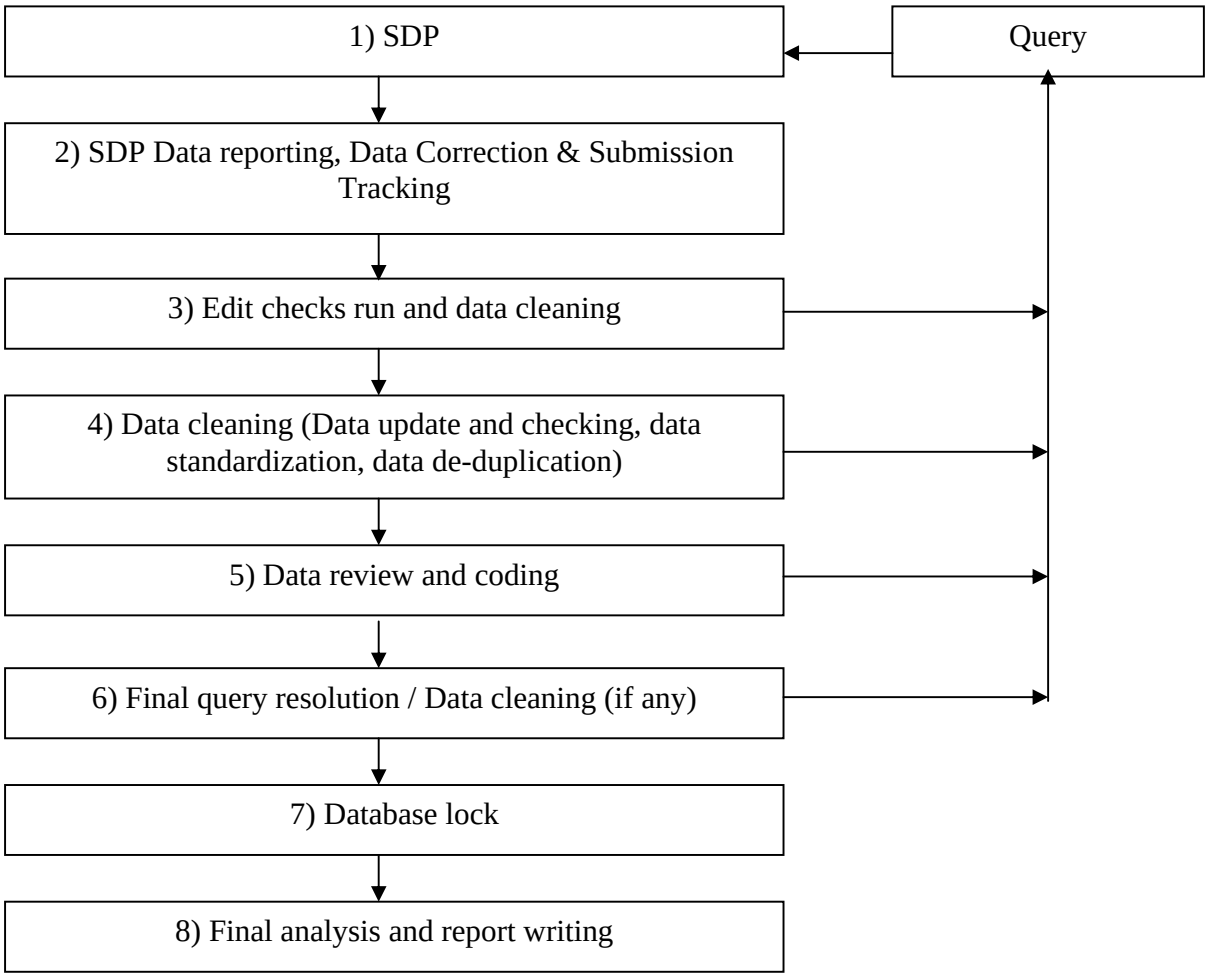
Data sources

SDPs or Source Data Providers of NTrD comprise of centres from various emergency departments and neurosurgery and surgery department of hospitals throughout Malaysia.

For purpose of verifying patient's outcome, i.e. death, lost to follow-up, the NTrD uses data from the National Vitals Registration System if data is available.

1.1 Data Flow Process

This section describes the data management flow process of the National Trauma Database Registry.



SDP Data reporting, Data Correction and Submission tracking
Data reporting by SDP is done via Web Applications e-Case Report Forms.

There are a number of data security features that are designed into NTrD web application (eCRF) such as web owner authentication, 2-level user authentication, access control, data encryption, session management to automatically log off the application, audit trail and data backup and disaster recovery plan.

SDP submits NTrD Notification form on an ad hoc basis whenever there is a case. SDP also submits follow up data at 3 months, 6 months and 1 year post notification date.

