National Trauma Database (NTrD) – Improving Trauma Care: First Year Report

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SUMMARY

The first Malaysian National Trauma Database was launched in May 2006 with five tertiary referral centres to determine the fundamental data on major trauma, subsequently to evaluate the major trauma management and to come up with guidelines for improved trauma care. A prospective study, using standardized and validated questionnaires, was carried out from May 2006 till April 2007 for all cases admitted and referred to the participating hospitals. During the one year period, 123,916 trauma patients were registered, of which 933 (0.75%) were classified as major trauma. Patients with blunt injury made up for 83.9% of cases and RTA accounted for 72.6% of injuries with 64.9% involving motorcyclist and pillion rider. 42.8% had severe head injury with an admission Glasgow Coma Scale (GCS) of 3-8 and the Revised Trauma Score (RTS) of 5-6 were recorded in 28.8% of patients. The distribution of Injury Severity Score (ISS) showed that 42.9% of cases were in the range of 16-24. Only 1.9% and 6.3% of the patients were reviewed by the Emergency Physician and Surgeon respectively. Patients with admission systolic blood pressure of less than 90mmHg had a death rate of 54.6%. Patients with severe head injury (GCS <9), 45.1% died while 79% patients with moderate head injury survived. There were more survivors within the higher RTS range compared to the lower RTS. Patients with direct admission accounted for 52.3% of survivors and there were 61.7% survivors for referred cases. In conclusion, NTrD first report has successfully demonstrated its significance in giving essential data on major trauma in Malaysia, however further expansion of the study may reflect more comprehensive trauma database in this country.

KEY WORDS:
Trauma, Database, Registries

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 and developing countries including Malaysia. Accidents are the third most common cause of admission to Ministry of Health hospitals following normal delivery and complications of pregnancy and childbirth, and is the 5th principal cause of death[1]. For every person killed, there are at least two who survive with serious permanent disabilities[2]. In 2002 there were 15,100 deaths due to injuries with 4,900 from road traffic accidents (RTA)[3].

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[4].

The lack of research into trauma epidemiology is well known. The paucity of information has led to the conclusion that proper epidemiological studies cannot be conducted in the absence of meaningful data. United States (US) has led the way in major trauma epidemiological studies. The Major Trauma Outcome Study (MTOS)[5] 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 the international standard against which all other trauma databases can be compared. Following the US MTOS, many countries and states have set up trauma databases and registries; The National Trauma Databank in US, Idaho Trauma Registry, National Trauma Registry Consortium and Victoria State Trauma Registry in Australia, Trauma Audit and Research Network in United Kingdom to name a few.

Even though short term studies on major trauma have been carried out in Malaysia[6,7] there are no such registries or databases that focus on major trauma. The creation of a national trauma database will bring about better understanding of the severely injured patient and the potential for delivering better care. With this knowledge, the National Trauma Database (NTrD) was started with a short term grant from the Ministry of Health for 2006 and 2007.

The objectives of NTrD are as follows:

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 major trauma patients.

3. To evaluate the major trauma management in participating hospitals and to come up with guidelines for improved trauma care.
4. To determine the extent of which improvements introduced have been achieved.
5. To stimulate and facilitate research on major trauma and its management.

MATERIALS AND METHODS

All major trauma patients between May 2006-April 2007 seen in participating hospitals; Hospital Kuala Lumpur, Hospital Selayang, Hospital Pulau Pinang, Hospital Alor Star and Hospital Sultanah Aminah Johor Bahru, were included. Major trauma is defined as: A)Patients who died from injuries after admission B)Patients with injury severity score (ISS) of > 15, C)Patients admitted to Intensive Care Unit (ICU) or high dependency ward (HDW) for > 24 hours and mechanically ventilated, D)Urgent surgery within 24 hours for intracranial, intrathoracic, intra-abdominal, or fixation for pelvic or spinal injuries, E)All severe head injury patients with Glasgow Coma Scale (GCS) of 3-8, F) All moderate head injury patients with GCS of 9-12.

Data is entered directly into the National Trauma Database web application at www.acrm.org/ntrd or entered into a form and later into the web application.

RESULTS

During the 12 month period, there were 123,916 trauma patients of which 933 (0.75%) were classified as major trauma. There were 84% men and 16% women. Malaysians made up 88.2% of the cases with Malays 58%, Chinese 22.5% and Indians 15.6%. The majority of patients were within 15-24 years old (30.2%) (Fig.1). Most of the patients were admitted between 6pm – 12 midnight representing 25.6% and most commonly on Wednesday with 16.7%. Cases referred from other hospital accounted for 53.5% of cases.

