A STUDY ON THE DEMOGRAPHIC PROFILES, DISEASE CHARACTERISTICS AND ONE-WEEK OUTCOME OF RED-TAG PATIENTS IN THE EMERGENCY DEPARTMENT, HOSPITAL UNIVERSITI SAINS MALAYSIA

DR. RASHDAN BIN RAHMAT

Dissertation Submitted In

Partial Fulfillment Of The Requirement

For The Degree Of Master Of Medicine

(Emergency Medicine)

UNIVERSITI SAINS MALAYSIA

NOVEMBER 2007

ACKNOWLEDGEMENTS

All praise be to Allah. With His blessings, I finally managed to complete this task.

I would like to convey my deepest gratitude and sincere appreciation to:

- Dr. Nik Hisamuddin Nik Abdul Rahman, Head of Department, Emergency Department, Hospital Universiti Sains Malaysia;
- Dr. Rashidi Ahmad, Lecturer and Emergency Physician, my supervisor who had given his strong support and encouragement throughout the period of completion of this dissertation;
- all the other lecturers / Emergency Physicians of Hospital Universiti Sains Malaysia who helped me throughout my stay during the course;
- all my colleagues and the Master students of Emergency Medicine for their support and help during the course;
- the staff of Emergency Department, Hospital Universiti Sains Malaysia in helping me during the data collection to complete this dissertation;
- last but not least, to my beloved family. To my wife, Dr. Khursiah Daud who has been my inspiration in all the moments that we shared throughout this journey for a better future; thank you for all your support and understanding. To my children, Muhammad Nur Faiz and Nur Farhanah, thank you for understanding the difficulties that both of you have to face for your parent to complete this course of post graduation. To my parents, your prayer and hope have become a reality. May Allah bless our family, InsyaAllah.

UNIVERSITI SAINS MALAYSIA

LAPORAN AKHIR PROJEK PENYELIDIKAN JANGKA *PENDEK*

FINAL REPORT OF SHORT TERM RESEARCH PROJECT

Sila kemukakan laporan akhir ini melalui Jawatankuasa Penyelidikan di Pusat Pengajian dan Dekan/Pengarah/Ketua Jabatan kepada Pejabat Pelantar Penyelidikan

1. **Nama Ketua Penyelidik:**
Name of Research Leader

☑ Profesor Madya/ *Assoc. Prof.* ☐ Dr./ *Dr.* ☐ Encik/Puan/Cik *Mr/Mrs/Ms*

2. **Pusat Tanggungjawab (PTJ):** PPSP, USM KAMPUS KESIHATAN
School/Department

3. **Nama Penyelidik Bersama:** Dr. Abu Yazid Md Noh
Name of Co-Researcher

4. **Tajuk Projek:**
Title of Project

A STUDY ON THE DEMOGRAPHIC PROFILES, DISEASE CHARACTERISTICS AND ONE WEEK OUTCOME OF RED TAG PATIENTS IN EMERGENCY DEPARTMENT, HOSPITAL UNIVERSITI SAINS MALAYSIA, KUBANG KERIAN, KELANTAN

5. **Ringkasan Penilaian/***Summary of Assessment*:	Tidak Mencukupi *Inadequate*		Boleh Diterima *Acceptable*	Sangat Baik *Very Good*	
	1	2	3	4	5
i) **Pencapaian objektif projek:** *Achievement of project objectives*	☐	☐	☐	☑	☐
ii) **Kualiti output:** *Quality of outputs*	☐	☐	☐	☑	☐
iii) **Kualiti impak:** *Quality of impacts*	☐	☐	☐	☑	☐
iv) **Pemindahan teknologi/potensi pengkomersialan:** *Technology transfer/commercialization potential*	☐	☐	☐	☑	☐
v) **Kualiti dan usahasama :** *Quality and intensity of collaboration*	☐	☐	☐	☑	☐
vi) **Penilaian kepentingan secara keseluruhan:** *Overall assessment of benefits*	☐	☐	☐	☑	☐

6. Abstrak Penyelidikan
(Perlu disediakan di antara 100 - 200 perkataan di dalam **Bahasa Malaysia dan juga Bahasa Inggeris.** Abstrak ini akan dimuatkan dalam Laporan Tahunan Bahagian Penyelidikan & Inovasi sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti & masyarakat luar).

Abstract of Research
(An abstract of between 100 and 200 words must be prepared in Bahasa Malaysia and in English).
This abstract will be included in the Annual Report of the Research and Innovation Section at a later date as a means of presenting the project findings of the researcher/s to the University and the community at large)

See attachment

7. Sila sediakan laporan teknikal lengkap yang menerangkan keseluruhan projek ini.
[Sila gunakan kertas berasingan]
Applicant are required to prepare a Comprehensive Technical Report explaning the project.
(This report must be appended separately)

Senaraikan kata kunci yang mencerminkan penyelidikan anda:
List the key words that reflects your research:

Bahasa Malaysia	*Bahasa Inggeris*
Kes zone merah, profil klinikal dan kematian dalam jangkamasa seminggu	Red tag patients, clinical profiles and one week mortality outcome

8. Output dan Faedah Projek
Output and Benefits of Project

(a) * **Penerbitan Jurnal**
Publication of Journals

(Sila nyatakan jenis, tajuk, pengarang/editor, tahun terbitan dan di mana telah diterbit/diserahkan)
(State type, title, author/editor, publication year and where it has been published/submitted)

See attachment

(b) **Faedah-faedah lain seperti perkembangan produk, pengkomersialan produk/pendaftaran paten atau impak kepada dasar dan masyarakat.**
State other benefits such as product development, product commercialisation/patent registration or impact on source and society.

Knowing the distribution of red tag patients and their otcome increases emergencyhealthcare providers readiness to combat the disease and eventually to reduce the morbidity and mortality related to the diseases. Furthermore, focus on the prevention of particular ror specific disease such heart attack among our community can be made.

* Sila berikan salinan/*Kindly provide copies*

(c) **Latihan Sumber Manusia**
Training in Human Resources

i) Pelajar Sarjana:
Graduates Students
(Perincikan nama, ijazah dan status)
(Provide names, degrees and status)

DR RASHDAN RAHMAT

MASTER IN MEDICINE
(EMERGENCY MEDICINE

ii) Lain-lain:
Others

9. **Peralatan yang Telah Dibeli:**
Equipment that has been purchased

none

Dr. Rashidi Ahmad
(No. Pendaftaran Penuh MPM : 32124)
Pakar/Pensyarah Jabatan Kecemasan (DU 52)
Hospital Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan

Tandatangan Penyelidik
Signature of Researcher

22/12/2009

Tarikh
Date

omen Jawatankuasa Penyelidikan Pusat Pengajian/Pusat
omments by the Research Committees of Schools/Centres

This report has been attended by the PTJ research committee and approved.

This project has achieved all its objectives. Among the output from this project are a publication in the Southeast Asian J Trop Med Public Health, three paper presentations and a master (Emergency) graduate dissertation.

PROFESSOR AHMAD SUKARI HALIM
Chairman of Research Commitee
School of Medical Sciences
Health Campus
Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan.

TANDATANGAN PENGERUSI
JAWATANKUASA PENYELIDIKAN
PUSAT PENGAJIAN/PUSAT
Signature of Chairman
[Research Committee of School/Centre]

18/5/10

Tarikh
Date

ABSTRACT

A Study On The Demographic Profiles, Disease Characteristics And One Week Outcome Of Red Tag Patients In Emergency Department, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan

INTRODUCTION:

Emergency Department provides initial treatment to patients with a broad spectrum of life threatening illnesses and injuries. Unfortunately, we hardly can found literatures discussing the distribution of red tag patients and their one week outcome.

METHODOLOGY:

A prospective observational study for a period of 6 months was carried out. The variables include age, sex, race, type of cases, shock index (SI), revised trauma score (RTS) and mortality. univariate analysis was done to find possible predictors of mortality.

RESULTS:

A total case was 440, 101 patients (23.0%) were trauma cases and 339 patients (77.0%) were non trauma cases. The mean age of the population is 47.21 $\pm$ 21.775 and ranges from 1 to 89 years old. For trauma cases, the mean age for population of patients was 31.61 $\pm$ 21.411 years old. About 2/3 of the patients were male (67.27%). More than half of the cases (58.6%) were medical cases, being cardiac or non cardiac in origin. Twenty seven patients (6.13%) died within a week. From univariate analysis, high score of RTS

and shock indek are associated with one week mortality for trauma and medical cases respectively ($p<0.01$).

CONCLUSIONS:

There was more medical than trauma red tag patients. RTS and SI are very useful in assessing the prognosis of trauma and non trauma cases respectively.

ABSTRAK

Kajian Mengenai Profil Demografi, Sifat Penyakit Dan Kajian Susulan Seminggu Pesakit Yang Di Tag Merah Di Jabatan Kecemasan, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan

PENGENALAN:

Jabatan Kecemasan (JK) memberi rawatan awal kepada pelbagai penyakit yang mengancam nyawa. Taburan demografi pesakit serta jenis-jenis kes kritikal. Di JK kurang diketahui umum.

METODOLOGI:

Kajian prospektif ini dijalankan selama 6 bulan di JK Hospital Universiti Sains Malaysia. Antara parameter yang diukur ialah umur, jantina, kaum, jenis penyakit dan kes kematian dalam masa seminggu. Analisa univariate dilakukan bagi menentukan factor kematian.

KEPUTUSAN:

Dari 440 pesakit, 101 (23.0%) merupakan pesakit trauma manakala selebihnya adalah bukan trauma. Purata umur populasi adalah 47.21 $\pm$ 21.775 tahun. Lebih dari separuh (58.6%) adalah pesakit medical. Sejumlah 27 orang telah meninggal dunia, 7 (1.59%). Analisa statistik menunjukkan terdapat hubung kait antara nilai RTS bagi kes trauma dan nilai SI bagi kes medikal dalam kadar kematian dalam tempoh seminggu selepas dimasukkan ke wad ($p<0.01$).

KESIMPULAN:

Kes medikal lebih banyak berbanding kes trauma. Nilai RTS dan SI sangat berguna di dalam menentukan prognosis pesakit trauma dan bukan trauma.

Output dan Faedah projek

1. **Rashidi A**, Rashdan R, Hisamudin NAR. et al. Demographic and clincal characteristics of red tag patients and their one-week mortality rate from the ED of HUSM Southeast Asian Journal of Tropical Medicine and Public Health 2009. Vol 40(6): 1332-30

2. **Rashidi A**, Rashdan R, Hisamudin NAR. et al. A study on the demographic profiles, disease chracteristics and one week outcome of red tag patients at ED of HUSM. Abstract publication. 14th National Conference on Medical and Health Science. Page: 50

3. **Rashidi A**, Rashdan R, Hisamudin NAR. et al One week mortality outcome of red tag patients in ED of HUSM. Abstract publication (proceeding). The 16 th International Symposium on Critical Care and Emergency Medicine 2009. July 30-Aug 1, 2009. Nusa Bali, Indonesia

BORANG LAPORAN HASIL PENYELIDIKAN
PPSP

Tajuk geran: A Study On The Demographic Profiles, Disease Characteristics And One Week Outcome Of Red Tag Patients In Emergency Department, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan

Penyelidik: Prof. Madya. (Dr) Rashidi Ahmad
Jenis geran: Short Term
Tempoh geran: 2 tahun

Jenis laporan: Laporan Kemajuan ☐ Alatan di beli ☐ Ya:nyatakan.....