Prior to registering a patient record, a verification process is done by using the search functionality to search if patient exist in the entire registry. This step is done to avoid duplicate records. For patients that exist in the database, SDP only needs to add a new notification with basic patient particulars pre-filled based on existing patient information in the database.

There are a few built-in functionalities at the data entry page that serve to improve data quality. One such function is auto calculation which reduces errors in human calculation. There is also inconsistency check functionality that disables certain fields if these fields are answered in a certain manner. When value entered is not within the specific range, user is prompted for the correct value.

A real time data query page is also available via the web application which enables user to check for missing non-compulsory data, out of range and inconsistent data. A link is provided on the data query page for users to click on to resolve the query for a particular patient.

An alert page containing all the overdue submission for Follow Up at 30-days, 6-months and 1-year post notification date is available to users to ease their for submissions tracking.

Real time reports are also provided in the web application. The aggregated data reports are presented in the form of tables and graphs manner. The aggregated data reports are typically presented in two manners, one as the centre's own data aggregated data report and another as registry's overall aggregated data report. In this way, the centre is able to compare itself against the overall registry's average.

Edit checks run and Data cleaning
Edit check is performed periodically to identify missing compulsory data, out of range values, inconsistency data, invalid values and error with de-duplication. Data cleaning is then performed based on the results of edit checks. Data update and data checking of the dataset is performed when there is a query of certain fields when necessary. It could be due to request by user, correction of data based on checking from data query in eCRF or after receiving results for preliminary data analysis. During data standardization, missing data are handled based on derivation from existing data. Data de-duplication is also

performed to identify duplicate of records in the database that might have been missed by SDP.

Data review and coding

Data coding of free text injury description to its Abbreviated Injury Scale (AIS) Score and Injury Severity Score (ISS) was done by registry manager. The expert panel comprising of members with expertise and knowledge in the relevant area serves the Quality Control function on the assessment of coding by registry manager. They ensure that complex medical data are reviewed and assessed to detect clinical nuances in the data.

Final query resolution / data cleaning / database lock

A final edit check run was performed to ensure that data is clean. All queries were resolved before database is locked to ensure data quality and integrity. Final dataset is subsequently locked and exported for statistical analysis.

Data analysis

Please refer to Method of Statistical Analysis section for further details.

Data release policy

One of the primary objectives of the Registry is to make data available to the trauma healthcare community. The Registry would appreciate that users acknowledge the Registry for the use of the data. Any request for data that requires a computer run must be made in writing (by e-mail, fax, or registered mail) accompanied with a Data Release Application Form and signed Data Release Agreement Form. These requests need prior approval by the Advisory Board before data can be released.

Registry ICT Infrastructure and Data centre

The operations of the NTrD are supported by an extensive ICT infrastructure to ensure operational efficiency and effectiveness.

The network infrastructure consists of the network layout, placement of relevant hardware equipment, the general flow of data across the network, as well as the network services required for a functional and secure NTrD network infrastructure. NTrD servers are located in a data centre at Cyberjaya in order to provide NTrD with quality assured Internet Hosting services and state-of-the-art physical and logical security features without having to invest in costly data centre setup internally. The physical security features implemented include fire suppression system, access card and biometrics authentication to gain physical access to the data centre, for uninterrupted power supply, for environmental control and raised flooring system, firewall, and backup devices. Logical security features implemented include firewall, antivirus, automated patching, encryption, traffic monitoring and intrusion detection system.

APPENDIX C

Method of Statistical Analysis

Statement of objective
The report focused on patient demographics, characteristic of major trauma admission, pattern of injury, clinical parameters and outcome.

Analysis sets:
The data of all major trauma cases admitted to emergency department and neurosurgery department from selected SDP from April 2006 to May 2007 that were reported to the NTrD were analyzed. The data was stratified to reflect differences in

1. Patient's demographics: race, gender, age group and nationality of the patients.
2. Characteristics of major trauma admission: type, day and time of admission of the patients.
3. Pattern of injury: mechanism, intent and place of injury.
4. Clinical parameters: systolic BP, respiratory rate, GCS, RTS, trauma cases reviewer and disposition of patients.
5. Outcome: survived or dead patients from the major trauma cases.
6. Length of stay: total and average length of stay in hospital and ICU of the patients.

Methods for handling missing data and outliers

Unit missing

All queries were addressed to the manager of the registry. Missing or anomalous data are identified and queried soon after entry onto the main database. The amount of missing data was minimized manually without the used of any statistical technique.

Definitive analysis
The statistical methods described were used to summarize the data collected for the NTrD.