Patients with blunt injury made up for 83.9% of cases. RTA accounted for 72.6% of injuries with 64.9% involving motorcyclist and pillion rider. Trauma at home recorded 9.3%.

As expected, the majority of patients 42.8% had severe head injury with an admission Glasgow Coma Scale (GCS) of 3-8 and the Revised Trauma Score (RTS) of 5-6 were recorded in 28.8% of patients. (Table I). Traumatic subdural haematoma accounted for most of the intracranial injury with 20.7%. The distribution of Injury Severity Score (ISS) showed that 42.9% of cases were in the range of 16-24 (Fig. 2). However, there were numerous missing data (>50%) but the ISS trend here is comparable as most trauma database and registries.

Only 1.9% and 6.3% of the patients were reviewed by the emergency physician and surgeon respectively. 35.5% of patients were sent immediately to ICU from the Emergency Department while 32.6% were admitted to the general wards. Only 3.2% of patients were transferred to other hospitals. 28.7% of cases were operated upon with 89.2% for intracranial surgery of which 55.6% were for intracranial haematoma. (Table II).

More than half (57.7%) of patients survived to hospital discharge and 63.4% of these patients were discharged home while 17.3% patients were discharged back to the referring hospital. Despite RTA being the most common cause of injury, injuries at trade/service areas and industrial/construction sites recorded the highest mortality with 33.3% and 30.6% of patients respectively versus 18.3% for RTA. Patients with admission systolic blood pressure of less than 90mmHg had a death rate of 54.6%. Patients with severe head injury (GCS <9), 45.1% died while 79% patients with moderate head injury survived (Fig. 3). There were more survivors within the higher RTS range compared to the lower RTS (Fig. 4). Most number of deaths were recorded in the highest ISS grouping (Fig. 5).

The average length of stay (LOS) in hospital was seven days. Patients with direct admission accounted for 52.3% of survivors and there were 61.7% survivors for referred cases. There was shorter average LOS and total LOS for directly admitted patients compared to referred cases (Table III). A total of 48.5% of patients were admitted to the ICU out of which 49.3% survived. The average LOS for ICU survivors was six days and non-survivors five days.

DISCUSSION

The NTrD first report has successfully demonstrated its usefulness in giving meaningful data on major trauma in Malaysia. The predominance of males compared to females was expected and similar to other registries and trauma databases [8,9]. Trauma is a disease of the young with the majority of patients between 15-34 years. In 2002 the Disability Adjusted Life Years (DALY) for injuries in Malaysia was reported as 369,000 which is comparable with Malawi, Guinea and Somalia[3]. This represents a great loss of potential economic earners to the country. Blunt injury from road traffic accidents constitute the main mechanism of injury with RTA accounting for 72.7% of cases and 64.9% involving motorcyclist. Malaysia has higher death rates from RTA when compared to other databases which ranges from 41-50%[8,9]. Worldwide, an estimated 1.2 million people are killed in road crashes each year and as many as 50 million are injured. Without appropriate action, by 2020, road traffic injuries are predicted to be the third leading contributor to global burden of disease and injury next to ischeamic heart disease and unipolar major depression[10].

The majority of major trauma patients suffer severe head injuries (GCS 3-8). This can be accounted for from the high number of motorcyclists involved in RTA and this occurs despite the mandatory use of crash helmets for motorcyclists and pillion riders. As Victorian data[8] showed a decreasing trend of patients with severe head injury, we hoped that we could show similar trends in the subsequent years with intense safety campaign in the mass media by the relevant authorities. The majority of our patients have ISS 15-24 comparable with other databases and registries. However, our database also showed near equal cases of ISS 1-10 which was not seen with other databases. The main reason is that the injuries sustained by the patients were not recorded, thus patients with more severe injuries were missed. This issue of missing data has to be urgently addressed. The majority of the trauma patients did not have any major operation and

Table I: Major Trauma cases by Glasgow Coma Scale and Revised Trauma Score

No.	n=933	%
Glasgow Coma Scale (GCS)		
13-15	268	28.72
9-12	203	21.76
3-8	399	42.77
Missing	63	6.75
Revised Trauma Score (RTS)		
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

Table II: Operative procedure for Major Trauma

Operative Procedure	No	%
Intracranial	239	89.18
Evacuation of Hematoma	133	55.65
Decompressive Craniectomy	77	32.22
External Ventricular Drain	24	10.04
ICP(Intra Cranial Pressure) 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

Table III: Total and Average Length of Hospital Stay in Days for Major Trauma Cases by Admission Type and Outcome