Laporan Akhir*: ☒ ☐ Tidak

OBJEKTIF SPESIFIK KAJIAN (sama spt dalam proposal asal)	**SECARA RINGKAS TERANGKAN PENCAPAIAN/HASIL**	**OBJEKTIF TERCAPAI ATAU TIDAK**
1. To classify and determine the type of cases admitted and managed in Red Zone.	Out of 440 patients analyzed in this study, 101 patients (23.0%) were grouped under the trauma cases whereas the other 339 patients (77.0%) were grouped under the non trauma cases. The mean age of the population is 47.21 ± 21.775 and ranges from 1 to 89 years old. For trauma cases, the mean age for population of patients was 31.61 ± 21.411 years old and ranges from 1 to 87 years old. About 2/3 of the patients were male (67.27%) and about 95.0% were Malays. More than half of the cases (58.6%) were medical cases, being cardiac or non cardiac in origin. Neurosurgical cases contribute to 25.0% of the total cases. The trauma cases involved more than 75.0% younger age group which is less than 60 years old. Elderly patients were classified more in non trauma cases of up to 50.0% with their mean age of 51.86 ± 19.642 years old and ranges from 1 to 89 years old. Up to 50.0% of the total cases presented directly to ED without being referred from other centers. A small proportion (0.68%) was referred by private hospitals. The mean duration of stay in ED before admission to the ward was 3.92 ± 1.495 hours and ranges from 1 to 8 hours. Even though neurosurgical cases representing only 1/4 of the total cases, at least nearly 40.0% of them required advanced airway management and admitted to ward 2 Delima, the neurosurgical ICU	Tercapai

2. To determine the number of mortality for trauma and non-trauma cases by using the Revised Trauma Score and Shock Index respectively after being managed in Red Zone or in the ward within the one-week follow up period.	Out of 440 patients; total of 27 patients (6.13%) died and 7 (1.59%) of them died in ED; out of which 3 (0.68%) were trauma cases. Another 20 (4.55%) from the study subjects died within the period of one-week ward stay. The statistical analysis using the independent T-test showed there was a significant difference between the RTS value and the mortality within the period of one week of ward stay as the p=0.000. There was also a significant difference between the SI value and the mortality within the period of one week of ward stay as the p=0.000. However, there were no significant differences comparing the age, sex, duration of ED stay as well as the duration of one week ward stay with the outcome when the p>0.005. There were also no significant differences when comparing the individual components of RTS (GCS, RR and SBP) and SI (HR and SBP) with the outcome as all the p values calculated were p>0.05.	Tercapai

- *Laporan Akhir perlu disertakan salinan manuskrip dan surat yang dihantar kepada mana-mana jurnal untuk penerbitan.*

Nama Penyelidik Utama (PI): PROF. MADYA. DR. RASHIDI AHMAD

Dr. Rashidi Ahmad
(No. Pendaftaran Penuh MPM : 32124)
Pakar/Pensyarah Jabatan Kecemasan (DU 52)
Hospital Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan

t.t.:

Tarikh: 2 Mac 2010

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF RED TAG PATIENTS AND THEIR ONE-WEEK MORTALITY RATE FROM THE EMERGENCY DEPARTMENT OF THE HOSPITAL UNIVERSITI SAINS MALAYSIA

Rashidi Ahmad, Rashdan Rahmat, Nik Hisamudin Nik Abdul Rahman, Abu Yazid Mohd Noh, Nasir Mohammad, Sheik Farid Abdul Wahab and Ida Zarina Zaini

Department of Emergency Medicine, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

Abstract. Early identification and rapid treatment of red tag patients may decrease morbidity and mortality. We examined the clinical characteristics, etiologies and one week mortality rate of red tag (life threatening and potentially life threatening illness) patients at the Hospital Universiti Sains Malaysai (HUSM). A cross-sectional study was conducted at the Emergency Department of the HUSM from 1 August 2006 to 31 January 2007; 440 eligible patients were analyzed. The group had a mean age of 47.2 ± 22 years, with 67.3% of the patients being male. Twenty-three percent were trauma cases with motor vehicle accident being the major mechanism of injury. Fifty-four percent of the cases had cardiac related illnesses. The mean duration of stay in the Emergency Department (ED) was 3.9 ± 1.5 hours. The survival rate at one week was 76.6%. The non-trauma group comprised 74.0% of death cases. Acute coronary syndrome and road traffic accidents comprised 22.0% of total death cases at one week. Red tag patients constitute a large proportion of ED cases and may remain in the ED for significant periods of time.

INTRODUCTION

The Emergency Department (ED) provides initial treatment to patients with a broad spectrum of illnesses and injuries, of which some may be critical and require immediate assessment and managerment. Acute, critical illnesses have a predicted mortality in excess of 30% (Shoemaker, 1992). Critically ill patients make up a substantial part of some ED patient populations. They may constitute up to 8% of all patients and over 25% of patients who are admitted (Fromm *et al*, 1993). In our ED, these patients are categorized as red tag patients. Early identification and rapid treatment of red tag patients may decrease morbidity and mortality (Gropper, 2004).

To date, there have been no proper studies of the demographic characteristics and disease/clinical profiles of red tag patients and their morbidity and mortality rate in Malaysia or Southeast Asia. There are no studies of the efficiency of critically ill patient management in the ED of the Hospital Universiti Sains Malaysai (HUSM). Study of such characteristics need to be considered for decisions to be made regarding improving emergency health services. The purpose

Correspondence: Dr Rashidi Ahmad, Department of Emergency Medicine, School of Medical Sciences, USM Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia.
E-mail: shidee_ahmad@yahoo.com

surface antigen-positive blood donors: degree of understanding and action taken after notification. *Transfusion* 1992; 32: 702-6.

Nilsson Sojka B, Sojka P. The blood-donation experience: perceived physical, psychological and social impact of blood donation on the donor. *Vox Sang* 2003; 84: 120-8.

Sanchez AM, Ameti DI, Schreiber GB, *et al*. The potential impact of incentives on future blood donation behavior. *Transfusion* 2001; 41: 172-8.

Sharma UK, Schreiber GB, Glynn SA, *et al*. Knowledge of HIV/AIDS transmission and screening in United States blood donors. *Transfusion* 2001; 41: 1341-50.

Tan HL, Koh KC. Is HIV screening in the general population cost-effective? *Malaysian Fam Physician* 2008; 3: 97-97.

Tynell E, Norda R, Ekermo B, Sanner M, Andersson S, Bjorkman A. False-reactive microbiologic screening test results in Swedish blood donors-how big is the problem? A survey among blood centers and deferred donors. *Transfusion* 2007; 47: 80-9.

Wake DJ, Cutting WA. Blood transfusion in developing countries: problems, priorities and practicalities. *Trop Doct* 1998; 28: 4-8.

Yousuf R, Rapiaah M, Ahmed SA, *et al*. Trends in hepatitis B virus infection among blood donors in Kelantan, Malaysia: A retrospective study. *Southeast Asian J Trop Med Public Health* 2007; 38: 1070-4.

parison of the shock index and conventional vital signs to identify acute, critical illness in the emergency department. *Ann Emerg Med* 1994; 685-90.

Rashidi A, Maheswaran M, Hisamuddin NAR, *et al.* Magnitude of non-traumatic altered state of consiousness in Department of Emergency Medicine, HUSM. *Middle East J Emerg Med* 2007; 7:10-13.

Sanchez LD, Goudie JS, De la Pena J, *et al.* Mortality after emergency department intubation. *Int J Emerg Med* 2008; 1: 131-3.

Schwab CW, Kauder DR. Trauma in the geriatric patient. *Arch Surg* 1992; 127: 706-10.

Schiller WR, Knox R, Chleborad W. A five-year experience with severe injuries in the elderly patients. *Accid Anal Prev* 1995: 167-74.

Shoemaker WC, Patil R, Appel PL, *et al.* Hemodynamic and oxygen transport patterns for outcome prediction, therapeutic goals and clinical algorithms to improve outcome. *CHEST* 1992; 102: 617-25.

Varon J, Fromm RE, Levine RL. Emergency department procedures and length of stay for critically ill medical patients. *Ann Emerg Med* 1994; 23: 546-9.

WHO. World health report 2003. [Cited 2009 May 28]. Available from: URL//http://www.who.int/whr/2003/en/

WHO. WHO global burden of disease 2004: causes of death. [Cited 2009 May 28]. Available from: URL//http//www.who.int/healthinfo/globalburden_disease/GBD_report_2004_update_part2.pdf

in this study, we still can conclude the RTS demonstrates accuracy in predicting death (Champion *et al*, 1989).

Twenty-five percent of intubated patients succumbed to death within a week. A previous pilot study at the Department of Emergency Medicine, Beth Israel Deaconess Medical Center, revealed the 30-day mortality after an ED intubation in their study population was 27.0% (Sanchez *et al*, 2008). We could not conclude whether the above was due to the severity of the illness or a complication of the intubation itself. Future studies should attempt to identify predictors of mortality among ED intubations.

In summary, red tag or critically ill patients constitute an important proportion of ED practice and may remain in the ED for significant periods of time. Although we are satisfied with the ED performance in managing red tag patients in view of the number of survivors within a week, but this result may not reflect the general outcome of red tag patients. Given the realities of ED practice, emergency medicine practitioners should receive training in the continuous management of critically ill patients.

By knowing the demograhic characteristics, clinical profiles and mortality rates of red tag patients, we can be more prepared in terms of number of staff required, equipment, drugs, and training of personnel in managing red zone cases. Optimal care can be given efficiently to reduce mortality and morbidity. It can help us improve the quality of services provided to our patients, thus improving the overall quality of life in our community. Data from this study can be used as a landmark or general guideline to understand the magnitude of red tag cases in the ED and hopefully will contribute to the improvement of emergency care. Further study of life threatening or potentially life threatening diseases should be on-going to better understand the diseases for facility preparedness.

REFERENCES

American College of Emergency Physicians (ACEP), American College of Surgeons: Equipment for ambulances, 2000.

Ali J, Adam R, Butler AK, *et al*. Trauma outcome improves following the advanced trauma life support program in a developing country. *J Trauma* 1993; 34: 898-9.

Arokiasamy JT. Malaysia's ageing issues. *Med J Malaysia* 1997; 52: 1-3.

Champion HR, Sacco WJ, Copes WS, *et al*. A revision of the trauma score. *J Trauma* 1989; 29: 623-9.

FRISC II investigators. Invasive compared with noninvasive treatment in unstable coronary artery disease. *Lancet* 1999; 354: 708-15.

Fromm RE, Gibbs LR, McCallum WG, *et al*. Critical care in emergency department: a time-based Study. *Crit Care Med* 1993; 21: 970-6.

Graft LG, Clark S, Radford MJ. Critical care by emergency physicians in American and English hospitals. *Arch Emerg Med* 1993; 10: 145-54.

Gropper MA. Evidence-based management of critically ill patients: analysis and implementation. *Anesth Analg* 2004; 99: 566-72.

Kucher N, Luder CM, Dornhofer T, *et al*. Novel management strategy for patients with suspected pulmonary embolism. *Europ Heart J* 2002; 24: 366-76.

Ministry of Health. Health facts 2006. [Cited 2009 May 28]. Available from: URL: http://www.moh.gov.my/static/health_facts_2006.pdf

Morris JA Jr, MacKenzie EJ, Edelstein SL. The effect of pre-existing conditions on mortality in trauma patients, *JAMA* 1990; 263: 1942-1946.

Nelson M, Waldrop RD, Jones J, *et al*. Critical care provided in an urban Emergency Department. *Am J Emerg Med* 1998; 16: 56-9.

Rady MY, Smithline HA, Blake H, *et al*. A com-

before their 80th birthday and regional variations in risk of death at older ages were smaller, ranging from around 40.0% in developed countries of Western Europe to 60.0% in most developing regions and 70.0% in Africa. We postulate that the prognosis of critically ill patients is relatively poor among elderly patients.

A high rate of mortality was observed among critically ill patients with underlying medical (63.0%) and neurosurgical (30.0%) illnesses. The fact the HUSM is a tertiary referral center for the east coast of Peninsular Malaysia, especially in cardiology and neurosciences, affects the distribution of cases. Forty-four percent of deaths within a week were due to coronary artery disease and another 20.0% were due to trauma cases. These results are not surprising. According to the WHO (2004) ischemic heart disease is the leading cause of death worldwide (12.2% of total deaths). Cerebrovascular disease and trauma contribute to 9.7% and 1.3% of total deaths, respectively (WHO, 2004). Malaysian statistic regarding to top ten causes of death in 2002, cardiovascular disease was the leading cause (11%) and in the year 2005 cardiovascular disease was the second leading cause of death (14.3%) behind septicemia (Ministry of Health, 2006). The mortality rate due to ACS in this study was high and worrisome. Although our institution has a cath lab, the rates of urgent revascularization were low for both CABG and PTCA despite the fact that recent data indicates that in patients with unstable coronary artery disease, the prognosis can be greatly improved by early revascularization (FRISC II investigators, 1999).