Descriptive Statistics

Mean, SD, Median, Min, and Max were reported for continuous variables. Categorical variables were summarized using frequency counts and percentages. Total and average length of ICU stay in days and total and average length of hospital stay in days were calculated. Average length of stay was calculated from the total length of stay divided by number of patients.

Statistical Software:
Stata version 9.2

National Trauma Database (NTrD) Notification Form

Office use:

A. Reporting Centre Name:

B. Date of Notification: *(dd/mm/yy)*

SECTION 1 : PATIENT'S PARTICULARS

1. Name :

2. Identification Card Number :

MyKad / MyKid: - -

Old IC:

Other document No: (eg Birth Cert, Mother's IC)

Specify type (eg.passport, armed force ID):

3. Patient RN : ED: Neurosurgery Dept (if different from ED):

4. Age : *(Auto Calculated)* **b. Date of Birth :** *(dd/mm/yy)*

5. Gender : Male Female

6. Nationality and Ethnic Group :

- Malaysian →
  - Malay
  - Orang Asli
  - Other M'sian, specify :
  - Chinese
  - Bumiputra Sarawak
  - Indian
  - Bumiputra Sabah
- Non Malaysian → **Specify nationality:**

SECTION 2 : ADMISSION

7. Date of Admission : *(dd/mm/yy)*

8. Time of Admission : : AM / PM

9. Type of Admission :

- Direct
- Transfer / Referred from →
  - **a) Hospital Name:**
  - **b) Time of Arrival:** : AM / PM
  - **c) Hospital Type:**
    - Hospital with Specialist
    - Hospital without Specialist
    - Health clinics
    - Private Hospital
    - Private Clinic
    - Not Available

SECTION 3 : INJURY

10. Date of Injury : *(dd/mm/yy)*

11. Time of Injury : : AM / PM

12. Mechanism of Injury :

- Blunt (e.g. MVA)
- Penetrating (e.g. Stab, Gunshot wound)
- Burns

13. Injury Intent : *(Check one or more boxes)*

- Unintentional
- Maltreatment / Assault by partners
- Child neglect / Maltreatment
- Intentional self harm
- Intent cannot be determined
- Intent not specified

14. Cause of Injury :

- Road Traffic Accident
  - Motorcycle Rider
  - Motorcycle Pillion
  - Driver
  - Front Seat Passenger
  - Back Seat Passenger
  - Bicyclist
  - Pedestrian
  - Not Available
- Industrial Accident
- Fall over 2 metre
- Fall under 2 metre (about 1 door's height)
- Sports Injury
- Burns
- Stabbing
- Gunshot Wound
- Other Assault
- Others
- Not Known

15. Place of Injury :

- Road, Street, Highway
- Home
- Industrial / Construction Area
- School / Kindergarten / nursery
- Sports / Recreational Area
- Trade / Service area
- Residential institution
- Other specified place
- Not Available

SECTION 4 : CLINICAL DETAILS (EMERGENCY DEPARTMENT)

16. Pulse rate : *(Beats / Min)*

17. Respiratory rate : *(Breath / Min)*

18. Blood pressure : **a. Systolic :** *(mmHg)* **b. Diastolic :** *(mmHg)*

19. Temperature : *(C)*

20. Pulse Oximetry : *(%)*

21. Glasgow Coma Scale :

a. Best Eyes opening :	1	2	3	4		
b. Best Verbal Response :	1	2	3	4	5	
c. Best Motor Response :	1	2	3	4	5	6
d. Total GCS : *(Auto Calc)*						
e. Head Injury Category: *(Auto Calc)*	Mild (13-15)	Moderate (9-12)	Severe (3-8)			

22. Reviewed by : *(Check one or more boxes)*

- Emergency Physician → Medical Officer / Trainee; Specialist / Consultant
- Surgeon → Medical Officer / Trainee; Specialist / Consultant

23. Disposition from ED to : ICU OT General Ward Mortuary Other Hospital AOR

SECTION 5 : DIAGNOSIS AND OPERATIVE PROCEDURE

24. Traumatic Brain Injuries (based on ICD10):

(Check one or more boxes)

- ☐ Open wound of head →
  - ☐ Open wound of scalp
  - ☐ Multiple open wounds of head
- ☐ Fracture of skull and facial bones →
  - ☐ Fracture of vault of skull
  - ☐ Fracture of base of skull
- ☐ Intracranial Injury →
  - ☐ Concussion
  - ☐ Traumatic cerebral oedema
  - ☐ Diffuse brain injury
  - ☐ Focal brain injury
  - ☐ Epidural haemorrhage
  - ☐ Traumatic subdural haemorrhage
  - ☐ Traumatic subarachnoid haemorrhage
  - ☐ Intracranial injury with prolonged coma
  - ☐ Other intracranial injuries
  - ☐ Intracranial injury, unspecified
- ☐ Others, specify: _____