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

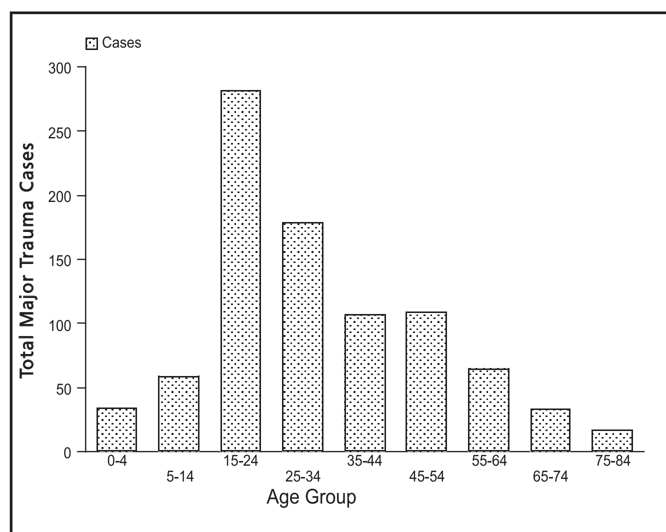

Fig. 1: Major Trauma cases by age group

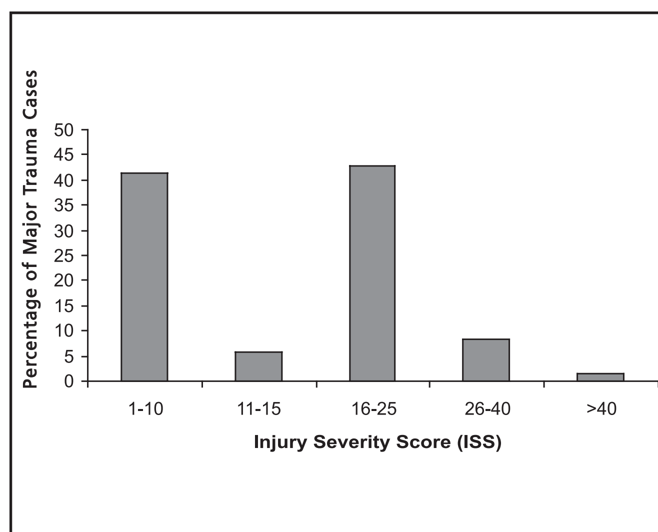

Fig. 2: Injury Severity Scale of Major Trauma Patients

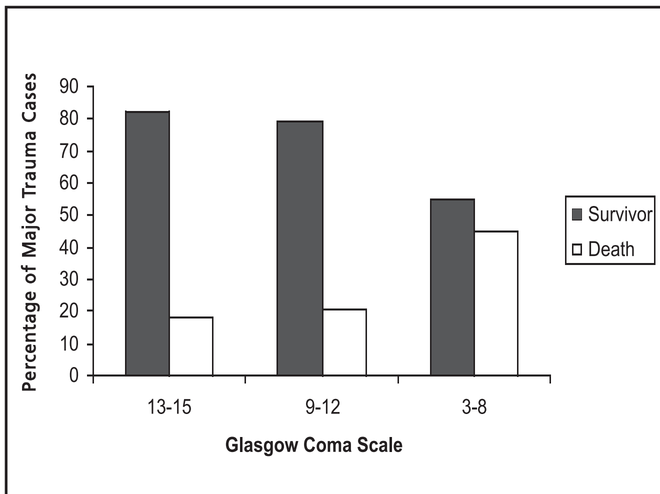

Fig. 3 Glasgow Coma Scale (GCS) and Outcome

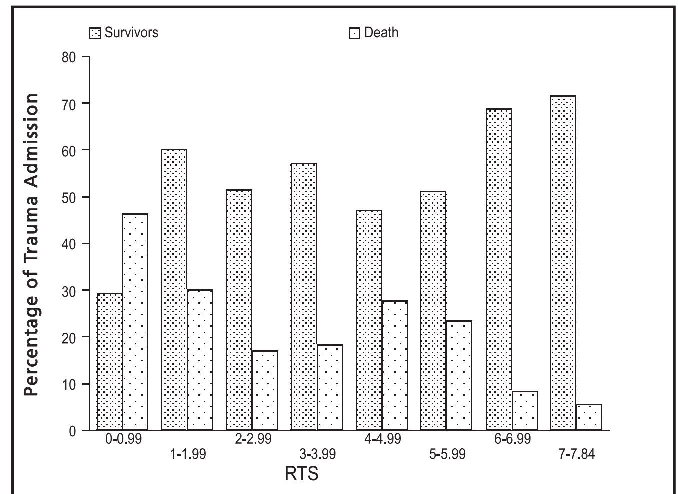

Fig. 4 Revised Trauma Score (RTS) and Outcome

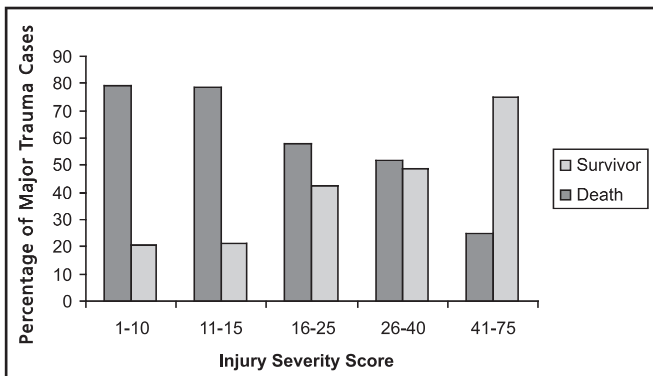

Fig. 5 Injury Severity Score (ISS) for Major Trauma patient by Outcome

intracranial surgery for evacuation of haematoma was the most common surgical operation. There is an urgent need for more neurosurgeons to cope with this high volume of head injured patients. In 2007 there were only 21 neurosurgeons in public hospitals in Malaysia, and only nine covering the hospitals that were included in the database. Neurosurgical services in Malaysia are regionally based and all states do not have Neurosurgeons.

General surgeons need to be trained to perform surgeries for evacuation of haematoma and decompressive craniotomy. Emergency decompressive craniotomy before further referral to neurosurgical center may make the difference between survival and death.

The major trauma patient is a group of critical ill patients that require good specialist treatment in the first instance. However, the initial involvement of specialist is very low as recorded in our database. There is certainly a lack of Emergency Physicians in our country with each state having only 1 or 2 but the lack of involvement of surgeons is worrying. In the Severe Injured Patient Study, it is recommended that initial assessment of the severely injured trauma patients should include doctors of sufficient experience and authority to implement a management plan[11].

Due to lack of specialists to tackle the trauma patients, medical officers who initially review the trauma patients should receive the necessary training in trauma e.g. in Malaysian Trauma Life Support (MTLS) or Advanced Trauma Life Support Courses (ATLS©). Studies have shown the usefulness and benefits of such advanced trauma life support courses in ensuring the critical interface being managed efficiently and comprehensively[12]. Despite being severely injured, most of the patients were admitted to the general ward rather than the intensive care. This reflects the general lack of ICU beds in the hospitals involved and serious consideration is needed to address this issue. Downgrade management for major trauma may have a detrimental effect to the morbidity and mortality. The formation of trauma wards where the major trauma patients can be admitted for a period of observation until stable to be sent to the general wards could be an alternative.