According to Malaysian statistics regarding the top ten causes of death in all ages for 2002, trauma ranked 8th on the list (3%). However, in the year 2005, the incidence of trauma related death increased and became the third leading cause of hospitalization and the fifth leading cause of death (5.7%) in MOH hospitals in Malaysia (Ministry of Health, 2006). The above trend is expected since; approximately 5 million people worldwide die from injuries yearly (Ali *et al*, 1993). Road traffic-related injuries, self-inflicted injuries, interpersonal violence, burns and drowning were among the 15 leading causes of death among people age 5 to 44 years old (ACEP, 2000). In addition to the millions who die each year, millions more are temporarily or permanently disabled. This toll is expected to increase in coming years (ACEP, 2000).

We noted a majority of critically ill non-trauma patients who died within a week of hospitalization had SI values of more than 1 ($p<0.05$). SI has been evaluated as a predictor in many medical illnesses as well as traumatic injury cases. It has been shown to be a better indicator in identifying patients with acute illnesses as well as in those with early acute blood loss than either the heart rate or systolic blood pressure used in isolation (Rady, 1994). Kucher *et al* (2002) classified patients into two categories: a positive shock index defined as 1 (hemodynamically unstable patients) and a negative shock index of <1 (hemodynamically stable patients). We postulate the outcome of patients with a persistently high SI despite intensive resuscitation have a poorer prognosis than patients who respond to acute treatment.

We noted there was a significant difference between the means of the RTS value and the mortality within the period of one week after receiving treatment in the ED ($p<0.05$). Subanalysis of the mortality of head injured patients revealed that their RTS value was less than 4 upon the ED presentation. Though the sample size was very small for inferential statistical analysis and the RTS was heavily weighted towards the Glasgow Coma Scale

(93.0%). (Rashidi *et al*, 2007). Therefore, it was not a surprise when the distribution of races in this study was predominantly Malay (95.0%). Hence, the racial distribution in this study reflected the true Malaysian population.

Within the study period, the HUSM received critical cases as walk-in patients and from various sources of referral. Although the Hospital Kota Bharu and the HUSM are both tertiary referral centers for the east coast, the ED of the HUSM receives the substantial number of critical cases.

Cardiac cases comprised to 32.0% of red tag cases. This figure is comparable (33.0%) to a previous study done by Nelson *et al* (1998). Acute coronary syndrome comprised 40.0% of cases.

Trauma comprised 23.0% of the total number of cases. This result is higher than a previous study done by Nelson *et al* (1998) from the Department of Emergency Medicine, Long Medical Center, Baton Rouge, LA, USA (23.0% *vs* 16.0%). However, in the Nelson study, head trauma cases were not included due to the unavailability of neurosurgeons at the center (Nelson *et al*, 1998). Taking this factor into consideration, our critical case figures are similar to this center. We postulate these findings are associated with rapid urbanization and industrialization in Malaysia and reflect the nature of diseases that will be encountered by the ED in the future.

The mean duration of stay in the ED prior to admission was 2 to 6 hours; the majority of patients stayed no longer than 3 hours. This result is comparable with previous studies ranging from 2.4 to 4.7 hours (Graft *et al*, 1993; Varon *et al*, 1994; Nelson *et al*, 1998). Longer stays in the ED were most likely caused by in-patient bed availability. According to previous studies, there are four main reasons for extended stay by critical care patients: time to examination, work-up time, time to bed availability and overcrowding with non-emergent patients (Fromm *et al*, 1993; Graft *et al*, 1993). In our institution, lack of intensive care and high dependency bed space were the main causes for delayed admissions. Shortage of doctors in Malaysian EDs is considered a normal phenomenon. Many urban EDs have 10-12 doctors and 1 or 2 Emergency Physicians (EP). It is worse in district EDs whereby EPs are not available and only 4-6 doctors run the whole hospital and take turns at managing patients in the ED each day. As a result, critical care patients presenting to the ED may experience long delays. Although this situation may not be optimal, it is a reality in many hospitals in Malaysia. A few measures to improve this problem have been adopted including increasing the number of medical students, training more local EPs compulsory service in district hospitals, compulsory posting in the ED for houseman and others.

In this study, we reviewed the one-week outcomes of red tag patients. We believe that patient one week survival is significantly influenced by appropriate management in the ED. We assumed the diagnosis could be made within a week and if it was beyond a week, the complications of the illness or disease might have masked the actual diagnosis. Ninety-four percent of red tag patients survived a week after admission. We speculate this is because of the ability of our emergency physicians, residents and paramedics to recognize potentially critically ill patients and manage them appropriately.

In this study, 51.0% of patients who died within a week were >60 years old. According to a WHO report (2003), 42.0% of adult deaths in developing countries occur after 60 years of age, compared to 78.0% in developed countries. They also find that globally 60-year-olds had a 55.0% chance of dying

Table 1
Distribution of one-week mortality in studied red tag patients.

	Trauma *n* (%)	Non-trauma *n* (%)	Total *n* (%)
Death in ED	3 (11.1)	4 (14.8)	7 (25.9)
Death in ward	4 (14.8)	16 (59.3)	20 (74.1)

We reviewed 440 treated cases and their one week mortality outcome. The number of studied patients represents approximately 2.0% of the total ED census during the study period. The above findings are comparable with other studies (Fromm, 1993; Nelson, 1998).

In this study, the mean of age of patients was 47.2 (±22) years old and the majority were adults of >50 years old. Men >65 years old formed the majority of patients. The obvious reason why many of the red tag patients were elderly is this population is more likely to have underlying chronic diseases. The presence of comorbid disease states among the elderly, such as diabetes mellitus, coronary artery disease, renal disease and pulmonary disease, makes it more difficult for them to recover from acute illnesses or injuries (Morris *et al*, 1990). Ageing can be defined as a biological, sociological, economic and chronological phenomenon (Arokiasamy, 1997). Schwab and Kauder (1992) divided the elderly population into two groups: the "young old" (65 to 80 years old) and the "old old" (80 years of age and older). However, in this paper, the chronological definition used the United Nation's and Ministry of Health's recommendations: "the elderly or ageing population" was defined as people ≥60 years old (Arokiasamy, 1997). Interestingly, when we separated the data into trauma and non-trauma cases, we noted two different types of age distribution. In the non-trauma group, the distribution of age was normal, whereas in the trauma group, it was skewed to the left. The observed mean age for non-trauma and trauma patients were 52 and 32 years old, respectively. In other words, serious trauma more commonly occur in the younger age group. In contrast, critically ill non-trauma patients are more likely to be adults at later ages. Factors that may explain the above phenomena includes urbanization, industrialization, multiple stress factors, advancement of engineering technology and non-compliance with healthy lifestyles.

In this study, 67.3% of patients were male. Further group analysis also revealed that more than two thirds of trauma and non-trauma cases involved male patients. The above findings are most likely influenced by the fact the incidence of ischemic heart disease (IHD) is lower in females and because males generally hold job positions with higher risks for accidents. Both the elderly and male patients are at greater risk for developing hypertension, diabetes, atherosclerosis and coronary artery disease (Rashidi *et al*, 2007). Male drivers are also more prone to accidents than female drivers because men are more likely to speed, are aggressive, dangerous and easily distracted during driving. According to a study by Schiller *et al* (1995) male trauma victims were predominantly in the younger age group. However, males and females were equally represented in the geriatric trauma population.

In northeastern Peninsular Malaysia, a vast majority of the population are Malays

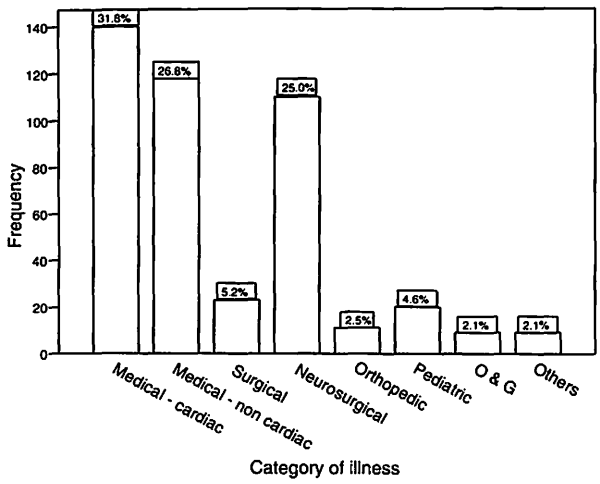


Fig 1–Frequency of categorical illness in the studied red tag patients.

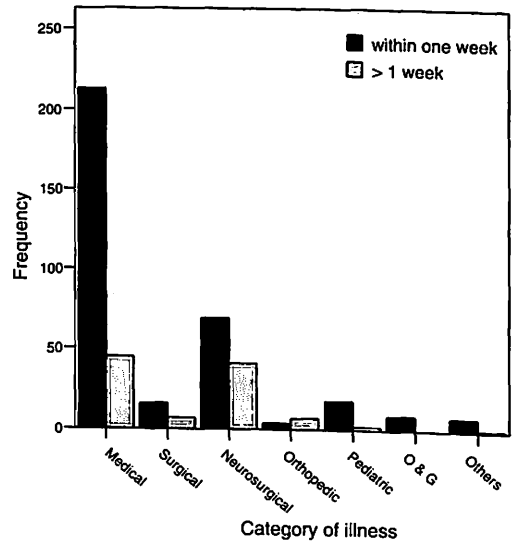


Fig 3–Distribution of length of stay by various categories of illness.

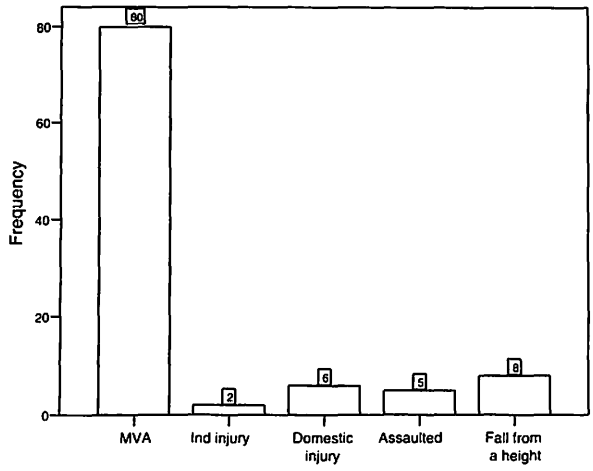


Fig 2–Mechanism of injury.

succumbed to their illnesses within a week of hospitalization. Forty-one percent of patients who died were 20-60 years old and 51.0% were more than 60 years old. Seventy percent of patients who died were males. Non-trauma and trauma cases consisted of 74.0% (4.5% of the total cases) and 26.0% (1.6% of the total cases) of those who died, respectively. Forty-four precent and 22.2% of total deaths within one week were contributed by ACS and road traffic accidents, respectively. Twenty-six percent of deaths occurred in the ED (Table 1). A high rate of mortality was observed among critically ill patients with underlying medical (63.0%) and neurosurgical illnesses (30.0%). Twenty-five percent (11 of 51 intubated patients) died within a week ($p<0.05$; OR 9.1; 95% CI 4.0-21.0). The majority of critically ill non-trauma patients who died within a week of hospitalization (85%, 17 of 20 patients) had a SI value of >1 ($p<0.05$; OR 21.3; 95% CI 6.1-74.9). Subanalysis of the patients who died due to head injuries had poor revised trauma score (RTS) values (≤ 3 upon presentation the ED).