25. Operative Management: ◯ Yes (if Yes, please fill up below) ◯ No (If No, please proceed to Section 6 directly)

26. Date of Operation : _____ *(dd/mm/yy)*

27. Time of Operation : **Start** _____ : _____ AM / PM

28. Duration Time to Operation : (Time of Admission to Start of Surgery) *(Auto Calc)*

29. Operative Procedure :

(Check one or more boxes)

- ☐ Intracranial →
  - ☐ Evacuation of hematoma
  - ☐ Decompressive craniectomy
  - ☐ External ventricular drain
  - ☐ ICP (Intra cranial pressure) monitoring
  - ☐ Elevation of depressed skull fracture
  - ☐ Others, specify: _____
- ☐ Intrathoracic
- ☐ Intra-abdominal
- ☐ Spinal surgery
- ☐ Pelvic fixation
- ☐ Others, specify: _____

SECTION 6 : IN-HOSPITAL OUTCOME

30. Length of Stay in ICU: ◯ < 24 hrs: _____ *hrs* ◯ ≥ 24 hrs: _____ *day*

31. Length of Stay in Hospital: _____ *day*

32. Discharge Date : _____ *(dd/mm/yy)*

33. Patient's Outcome at Discharge:

a. Alive ◯

Glasgow Outcome Score at Discharge:	*(Auto Calc)*
1 - Dead	◯
2 - Persistent Vegetative	◯
3 - Severe Disability	◯
4 - Moderate Disability	◯
5 - Well	◯

Disposition

- ◯ **Discharge Home**
- ◯ **Discharge to Referring Hospital**
  - **Name of Hospital:** _____
- ◯ **Discharge to Other Hospital**
  - **Name of Hospital:** _____
- ◯ **Discharge Against Medical Advice**

b. Death ◯

Name :	

SECTION 7 : INJURY SEVERITY SCORE

34. Injuries and Injury Severity Score	
BODY REGION	**INJURIES**
Head & Neck	**1.**
	2.
	3.
	4.
	5.
	6.
	7.
Face	**1.**
	2.
	3.
	4.
	5.
	6.
	7.
Thorax	**1.**
	2.
	3.
	4.
	5.
	6.
	7.
Abdomen / Pelvic content	**1.**
	2.
	3.
	4.
	5.
	6.
	7.
Extremitis / Pelvic girdle	**1.**
	2.
	3.
	4.
	5.
	6.
	7.
External	**1.**
	2.
	3.
	4.
	5.
	6.
	7.

35. Total ISS :	*(Auto Calc)*
36. Revised Trauma Score :	*(Auto Calc)*
37. Please check (√) if patient has one or more criteria:	☐ Patient who died from their injuries after admission ☐ Patients with injury severity score (ISS) of >15 ☐ Patients admitted to ICU or high dependency area for >24 hours and mechanically ventilated ☐ Urgent surgery (within 24hours) for intracranial, intrathoracic, intraabdominal or fixation for pelvic or spinal injuries.

National Trauma Database (NTrD) Follow Up Form

Office use: /
Centre:

Complete this form at 3rd month, 6th month, 12th month and annually after the trauma event. Check (√) one box unless specified otherwise.

A. Reporting Centre Name	
B. Date of Follow Up:	*(dd/mm/yy)*
C. Name :	Mr/Mrs/Ms/Dr
D. Identification Card Number :	*MyKad / MyKid:* - - *Old IC:* *Other document No:* *Specify type (eg.passport, armed force ID):*
E. Patient RN :	**ED:** **Neurosurgery Dept (if different from ED):**

PATIENT OUTCOME

1. Follow Up at:

- ☐ **3 months**
- ☐ **6 months**
- ☐ **1 year**

2. Outcome

a. Alive	☐	
b. Death	☐ →	**i) Date of death: (dd/mm/yy)**
c. Transferred to another centre	☐ →	**i) Date of last follow up: (dd/mm/yy)** **ii) Name of centre transferred to:**
d. Lost to Follow Up	☐ →	**i) Date of last follow up: (dd/mm/yy)**

3. Glasgow Outcome Score

1 - Dead	◯
2 - Persistent Vegetative	◯
3 - Severe Disability	◯
4 - Moderate Disability	◯
5 - Well	◯

Sponsors:

EMERGENCY MEDICAL AND TRAUMA SERVICES,
MINISTRY OF HEALTH

SURGERY SERVICES,
MINISTRY OF HEALTH

NEUROSURGERY SERVICES,
MINISTRY OF HEALTH

CLINICAL RESEARCH CENTRE