Referred patients accounted for 53.5% of patients and direct admissions 45.1%. This study is being carried out in tertiary referral centres, and involving more hospitals in the database may reflect more accurate data on patient admission. There were more survivors among the referred cases. The centres that refer patients would invariably refer cases that are relatively stable and with better prognosis thus better survival. Sethi *et al* in comparison of major trauma services in Malaysia noted that patients admitted to the district hospitals were associated with an almost 10-fold increase in odds of fatality when compared with central tertiary referral hospital and have suggested that severe trauma patients will have better outcomes if treated at a centre with specialists[6]. In tally with other databases, most of the survivors were within the lower RTS while most deaths occurring with ISS >15 with the highest in the >40 range.

The average LOS of trauma patient is seven days. Despite receiving ICU management, 48.5% patients died. Patients with higher ISS and who were operated upon might be the choice of ICU candidate and therefore are more severely ill, thus the higher mortality. In one series of Injury Severity Score of ICU patients, FJ Sabariah and colleagues (unpublished report) found that the mean ISS for non-survivors was 27(± 9.1) and for survivors 20.1(± 10.8)[14].

CONCLUSION

Trauma registries are at an early stage of development relative to other disease registries[13]. Experience from other established registries in Malaysia such as the National Renal Registry as well as the support of the Clinical Research Centre has helped in the development of the NTrD.

The first year of the NTrD has successfully given us insights to the pattern of major trauma in the country. However, persistent concerns about the completeness of data and incomplete geographical coverage will be addressed. In 2008, there will be an additional seven centres that, with further funding from the Ministry of Health, will definitely give us a more accurate picture allowing a more detailed analysis including the probability of survival and other statistics used in the analysis of trauma databases and registries.

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