DISCUSSION

Red tag or critically ill patients make up a substantial part of some ED patient populations. To the best of our knowledge, this is the first review of red tag patients in the ED.

than 20 years old. About two thirds (67.3%) of the studied patients were male. Malays made up the majority of the studied patients (94.1%). Half the patients (50.3%) came to the ED on their own or were brought in by family members or the public, whereas the rest came from various sources of referral such as being referred from health clinics (16.4%) or district hospitals (22.1%). A small proportion (0.7%) was referred by private hospitals around Kota Bharu town.

We subdivided the data into trauma and non-trauma groups: 23% were trauma cases and 77.0% were non-trauma cases (Fig 1). The mean age of non-trauma cases was 52.0 (±19.5) and the median age of trauma patients was 27.0 (±21) years; males were predominant in both groups (64% and 78.2%, respectively). Two hundred fifty-six (75.5%) non-trauma patients had a Shock Index less than 1. The mean RTS in the trauma patients was 6.5 (±2) (mode: 8; median: 6). Ninety-four (93.0%) trauma patients had a Revised Trauma Score (RTS) of greater than 3.

Of 339 critically ill non-trauma cases, 258 (76.1%) had medical illnesses. We divided the medical cases into cardiac and non-cardiac cases. Thirty-two percent of the red tag patients had cardiac related illnesses. One hundred forty out of 258 medical cases (54.3%) had cardiac related illnesses and the remaining 118 cases had mixed medical illnesses (respiratory diseases, renal diseases, sepsis, or cerebrovascular accidents).

One hundred four medical cases (40.0%) suffered from acute coronary syndrome (ACS): ST elevation myocardial infarction in 6.6%, non-ST elevation myocardial infarction in 1.6% and unstable angina in 32.1%. The mean age of the patients with ACS was 58.0 (±12) years; they were predominantly male (78.0%). Thirty-six medical cases (14.0%) were considered as non-acute coronary syndrome cases. The cases included stable angina, congestive cardiac failure, valvular heart disease, and cardiac arrhythmias.

One hundred eighty-two patients (47.4%) suffered from trauma related illnesses. Most (93.0%) had a RTS greater than 3. Motor vehicle accident was the major mechanism of injury in trauma cases (80.0%). The insults caused were varied, including head injury, cervical and bony fractures, chest and abdominal trauma and polytrauma (Fig 2). Neurosurgical cases contributed to 81.0% of trauma cases, mainly head injuries; 56.3% were male patients. Motor vehicle accident was the main contributor (84.0%) of the neurosurgical cases.

Fifty-one patients (11.6%) required intubation and mechanical ventilation; 30 (58.8%) were neurosurgical cases, 13% (4/30 intubated neurosurgical patients) succumbed to their illnesses in the ED despite vigorous resuscitation. Seven neurotrauma cases (23.0%) were taken urgently to the operating theater for immediate surgical intervention while the others were admitted to the high dependency neurosurgical ward. Other procedures done in the ED include central venous catheter insertion (7.7%), chest tube insertion (1.1%) and bladder catheterization (29.3%).

The mean duration of stay in the ED prior to ward admission was 3.9 (±1.5) hours (median: 3.5 hours). Seventy-five percent of red tag cases stayed from 2 to 6 hours in the ED. The percentage of those who stayed more than 6 hours in the ED was 12.5%. Trauma cases were in the ED longer than non-trauma cases [4.5 (±2) hours versus 3.8 (±2) hours, respectively]. Medical and neurosurgical cases spent more time in the ED than the others non-trauma cases. Pediatric and Obstetric and Gynecology (O & G) cases stayed in the ED for a shorter period of time.

Most patients (76.6%) were discharged within a week. Twenty-seven patients (6.1%)

of this study was to examine the demographic and clinical characteristics and one-week mortality rate of red tag patients in the ED of the HUSM.

MATERIALS AND METHODS

This cross-sectional study was conducted at the ED of the HUSM. The HUSM is a 750-bed teaching hospital and tertiary referral center for the east coast of Peninsular Malaysia. The northeast coast covers 2 states, Kelantan and Terengganu, with a total population of 3.1 million and a total area of 27,877 km^2. The HUSM is located in Kelantan. The entire Kelantan population is covered by both the HUSM and Hospital Kota Bharu under the Ministry of Health, Malaysia. The HUSM had an annual patient census of 55,000 persons from 1 August 2006 to 31 January 2007. Ethical approval for this study was obtained from the Research and Ethics Committee, School of Medical Sciences, Universiti Sains Malaysia [reference: USMKK/PPSP/JK EP (manusia) USM]. The target population was red tag patients, both trauma and non-trauma cases.

All patients triaged as red in the ED of the HUSM during the study period were included in the sample population. In the ED of the HUSM, a 3-tier triage system is used. Patients are triaged to different zones based on their presenting illness: Green Zone – non-urgent case; Yellow Zone – semi-urgent case, and Red Zone – life-threatening/potentially life threatening conditions.

Cases with impaired conscious monitored in the red zone and transit patients were excluded from the study. We found no similar studies in the literature. To calculate standard deviation and mean, attendance data in the ED of the HUSM from 1 January 2005 to 30 June 2005 were reviewed. The sample size was then calculated using a single proportion formula with significance set at $p<0.05$. This study used a convenience sample design with a prospective identification of red tag patients followed by a retrospective review of the medical records a week after hospitalization to determine the length of stay and outcome (alive or dead).

Various demographic and clinical data regarding studied patients were recorded using a data collection sheet specifically designed for the purpose. Factors taken into consideration for analysis were: age, sex, race, category of illnesses, mechanism of injury in trauma cases, length of stay in the ED, acute care management and outcome. It was sometimes difficult to specify the exact diagnosis due to the variety of diseases in the ED. Therefore, we categorized the diseases according to the respective teams who managed the cases. A Revised Trauma Score (RTS) was used to categorize the severity of trauma cases, while non-trauma cases were categorized using a Shock Index (SI) scoring system. A RTS of less than 4 was considered severe and a shock index score of more than 1 was considered a significant risk for mortality.

Qualitative and quantitative variables were analysed using the Statistical Package for Social Sciences (SPSS) 12.0 software for Windows. Sociodemographic data was analyzed using descriptive statistics. Data were presented as frequencies and proportions. The data obtained were subjected to chi-square test at a 5% ($p<0.05$) confidence interval.

RESULTS

Four hundred forty patients were analyzed. The mean age of the studied patients was 47.2 (± 22) years old (median: 52 years; mode: 65 years; range: 1 to 89 years). One hundred sixty-five patients (37.5%) were more than 60 years old, 198 (45%) were 21-60 years old and the others (17.5%) were less

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF RED TAG PATIENTS AND THEIR ONE-WEEK MORTALITY RATE FROM THE EMERGENCY DEPARTMENT OF THE HOSPITAL UNIVERSITI SAINS MALAYSIA

Rashidi Ahmad, Rashdan Rahmat, Nik Hisamudin Nik Abdul Rahman, Abu Yazid Mohd Noh, Nasir Mohammad, Sheik Farid Abdul Wahab and Ida Zarina Zaini

Department of Emergency Medicine, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia

Abstract. Early identification and rapid treatment of red tag patients may decrease morbidity and mortality. We examined the clinical characteristics, etiologies and one week mortality rate of red tag (life threatening and potentially life threatening illness) patients at the Hospital Universiti Sains Malaysai (HUSM). A cross-sectional study was conducted at the Emergency Department of the HUSM from 1 August 2006 to 31 January 2007; 440 eligible patients were analyzed. The group had a mean age of 47.2 ± 22 years, with 67.3% of the patients being male. Twenty-three percent were trauma cases with motor vehicle accident being the major mechanism of injury. Fifty-four percent of the cases had cardiac related illnesses. The mean duration of stay in the Emergency Department (ED) was 3.9 ± 1.5 hours. The survival rate at one week was 76.6%. The non-trauma group comprised 74.0% of death cases. Acute coronary syndrome and road traffic accidents comprised 22.0% of total death cases at one week. Red tag patients constitute a large proportion of ED cases and may remain in the ED for significant periods of time.

INTRODUCTION

The Emergency Department (ED) provides initial treatment to patients with a broad spectrum of illnesses and injuries, of which some may be critical and require immediate assessment and managerment. Acute, critical illnesses have a predicted mortality in excess of 30% (Shoemaker, 1992). Critically ill patients make up a substantial part of some ED patient populations. They may constitute up to 8% of all patients and over 25% of patients who are admitted (Fromm *et al*, 1993). In our ED, these patients are categorized as red tag patients. Early identification and rapid treatment of red tag patients may decrease morbidity and mortality (Gropper, 2004).

To date, there have been no proper studies of the demographic characteristics and disease/clinical profiles of red tag patients and their morbidity and mortality rate in Malaysia or Southeast Asia. There are no studies of the efficiency of critically ill patient management in the ED of the Hospital Universiti Sains Malaysai (HUSM). Study of such characteristics need to be considered for decisions to be made regarding improving emergency health services. The purpose

Correspondence: Dr Rashidi Ahmad, Department of Emergency Medicine, School of Medical Sciences, USM Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia.
E-mail: shidee_ahmad@yahoo.com

surface antigen-positive blood donors: degree of understanding and action taken after notification. *Transfusion* 1992; 32: 702-6.

Nilsson Sojka B, Sojka P. The blood-donation experience: perceived physical, psychological and social impact of blood donation on the donor. *Vox Sang* 2003; 84: 120-8.

Sanchez AM, Ameti DI, Schreiber GB, *et al.* The potential impact of incentives on future blood donation behavior. *Transfusion* 2001; 41: 172-8.

Sharma UK, Schreiber GB, Glynn SA, *et al.* Knowledge of HIV/AIDS transmission and screening in United States blood donors. *Transfusion* 2001; 41: 1341-50.

Tan HL, Koh KC. Is HIV screening in the general population cost-effective? *Malaysian Fam Physician* 2008; 3: 97-97.

Tynell E, Norda R, Ekermo B, Sanner M, Andersson S, Bjorkman A. False-reactive microbiologic screening test results in Swedish blood donors-how big is the problem? A survey among blood centers and deferred donors. *Transfusion* 2007; 47: 80-9.

Wake DJ, Cutting WA. Blood transfusion in developing countries: problems, priorities and practicalities. *Trop Doct* 1998; 28: 4-8.

Yousuf R, Rapiaah M, Ahmed SA, *et al.* Trends in hepatitis B virus infection among blood donors in Kelantan, Malaysia: A retrospective study. *Southeast Asian J Trop Med Public Health* 2007; 38: 1070-4.

OM 05

A study on the demographic profiles, disease characteristics and one week outcome of red tag patients at Emergency Department, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan

Rashidi Ahmad, Rashdan Rahmat, Abu Yazid Md Noh, Nik Hisamuddin Nik Abdul Rahman, Kamarudin Jaalam*

Department of Emergency Medicine, School of Medical Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia.

** shidee_ahmad@yahoo.com*

Introduction: Emergency Department (ED) provides initial treatment to patients with a broad spectrum of illnesses and injuries. To date, there is a lack of local study on the clinical characteristics of red tag patients in Malaysian ED. Results from the analysis of the demographic and disease characteristics will assist Emergency Manager in making appropriate decision on the development of most needed area of emergency care.

Objective: To study on the demographic and disease characteristics of red zone cases and its one week outcome

Materials and methods: The study was conducted at ED of Hospital Universiti Sains Malaysia (HUSM) from August 2006 till January 2007. All patients triaged as 'RED' was included during the study period. Cases of conscious sedation observed in red zone for monitoring and transit patients were excluded. This study used a convenience sample design with a prospective identification of red tag patients followed by a retrospective review of the medical records a week after hospitalization to determine either patient were alive or dead.

Results: Four hundred forty cases were analyzed. Hundred and one patients (23.0%) were trauma cases. The mean age of the studied population is 47.2 $\pm$ 21.78 and 67% were male patients. Medical and neurosurgical cases contribute to 58.6% and 25.0% of the total cases respectively. The mean duration of stay in ED before admission to the ward was 3.9 $\pm$ 1.5 hours. Forty five percent of studied cases required advanced airway management. Twenty-seven patients (6.13%) died within a week whereby 7(1.59%) of them died at ED.

Conclusion: Medical patients, especially cardiac related diseases and neurosurgical patients form the majority of red tag patients at ED of HUSM. Great emphasize or focus is required to improve the above services.

One Week Mortality Outcome of Ded Tag Patients in Emergency Department, Hospital University Sains Malaysia; Kubang Kerian, Kelamtan

Rashidi Ahmad, Rashdan Rahmat, Nik Hisamuddin Nik Abdul Rahman, Nasir Mohamad, Kamarul Aryffin Baharudin, Tuan Haitul Nizam Tuan Kamauzaman, Shaik Farid Abdul Wahab

Department of Emergency Medicine, School of Medical Sciences, Universiti Sains Malaysia,Health Campus USM, 161500 Kelantan, Malaysia

Abstract

Emergency Department (ED) provides initial treatment to patients with a broad spectrum of illnesses and injuries. We believed that ED management contributes to the morbidity and mortality of critically ill patients. Unfortunately, there is no data to support it. We postulate that appropriate disease management of critically ill patient; i.e., red tag patients in our ED is associated with a patient's survival within a week

We conducted an observational prospective study from 1st August 2006 till 31st January 2007. The target population were red tag patients, either trauma or non-trauma cases. Factors taken into the consideration for analyses were as follows: age, sex, race, category of illnesses, Shock Index (SI), Revised Trauma Score (RTS), need of intubation, length of stay in ED and ward, and death.

Four hundred forty patients were analyzed - 101 patients (23.0%) were trauma cases and 339 patients (77.0%) were non-trauma cases. Fifty nine percent was medical cases; i.e., cardiac or non cardiac in origin. Twenty seven patients (6.13%) died within a week and 7 of them died (1.59%) in ED. High rate of mortality was observed among critically ill patients with underlying medical (63%) and neurosurgical illnesses (30%). Thirteen of the intubated patients (25.5%) were succumbed to death within a week (p value < 0.01; 95% CI: 0.05-0.25). Both means of RTS in trauma cases and SI in non-trauma cases had significant correlation with one-week mortality (P<0.05)

In conclusion, 94% of critically ill patients or red tag patients who was managed in ED of Hospital Universiti Sains Malaysia were survived beyond one week of hospitalization. Factors that associated with poor one week outcome include trauma cases with RTS less than 4, medical cases with SI more than 0.9 and intubated patients.

Key words: Red tag patients, one week mortality outcome, factors

Comparison of Apache II, Sofa, and Modified Sofa Scores in Predicting Mortality of Surgical Critical Care Patients in Dr. Hasan Sadikin General Hospital

Halim, Dino A., Murni, Tri W., Redjeki, Ike S.

Dept. of General Surgery, Medical Faculty, Padjadjaran University
Bandung, West Java, Indonesia

ABSTRACT

Introduction: Scoring systems were developed to assess the severity of organ failures and to predict mortality. The sequential organ failure assessment (SOFA) score and its modification (MSOFA) are gaining popularity through their proven simplicity, validity, and reliability in previous studies.

Objective: To determine and compare the validity of the SOFA and MSOFA scores with Acute Physiology and Chronic Health Evaluation II (APACHE II) score for predicting mortality in surgical patients treated in ICU in dr. Hasan Sadikin General Hospital in Bandung, West Java, Indonesia.

Patients and Methods: This was a prospective observational cohort study involving consecutively 144 surgical patients (from January 2008 to December 2008). APACHE II, SOFA, and MSOFA scores were determined on admission. SOFA and MSOFA scores were also repeated every 48-72 hours till ICU discharge or death for determining mean and maximum values of SOFA and MSOFA. Scores validations were determined using Hosmer Lemeshow goodness-of-fit test and receiver operating characteristic (ROC) curve analyses to determine the area under the curve (AUC).

Results: Mortality rate was 39.8%. the mean APACHE II score (11,63±5,55, 14,95±4,27; p≤0,001), SOFA(3,7±2,23, 5,86±2,88, p≤0,001), and MSOFA(3,98±1,95, 5,79±1,98, p≤0,001) were all higher in nonsurvivors than in survivors. Discrimination was less satisfactory for APACHE II (AuROC=0,69; p≤0,001) and acceptable for both initial SOFA (AuROC=0,73; p≤0,001) and initial MSOFA (AuROC=0,75; p≤0,001). Mean and maximum values of SOFA and MSOFA showed even better discrimination values with AuROC=0,92; p≤0,001, and AuROC=0,91; p≤0,001 for meanSOFA and maksSOFA respectively, and AuROC=0,90; p≤0,001, AuROC=0,90; p≤0,001 for meanMSOFA and maksMSOFA respectively.

Conclusion: SOFA and MSOFA scoring systems are better than APACHE II system in predicting mortality in ICU surgical patients. Serial measurements of SOFA and MSOFA score significantly improve their predictive accuracy.

Key Words: Mortality, Surgical patients, APACHE II, SOFA, MSOFA

Corresponding email: liem_dino@yahoo.com

UNIVERSITI SAINS MALAYSIA
JABATAN BENDAHARI
KUMPULAN WANG PENYELIDIKAN GERAN USM(304)
PENYATA PERBELANJAAN SEHINGGA 31 DISEMBER 2009

Jumlah Geran:	RM	10,245.00	Ketua Projek:	DR RASHIDI AHMAD
Peruntukan 2007 (Tahun 1)	RM	4,500.00	Tajuk Projek:	A Study on the Demographic Profiles, Dusease Characteristics and One Week Outcome of Red Tag Patients in the Emergency Department, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan
Peruntukan 2008 (Tahun 2)	RM	5,745.00		
Peruntukan 2009 (Tahun 3)	RM	0.00	Tempoh:	15 Ogos 07 - 14 Ogos 09
			No.Akaun:	304/PPSP/6131546

Kwg	Akaun	PTJ	Projek	Donor	Peruntukan Projek	Perbelanjaan T'kumpul Hingga Tahun Lalu	Peruntukan Semasa	Tanggungan Semasa	Bayaran Tahun Semasa	Belanja Tahun Semasa	Baki Projek
304	11000	PPSP	6131546		-	-	-	-	-	-	-
304	14000	PPSP	6131546		-	-	-	-	-	-	-
304	15000	PPSP	6131546		-	-	-	-	-	-	-
304	21000	PPSP	6131546		-	-	-	-	-	-	-
304	22000	PPSP	6131546		-	-	-	-	-	-	-
304	23000	PPSP	6131546		150.00	-	150.00	-	-	-	150.00
304	24000	PPSP	6131546		-	-	-	-	-	-	-
304	25000	PPSP	6131546		-	-	-	-	-	-	-
304	26000	PPSP	6131546		-	-	-	-	-	-	-
304	27000	PPSP	6131546		6,095.00	34.50	6,060.50	-		-	6,060.50
304	28000	PPSP	6131546		-	-	-	-	-	-	-
304	29000	PPSP	6131546		4,000.00	-	4,000.00	-	5,625.00	5,625.00	(1,625.00)
304	32000	PPSP	6131546		-	-	-	-	-	-	-
304	35000	PPSP	6131546		-	-	-	-	-	-	-
					10,245.00	34.50	10,210.50	-	5,625.00	5,625.00	4,585.50

Previous | Next | Back to Messages | Mark as Unread | Print

Delete | Reply | Forward | Spam | Move...

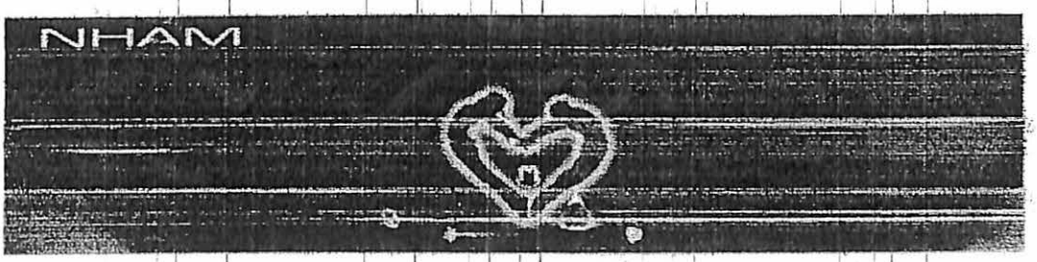
NHAM ASM 2010 -- FREE PAPER Acceptance Letter

Saturday, March 6, 2010 2:28 AM

From: "admin@nham-conference.com" <admin@nham-conference.com>

To: shidee_ahmad@yahoo.com

Cc: nham.asm2010@malaysianheart.org



Saturday 06, March 2010 05:28:37 PM

NHAM ASM 2010 - FREE PAPER Acceptance Letter

Dear Doctor RASHIDI AHMAD,

We are pleased to inform you that the scientific committee has accepted your abstract to be presented at the Free Paper Presentation session at the NHAM 14th Annual Scientific Meeting 2010.

The details of your presentation(s) are as follows:

Abstract ID: FP 4.4

Abstract Title: A SUBANALYSIS STUDY: THE ONE-WEEK OUTCOME OF RED TAG CARDIAC PATIENTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA (HUSM)

Abstract Presenter: Doctor RASHIDI AHMAD

Category: General Cardiology 2

Date of Presentation: 9th April 2010

Time of Presentation: 1500hr

Sessions: Free Paper

Venue: Sentral Accord, Hilton KL

Please confirm your participation by sending an email to us at nham.asm2010@malaysianheart.org before **17th March 2010.**

The "Guidelines for Presenter" is also attached for your kind attention. Please observe these Guidelines to ensure the smooth proceeding of the meeting. (Click here to download)

There will be one winner for the best presenter for each category.

Finally we would like to remind you to **register as a delegate** of the conference with the necessary registration fee as this is the pre-requisite to present your abstract at this conference before **24th March 2010.** Please feel free to contact us at nham.asm2010@malaysianheart.org should you require any further information information or clarification regarding your presentation.

We look forward to welcoming you to NHAM 14th Annual Scientific Meeting 2010 in Kuala Lumpur.

THANK YOU!

Secretariat of NHAM 14th ASM 2010

Previous | Next | Back to Messages Mark as Unread | Print

Delete | Reply | Forward | Spam | Move...

Invitation for publishing at LAP Sunday, February 21, 2010 11:47 PM

From: "Noorrinah Hoozeer" <n.hoozeer@lap-publishing.com>
To: shidee_ahmad@yahoo.com
5 Files (350KB) | Download All

BuchblockC General-te Informatior LAP-Online multiautho

Dear Dr. Rashidi Ahmad ,

Thank you for submitting your manuscript. We strongly believe that there
is a market for your work, so I am happy to inform you that we would publish it in the form of a monograph under the brand, LAP Lambert Academic Publishing.

In addition to this email, you will be receiving an automatically generated email from LAP Online with a link for registration. To register, please click on the link. After entering your personal data,
you can accept our general terms and conditions (see attached). Following registration, you will receive a confirmation email that will
contain your Username and Password. Thereafter, use this information to
login onto our system (click on the LOGIN button at www.lap-publishing.com <http://www.lap-publishing.com>.) and start uploading your work and other required documents (i.e. text for the book
cover, short bio and your photo). Upon completion of the upload, our Layout Department will approve your project, so that the publishing process can begin.

PLEASE NOTE: The possibility to register will expire after two weeks and
your project should be finished in four weeks after registering. If you
have any questions, feel free to contact me.

P.S. We need your bank information for royalty deposits. We transfer that sum once a year to your account. You can provide your bank information later on. Some of our authors set up a separate account for
safety where money can only be deposited.

***Please read the attached documents very carefully. You are reminded
to remove the title page, abstract, approval page, copyright and to correct the page numbering as per instructions in the attached documents. Failure to do so, the system may not upload your project correctly resulting in errors in your book.***

Best Regards,
Noorrinah
-- Noorrinah Hoozeer
Acquisition Editor

LAP Lambert Academic Publishing AG & Co. KG
Dudweiler Landstraße 99,
66123 Saarbrücken, Germany

Fon +49 681 3720-310
Fax +49 681 3720-3109

n.hoozeer@lap-publishing.com / www.lap-publishing.com

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACS	=	Acute coronary syndromes
AMI	=	Acute myocardial infarction
CI	=	Confidence interval
CPR	=	Cardiopulmonary Resuscitation
CVA	=	Cerebrovascular accident
DBP	=	Diastolic blood pressure
DKA	=	Diabetic ketoacidosis
ED	=	Emergency Department
EP	=	Emergency Physician
GCS	=	Glasgow Coma Scale
GIT	=	Gastrointestinal tract
HUSM	=	Hospital Universiti Sains Malaysia
HR	=	Heart rate
ICU	=	Intensive care unit
JK	=	Jabatan Kecemasan
MOH	=	Ministry of Health
MVA	=	Motor vehicle accident
NSTEMI	=	Non ST-elevation myocardial infarction
O & G	=	Obstetric and Gynaecology
ORL	=	Otorhinolaryngoscopy
OT	=	Operation theatre
RR	=	Respiratory rate

RTS	=	Revised Trauma Score
SBP	=	Systolic blood pressure
SI	=	Shock Index
STEMI	=	ST-elevation myocardial infarction
UA	=	Unstable angina
WHO	=	World Health Organization

ABSTRAK

Kajian Mengenai Profil Demografi, Sifat Penyakit Dan Kajian Susulan Seminggu Pesakit Yang Ditag Merah di Jabatan Kecemasan, Hospital Universiti Sains Malaysia

PENGENALAN:

Zon merah di Jabatan Kecemasan (JK) berfungsi merawat pesakit yang tenat dan kritikal. Banyak kemajuan telah dicapai bagi menyelamatkan nyawa pesakit yang tenat ini. Walaubagaimanapun, terlalu sedikit data di Malaysia berkenaan kajian tentang ciri-ciri demografi, jenis-jenis penyakit serta kajian susulan ke atas pesakit selepas menerima rawatan di zon merah. Pengetahuan dari kajian ini akan dapat digunakan sebagai panduan di masa hadapan ke arah peningkatan kemampuan petugas di JK semasa mengendalikan kes-kes yang kritikal.

OBJEKTIF:

Tujuan kajian ialah mendapatkan taburan demografi pesakit, jenis kes-kes kritikal yang dirawat di zon merah JK HUSM. Sampel dianalisa seminggu kemudian sama ada hidup atau sebaliknya. Dua jenis skor penilaian iaitu 'Revised Trauma Score' untuk pesakit trauma dan 'Shock Index' bagi pesakit bukan trauma digunakan untuk melihat kaitan antara faktor dan mortaliti.

METODOLOGI:

Kajian prospektif di JK HUSM dijalankan selama 6 bulan bagi mencukupkan saiz sampel (440 pesakit). Data demografi seperti umur, jantina, kaum, sejarah pesakit dan jenis penyakit dianalisa. Selepas seminggu, langkah susulan dijalankan untuk melihat sama ada pesakit hidup atau meninggal dunia.

KEPUTUSAN:

Jumlah sampel ialah 440 pesakit. Pecahan pesakit trauma ialah 23.0%, selebihnya ialah pesakit bukan trauma (77.0%). Purata umur populasi ialah 47.21 +/- 21.78 tahun. Purata umur pesakit trauma ialah 31.61 +/- 21.41 tahun. 67.27% adalah pesakit lelaki dan kira-kira 95.0% ialah pesakit melayu. Pecahan taburan tertinggi di antara disiplin adalah pesakit kategori medikal (58.6%). Pesakit kategori neurosurgikal ialah 25%. Sebilangan besar mangsa trauma dalam sampel ini melibatkan golongan di bawah umur 60 tahun (84.1%). Purata waktu berada di JK ialah 3.92 +/- 1.5 jam. Sejumlah 27 orang telah meninggal dunia. Tujuh orang (1.59% daripada jumlah sampel) ialah pesakit kategori trauma dan 20 orang (4.55%) ialah kategori bukan trauma. Terdapat perbezaan ketara di antara nilai RTS dan kematian di dalam tempoh seminggu selepas dimasukkan ke wad ($p<0.05$, 95% CI: -4.4,-1.0). Terdapat juga perbezaan ketara di antara nilai SI dan kematian di dalam tempoh seminggu selepas dimasukkan ke wad ($p<0.05$, 95% CI: 0.3 – 0.8). Tiada sebarang perbezaan ketara antara purata umur, jantina, purata tempoh menerima rawatan di JK ataupun di wad dengan kematian ($p>0.05$). Juga tiada terdapat perbezaan ketara di antara komponen individu dari RTS (GCS, RR dan SBP) dan SI (HR dan SBP) dengan kematian ($p>0.05$).

KESIMPULAN:

Pesakit di zon merah di JK HUSM terdiri dari pelbagai umur, pesakit dan tahap kritikal. Pesakit kategori medikal adalah yang tertinggi. Kadar kematian pesakit kajian dalam jangkamasa seminggu adalah amat kecil. RTS dan SI berguna bagi menentukan prognosis pesakit trauma dan bukan trauma di JK HUSM.

ABSTRACT

A Study on the Demographic Profiles, Disease Characteristics and One-Week Outcome of Red-Tag Patients in the Emergency Department, Hospital Universiti Sains Malaysia

INTRODUCTION:

The red zone of Emergency Department (ED) provides treatment to critically-ill patients with life-threatening conditions. There have been many improvements achieved in saving the life of the patients. However, very minimal data can be found within Malaysian context regarding the patients' demographic profiles and disease characteristics along with the relationship between the types of illness and their outcomes. Knowledge from this study will serve as a guide on future management of critically-ill patients to improve the quality of services.

OBJECTIVES:

The study was done to obtain the demographic data and disease characteristics of critically-ill patients in ED HUSM red zone. The sample was analyzed a week later. Two scoring systems i.e. the Revised Trauma Score for the trauma patients and Shock Index for the non-trauma patients were used to see the correlation between the factors and the mortality.

METHODOLOGY:

A prospective observational study for a period of 6 months was carried out to achieve the sample size (440 patients). The demographic data in terms of age, sex, race, history of illness and types of disease were analyzed. Follow-up was done a week later to see whether patients were still alive or had succumbed to their illness.

RESULTS:

The sample size was 440 patients. Trauma patients were 23.0%, the rest were non-trauma patients (77.0%). The mean age of the population was 47.21 +/- 21.78. For trauma cases, the mean age for population of patients was 31.61 +/- 21.41 years old. 67.27% were male patients and about 95.0% were Malays. The highest number of patients was in the medical category (58.6%). Neurosurgical cases contributed to 25.0% of the total cases. Most of the trauma cases involved patients less than 60 years old (84.1%). The mean duration of stay in ED was 3.92 +/- 1.5 hours. A total of 27 patients died. Seven (1.59%) of them were trauma patients. There was a significant difference between the RTS value and the mortality within the period of one week (<0.05, 95% CI: -4.4,-1.0). There was also a significant difference between the SI value and the mortality within the period of one week ($p<0.05$, 95% CI: 0.3 – 0.8). There were no significant differences comparing the mean of age, sex, mean duration of ED stay as well as the duration of one-week ward stay with the mortality ($p>0.05$). There were also no significant differences when comparing the individual components of RTS (GCS, RR and SBP) and SI (HR and SBP) with the mortality ($p>0.05$).

CONCLUSIONS:

Patients of red zone of ED HUSM vary in age, illness and their severity. The majority of patients attending the ED HUSM were medical patients. The mortality rate within the period of one week was small. RTS and SI can be used in assessing the prognosis of trauma and non-trauma cases respectively in ED HUSM.

1. INTRODUCTION

The emergency department (ED), sometimes termed the emergency room (ER), emergency ward (EW), accident and emergency (A&E) department or casualty department is a hospital or primary care department that provides initial treatment to patients with a broad spectrum of illnesses and injuries, some of which may be life-threatening and requiring immediate attention (Fromm et al., 1993).

According to Nik Hisamuddin et al. (2005), the concept of emergency medical health care systems in Malaysia has existed since the 1950s. As in other countries in Asia, their functions and important contributions to the overall healthcare system have been much underestimated compared to other specialties. Emergency Medicine is a relatively new specialty still at its infancy but is rapidly expanding in Malaysia. The specialty is being increasingly recognized within the health care system in the country. It follows the Anglo-American model of emergency care, which uses predominantly emergency medical technicians. Other system follows the Franco-German model, which is physician driven. (MacFarlane, 2003).

Patients come to the ED with various complaints regarding their illness, ranging from non-critical cases up to acute, critical and life-threatening conditions which require prompt and rapid as well as straight-to-the-point assessment and management to stabilize and carry out life-saving procedures. All these require an established team work among all the staff working in ED, right from the Emergency Physician (EP) down to the

emergency residents, paramedics, attendants as well as the technicians from the radiology department, laboratories, mortuary etc. Thus, EP has little time to gather additional data, consult with others, or deliberate about alternative treatments. Instead, in emergent situations, there is a presumption for quick action guided by predetermined treatment protocols. (ACEP, 2005).

To date, there is no local data on the effectiveness of the management of critically-ill cases in the red zone of ED that is available to us. In a way to improve the services provided, analysis on the type of cases and the outcomes are required for any decision to be taken in improving the health services, especially in the red zone.

Stabilization of the critically-ill patients are the main stay in treating red zone cases. They are likely to have the best chance for survival when critical care is delivered as expeditiously as possible, regardless of setting (Chalfin et al., 2007). These include administration of drugs, intravenous cannulation and fluids, cardiopulmonary resuscitation (CPR) and intubations and ventilation if required. Further consultations to the respective department for disposition of patients are made after emergency cares have been delivered to the patients.

1.1 THE EMERGENCY DEPARTMENT, HOSPITAL UNIVERSITI SAINS MALAYSIA (ED HUSM)

The Emergency Unit, Hospital Universiti Sains Malaysia (HUSM) was upgraded to a department status in 2003, in parallel with the recognition of Emergency Medicine as a specialty on its own and as a postgraduate master degree pioneered by USM. The department, manned at the current moment by seven emergency physicians, is offering a 24-hour specialist coverage everyday.

The department, as with all other emergency departments around the globe, serves as a crucial and integral link between the community and the hospital. This department is a place where the sick, the wounded, the sexually battered, the depressed, the violent, the confused, the poor, etc, would go when in needs, and where the physicians, nurses and other paramedics staff were trained to treat them in the best possible way, 24 hours a day, 365 days per year.

1.1.1 EMERGENCY ROOM

The Triage Officer will determine the cases based on the complaints and triaged them accordingly. **Red zone** is for patients with critical, unstable, life-threatening and potential life-threatening conditions (Appendix 2). Four beds with complete vital signs monitoring are available in this zone. **Yellow zone** is for patient with semi-critical, non-life-threatening, non-walking or in severe pain. Four beds are available. **Green zone** is for non-critical, walking patient, stable, non-life-threatening or in mild pain. Four beds also available here. Patients presented to ED HUSM; either walk-in cases, ambulance-call

cases or referred from various sources (district hospitals, health clinics or general practitioners) are triaged red if they fulfilled the criteria mentioned. Immediate review by the medical officers on duty with prompt treatment directing at the presenting complaints are carried out without delay. Primary and secondary surveys are carried out followed by identifying of the underlying problems.

In this study, we were focusing on the red zone of ED HUSM – the cases tagged as red, and the discussion relating to it. These included the demographic profiles of patients e.g. age, sex, race and source of referral. The study also looked into the disease characteristics such as the types of illness, interventions given to the patients and their disposition from the ED. Those patients were divided into 2 groups i.e. trauma cases and non-trauma cases and they were analyzed using two scoring systems. Trauma cases were analyzed using the Revised Trauma Score (RTS) whereas non-trauma cases were analyzed using the Shock Index (SI) scoring systems. Follow up of patients, in this study, in determining the mortality of the subjects after being given the acute management in ED, HUSM or after admission to the ward (within period of one week) was done. Period of one week was chosen (and approved by the ethical committee) as during this period, most of the diagnosis of the illness has been established by the managing team in the ward. Furthermore, if shorter duration is chosen, the diagnosis will be lacking as most of the laboratory results as well as the other results e.g. biopsy, culture and sensitivity, reporting of x-rays etc are still pending. Subsequently, if longer duration is chosen, there will be confounding factors such as sepsis or septicemia will affect the patients may and interrupt the outcomes.

We receive and manage more than 200 patients per month in our red zone (Appendix 1). In 2005, motor vehicle accidents (MVA) or road traffic accidents (RTA) were the third principal cause of hospitalization in Malaysian MOH hospitals (MOH health facts, 2006). As Emergency Medicine is still new in Malaysia, a lot more information need to be gathered to give us the idea how cases are being managed in our ED, especially the red zone, as well as the limitations that we face in our daily works to give a proper and effective care to the critically-ill patients. For example, in trauma cases, there is a need to see the distribution of such cases as well as the demographic profiles and their outcomes after being managed in ED before been transferred to the respective wards so that necessary actions can be undertaken in future to give better treatment to improve the outcome.

Importantly, it can give us an idea regarding the underlying problems of cases triaged as RED, whether they are medical, surgical, pediatric, obstetrics, gynecology or others. By knowing this, we can be more prepared in terms of number of staff required, equipments, drugs, even further training of the personnel in the area concerned in handling or managing red zone cases; especially for young staff (James and Bart, 1997). Optimal care can be given efficiently in reducing mortality and morbidity. It can help us in improving the quality of services provided to our patients, thus improving the overall quality of life in our community.

2. LITERATURE REVIEW

Emergency department (ED) was developed during the 20th century, in response to an increased need for rapid assessment and management of critical illnesses as well as due to the reason that the emergency care is rapidly progressing into a more challenging task nowadays. The first specialized trauma care center in the world was opened at the University of Louisville Hospital in 1911 and developed by surgeon Arnold Grishwold during the 1930s and '40s. In some countries, ED has become important entry points for those without other means of access to medical care (Swaminatha, 2000).

The red zone of ED provides initial treatment to critically-ill patients with a life-threatening conditions and requiring immediate attention. They make up a substantial part of some ED patient populations, up to 8% of all patients, and over 25% of those admitted (Fromm et al., 1993).

With regard to this study, there are few things worth discussed here like the triage system, emergency patient care (red zone management) including the patients' demographic profile and the types of critically-ill and life-threatening conditions, EP and staff involved in the patients care, as well as the outcomes of the patients receiving emergency treatment and actions that could be taken to improve the management and care of the patients.

2.1 TRIAGE

Triage is derived from the French word, "trier", meaning "to sort or to choose". It is a dynamic process designed to get the right patient to the right place at the right time with the right care provider. It requires brief clinical assessment that determines the time and sequence in which patients should be seen in the ED or, if in the field, the speed of transport and choice of hospital destination (Robert, 2004). In general, triage can be defined as the prioritization of patient care based on severity of injury/illness, prognosis and the availability of resources (Tintinalli et al., 2004).

Robert (2004) mentioned that the concept of prioritizing patients and providing immediate care to the most seriously injured was practiced in France in the early 1800s. Over the next century, this practice was further developed in armies throughout the world. As a result, many injured persons whose surgery might have been delayed received critical care earlier. During World War I, improved outcomes of some battle injuries were credited to appropriate triage. Thus, triage is one of the first applications of medical care after first aid. He further stressed regarding the triage in ED which occurred sporadically in the early 1900s in crowded inner-city hospital dispensaries. However, it was not widely adapted in ED until the latter half of the century, when organized departments with on-duty EP became a national standard.

Triage may be performed by medical assistants (MA) or nurses at the entrance of ED. They are usually trained in managing emergency cases.

Primary roles of the triage nurse:

- Screening: quick look
- Assessment: focused assessment

The most common triage classification in the United States still involves assigning patients to one of four color-coded categories (red, yellow, green or black), depending on injury severity and prognosis. In addition to the nature and urgency of the patient's systemic condition, triage decisions should be sensitive to factors affecting prognosis, such as age, general health, and prior physical condition of the patient, and the qualifications of the responders and availability of key supplies and equipments (Tintinalli et al., 2004).

Other ED triage system divides patients into at least 3-4 tiers, which is also widely used by the hospitals in the United States (Robert, 2004).

Category I (obvious emergency):

The physician must examine the patient as soon as possible. Case examples include cardiac arrest, acute severe chest pain, massive vomiting of blood, sudden loss of consciousness, and major trauma with hypotension.

Category II (strong potential for emergency):

The patient needs full evaluation and treatment by a physician. Case examples include acute dyspnea, acute abdominal pain, acute chest pain, acute confusion, and severe pain.

Category III (potential emergency):

Consider the possibility of an occult or pending emergency condition. Case examples for this category include abdominal pain, high fever, acute back pain, serious extremity injuries, and large or high-risk lacerations.

Category IV (non-emergent):

These patients' presentation provides no reason to think they have an emergency medical condition or are at risk of developing one. Disorders are chronic, minor, or self-limiting. Case examples include medication refill, acne, mild adult upper respiratory tract symptoms, mild sore throat, blood pressure check, and lumps and bumps.

Other triage systems include the 5-level Canadian system and Simple Triage and Rapid Treatment (START) which categorizes victims based on their ability to walk, their mental status, and the presence or absence of ventilation or capillary perfusion.

Some ED have chosen numbers or colors to designate triage categories (Robert, 2004; Tintinalli et al., 2004). In Malaysia, the hospitals' ED used this type of triage system. ED is divided into three zones – green, yellow and red. Patients are triaged to each zone based on their presenting illness:

a. Green zone – non-critical case
b. Yellow zone – semi-critical case
c. Red zone – life-threatening conditions (see appendix 2)

It is a continuous (dynamic) process and categories should be checked regularly to ensure that the priority remains correct where the dynamic card allows the priority to move up or down.

2.2 ACUTE EMERGENCY CARE AND RED ZONE

Acute, critical illness has been defined, although unsatisfactorily, as a disease process with a predicted mortality in excess of 30%. (Shoemaker et al., 1992). The standard of care for critically-ill patients remains largely supportive. Early identification of these patients, however, may decrease mortality by rapid intervention. Resuscitation of patients in shock is essential. Therapy should be initiated as early as possible, ideally in the ED and continued in the ICU (Michael, 2004).

While many patients with critically-ill and life-threatening conditions (appendix 2) often presenting first to the ED, and triaged RED; medical officers working in ED and the EP must equip themselves with all the up-to-date information in treating such cases to prevent the complications including death. The patient could experience loss of life or function if immediate intervention is not instituted (Grossman, 1999). The EP has little time to gather additional data, consult with others, or deliberate about alternative treatments. Instead, in emergent situations, there is a presumption for quick action guided by predetermined treatment protocols (ACEP, 2005). Critically-ill patient require early identification as well immediate and continuing resuscitation from the moment of arrival to the ED (Rady, 1996). The patient needs to be managed properly and stabilized before

referral to the respective department is made for admission and further management in the ward.

The early identification and rapid resuscitation of critically-ill patients in the ED is important for two reasons. First, rapid initiation of appropriate and effective therapy is required to prevent these patients from progressive deterioration to cardiopulmonary collapse or immediate death in certain clinical situations. Second, early initiation of effective therapy to correct tissue hypoperfusion and resulting in hypoxia and reestablish normal systemic oxygen balance can reduce the in-hospital morbidity, reduce the length of hospital stay and contribute to a savings in health care costs for critically-ill patients (Boyd et al., 1993; Rady, 1996).

As mentioned in few articles, an ED requires different equipment and different approaches than most other hospital divisions. Patients frequently arrive with unstable conditions, and so must be treated quickly. They may be unconscious, and information such as their medical history, allergies, and blood type may be unavailable. ED staff are trained to work quickly and effectively even with minimal information (Swaminatha, 2000).

The resuscitation area or red zone as known in HUSM is a key area of an ED. It usually contains several individual resuscitation bays, with one specially equipped for pediatric resuscitation. Each bay is equipped with a defibrillator, airway equipments, oxygen points, intravenous lines and fluids, and emergency drugs as well as electronic monitoring for close monitoring of such patients who are critically-ill with life-

threatening conditions. The paramedics are usually trained in managing such cases along with the Medical Officers on duty and the EP. Resuscitation areas also have ECG machines, and often limited X-ray facilities to perform chest and pelvis films. Other equipment may include non-invasive ventilation (NIV) and portable ultrasound devices.

Robert (2004) mentioned that red zone is meant for those cases with serious emergency or life-threatening conditions such as ACS, hypertensive emergencies, massive bleeding with hypovolemic shock, polytrauma etc. The EP must examine the patient as soon as possible as every minute matters in treating critically-ill cases.

2.3 NON-TRAUMA EMERGENCIES

Regarding the cardiovascular emergencies, it was noted that ischemic heart disease was the most common cause of death worldwide in the age-group of 45 and above in the year 2002 (WHO, 2005). In the United States, ischemic heart disease accounted for more than 500,000 deaths annually (Tintinalli et al., 2004). Cardiogenic shock which usually results from acute myocardial infarction (AMI) is the most common cause of AMI-related in-hospital death. The overall incidence of cardiogenic shock in AMI is 6 to 8 percent, a rate that remained constant from 1975 to 1997 (Goldberg et al., 1999; Menon and Hochman, 2002). Cardiac arrest is relatively a common presentation in ED, therefore defibrillators, automatic ventilation and CPR machines, and bleeding control dressings are used heavily. Survival in such cases is greatly enhanced by shortening the wait for key interventions (Swaminatha, 2000).

In cases of pulmonary emergencies, common respiratory symptoms that bring patients to the ED include dyspnea (with the associated findings of hypoxia and hypercapnia), wheezing and cough. Most immediately life-threatening conditions causing dyspnea include upper airway obstruction with foreign body, angioedema or hemorrhage; tension pneumothorax, pulmonary embolism and due to neuromuscular weakness such as myasthenia gravis, Guillain-Barre syndrome and botulism (Tintinalli et al., 2004).

The most common cause of death worldwide in 2002 in patients in the age-group of 0 to 4 years and third most common in all ages were lower respiratory tract infections (WHO, 2005). The mortality rate of childhood pneumonia is less than 1 percent in industrialized nations, but pneumonia accounts for up to 5 million deaths annually in children younger than 5 years in developing countries (Hietala et al., 1989). Pediatric patients account for approximately 30 percent of visits in most ED (Tintinalli et al., 2004).

Diabetic ketoacidosis (DKA) which is an acute, life-threatening complication of diabetes mellitus is an example of endocrine emergencies that is commonly seen in ED HUSM. Diabetes mellitus was found to be at 13th position causing death worldwide in all ages in 2002 (WHO, 2005). DKA accounts for 24 percent of all diabetic admissions in the United States and better understanding of the pathophysiology and an aggressive, uniform approach to diagnosis and management have reduced mortality to less than 5 percent of reported episodes (American Diabetes Association, 2002).

Septicemia was the leading cause of death in Malaysian Ministry of Health hospitals' in 2005 representing 16.54 percent of all causes (MOH Health Facts, 2005). They may develop in those critically ill patients admitted to the ward after receiving treatment in ED

and can contribute to the prolong course of illness as well as adding to the mortality statistics. Most of the previous studies focused on critically ill patients with severe sepsis, because this population has been associated with both frequent mortality and increased hospital costs (Michael, 2004). Septic shock, the most severe form of sepsis, is associated with high mortality rates, largely due to the progressive compromise of various organ systems and the development of multiple organ failure (Oscar et al., 2004).

The most common disease states predisposing to sepsis are malignancies, diabetes mellitus, chronic liver disease, chronic renal failure, and the use of immunosuppressive agents. In addition, sepsis also is a common complication after major surgery, trauma, and extensive burns (Sharma, 2005). Invasive procedures that are commonly carried out in ED such as bladder catheterisations, intravascular devices and endotracheal tubes can predispose to the development of sepsis if done without taking care of the sterility of the performers or the equipment.

The hospital mortality ranged from about 25 percent in uncomplicated infection or sepsis to 40 percent in patients with severe sepsis and 60 percent for septic shock (Corinne et al., 2003). A multicenter prospective study reported a mortality rate of 56 percent during ICU stays and 59 percent during hospital stays. Twenty-seven percent of all deaths occurred within 2 days of the onset of severe sepsis, and 77 percent of all deaths occurred within the first 14 days. The risk factors for early mortality were higher severity of illness score, the presence of 2 or more acute organ failures at the time of sepsis, shock, and a low blood pH i.e. <7.3 (Brun-Buisson et al., 1995).

2.4 TRAUMA

Trauma, as a result from MVA, domestic injury or violence, industrial injury, fall from height, assaulted etc. is a major cause of premature death and disability worldwide. Data had shown that it was the third leading cause of hospitalization and the fifth leading cause of death in MOH hospitals in Malaysia in the year 2005 (MOH health facts, 2006). It was the fourth leading killer of Americans and the single greatest cause of death before the age of 45 or the eleventh most common causes of death worldwide in all ages in the year 2002. Road traffic-related injuries, self-inflicted injuries, interpersonal violence, burns and drowning were among the 15 leading causes of death occurring among people aged between 5 years and 44 years (WHO, 2005). Furthermore, studies have shown that every year, approximately 5 million people worldwide die from injuries (Ali et al., 1993). In addition to the millions who die each year, millions more are temporarily or permanently disabled. This toll is expected to increase in coming years (ACEP, 2000).

Regarding pediatric trauma, head injury is the most frequent cause of traumatic death in children (Rhodes et al., 1993). MVA are the leading cause of death among children over the age of 1 year, accounting for 18 percent of all deaths and 37 percent of all deaths due to trauma. Under the age of 1 year, suffocation is the most common cause of death due to injury. The other leading causes of death are drowning, fire/burn and firearms. Death rates for boys over the age of 5 are twice the rate for girls (Fingerhut and Warner, 1997).

While persons older than 65 years of age represent 12 percent of the population, they account for 36 percent of all ambulance transports, 25 percent of hospitalizations, and 25 percent of total trauma costs (Schwab and Kauder, 1992). Geriatric trauma patients represent between 8 and 12 percent of the general trauma population. While male trauma victims are predominant in the younger age groups, males and females are equally represented in the geriatric trauma population. Trauma ranks as the seventh leading cause of death in this age group, although the rate per 100,000 is 92, as compared with 35.7 for all age groups (Schiller et al., 1995). Approximately 28 percent of deaths due to accidental causes involve persons 65 years and older. Also, the elderly have the highest population-based mortality rate of any age group (Schwab and Kauder, 1992).

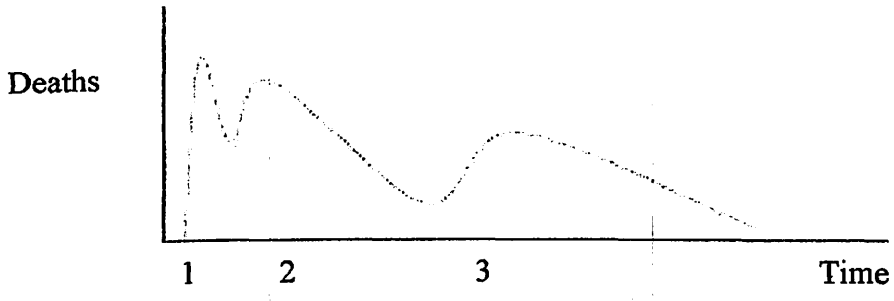
In case of polytrauma where the patient sustains serious injuries involving two or more vital organs, the management will be more critical as poor trauma care will cause many serious complications or even death. Multidisciplinary involvement is crucial in determining the outcome of the victims.

Many articles on trauma have quoted the famous trimodal distributions of death following an injury or trauma. Deaths from severe injury occur in one of the three phases as shown by the figure below. They:

1. occur immediately or occur quickly as a result of overwhelming injury;
2. occur during the intermediate or subacute phase; within minutes to a few hours after the injury. This is known as 'The Golden Hour' and deaths in this peak are largely as a result of major head, chest and abdominal injuries. This is the main focus of trauma

life support course as the injuries are frequently the result of treatable conditions. The mortality can be reduced to less than 10% with a proper trauma system.

3. are delayed. Deaths during this phase often occur days or weeks after the initial injury and are the result of infection, multisystem failure or other late complications of trauma.



Trimodal distribution of deaths from road traffic injuries

(WHO, 2005)

Trauma care has improved considerably over the past 25 years, largely from combined improvements in assessment, triage, resuscitation, and emergency and intensive care. The development of trauma centers has continued to evolve in North America with data supporting their efficacy (Vincent, 2006). Most existing injury control strategies focus on primary prevention – that is, avoiding the occurrence of injuries or minimizing their severity – or on secondary prevention – providing adequate medical response to enhance treatment and thereby minimize harm following an injury.

2.5 RESOURCES IN EMERGENCY DEPARTMENT

The ED can be a hectic environment; a patient arrives, health care is delivered, and the patient departs. A seemingly endless number of activities occur, frequently simultaneously, to provide care for patients. To the uninitiated, the ED and its chaotic environment would seem to defy classification and study. Analysis shows that most of the activities are the same repeated multiple times throughout the day. In order for the EP to perform at a high level over a career of suitable length, it is critical to pay attention to wellness issues. Emergency medicine (EM) is a stressful field, and there are great concerns regarding burnout of its practitioners (Robert, 2005).

James (2006) wrote regarding achieving a quality ED. In the ED, the customer is any person who is affected by a process. Customers include patients, physicians, nurses, technical staff, and other hospital personnel. Patients often arrive in the ED unscheduled, in crisis, and sometimes against their own free will. Thus, EP cannot rely on earned trust or on any prior knowledge of the patient's condition, values, or wishes regarding medical treatment.

An article from the American College of Emergency Physician (ACEP) in 2005 stated that EP must responds quickly to acute illnesses and injuries. In achieving these goals, EP serves the principle of beneficence, that is, they are acting in the best interests of their patients. The article also mentioned regarding the relationship between the EP and other professionals, with nurses and paramedical personnel without forgetting their prime task in dealing with the wellbeing of the patients seeking their help to prevent or minimize

pain and suffering, loss of function and loss of life. Thus, the patient's willingness to seek emergency care and to trust the physician is based on institutional and professional assurances rather than on a personal acquaintanceship.

Although the exact effect of the nurse staffing on the number of emergency physicians is yet to be determined, most EP would agree that an efficient emergency nurse is "worth his/her weight in gold". Avoidance of unnecessary delays for admitted patients (e.g., holding patients until the floor team comes to the ED to begin their workup) is crucial (Zun, 2006)

Teamwork is truly an important aspect and has to be practiced at all times in the ED. The team concept is well-known to EP. Failure to heed the rest of the team often predicts doom for physicians. Joint problem-solving helps, but keep such work groups small to enhance effectiveness (Robert, 2005). Training and continuous education of ED staff are truly an important element to improve the quality of services rendered to the patients. Reductions in clinical exposure at both undergraduate and postgraduate level have been implicated in junior doctors' inability to recognize and manage critically-ill patients (Gavin, 2007).

The effectiveness of emergency medicine decreases when other departments establish special roles in the ED. Joint arrangements with other departments often are necessary, but emergency medicine must be an equal at the table. The department is best served when the head of emergency medicine plays a key role in the hospital and medical school. Such physicians are usually well-qualified for leadership positions on the medical staff (Robert, 2005).

2.6 OUTCOMES OF THE PATIENTS RECEIVING TREATMENT IN EMERGENCY DEPARTMENT

Outcome for critically-ill patients often depends on time-sensitive critical care interventions, thus, the impact of delays in transfer to an intensive care unit (ICU) on outcome could be substantial. However, the impact of such delays on patient outcome is currently unclear. For example, trauma victims have higher survival when they are expeditiously transferred from the field to properly equipped and staffed trauma centers, and patients with AMI and ischemic CVA who meet criteria for reperfusion therapy have better outcomes when treatment is expeditiously administered (Chalfin et al., 2007).

Regarding the age component, various definitions are made regarding the term 'elderly'. Ageing can be defined as a biological, sociological, economic and chronological phenomenon (Karim, 2002). Chronologic age is the actual number of years the individual has lived. The elderly population can be divided into two groups: the 'young old' (65 to 80 years of age) and the 'old old' (80 years of age and older) (Schwab and Kauder, 1992). In this paper, chronological definition will be used and in line with the United Nation's and Ministry of Health's recommendations, *"the elderly or ageing population"* will be taken to mean people aged 60 years or older as suggested by Karim (2002). The elderly are, on the whole, less healthy than the non-elderly. Among the elderly, increasing age is associated with higher morbidity, higher use of health services (number of visits to doctors and hospitalizations) and greater demand for specialized services. All these factors will lead to an increase in the complexity of health services required and increased expenditure (Karim, 2002). Comorbid disease states such as diabetes mellitus,

coronary artery disease, renal disease and pulmonary disease can reverse the physiologic reserve of certain patients, which makes it more difficult for them to recover from injury (Morris et al., 1990).

The hospitalization rate for male and female patients was almost equal (19.2% versus 19.3%). Those 60 years and older (3,559 or 39.0%) had the highest hospitalization rate (28.0%). The higher the triage priority, the more likely the patient was to be observed and subsequently admitted (Lateef and Anantharaman, 2000). In addition, even though the elderly only represent about 10% of the population, they account for 36% of all ambulance transports, 25% of hospitalizations and 25% of total trauma costs (Schwab and Kauder, 1992).

In cases of trauma, David (2006) stressed regarding comprehensive trauma systems that can improve the outcomes of the patients. Crucial components of such a system should include a coordinated approach to both prehospital and hospital care, and to training providers in both areas. He further mentioned that trauma scoring has emerged as a means of describing injury severity and has become an essential component of quality improvement.

Septicemia was the most common cause of deaths in MOH hospitals in 2005 representing 16.54% from all causes. Heart diseases and diseases of pulmonary circulation came later with 14.31%. Accidents were in fifth place with 5.67%. Looking at the principal causes of hospitalization in MOH hospitals in 2005, accidents were in third place with 8.93% (MOH health facts, 2006). All these figures need to be attended seriously by those working in ED as they are the front liners that receive and give the initial treatment that

may change a lot in the outcomes of the patient; hence it is the hypothesis of this study. Lack in knowledge and skills of the personnel may jeopardize the patients' life.

2.7 SCORING SYSTEMS USED IN THE STUDY

The scoring systems vary widely, with some relying on physiologic scores (e.g., Glasgow Coma Scale [GCS] score, Revised Trauma Score [RTS]), and others relying on descriptors of anatomic injury (e.g., Abbreviated Injury Score [AIS], Injury Severity Score [ISS]). No universally accepted scoring system has been developed, and each system contains unique limitations. This limitation has resulted in the use of a number of such systems in different centers around the world (David, 2006).

This study is aimed at looking the outcomes of the trauma and non-trauma cases that are being treated in red zone of Emergency Department, Hospital Universiti Sains Malaysia. Therefore, in order to look at the outcomes in term of survival of patients, we are using two well known scoring systems i.e. Revised Trauma Score (RTS) for trauma patients and Shock Index (SI) for non trauma patients.

Critically-ill patients must be identified as early as possible to allow prompt diagnosis and treatment. Critical Care Outreach Teams have recently been introduced to help identify such patients—they may use early warning scoring systems to guide them. Scoring systems involve gathering information about current physiology and other data (e.g. premorbid diseases). They may be useful in research and in resource allocation, but

are controversial because many important factors may influence the final score and mask the outcome implications of the score (Hudson and Owen, 2007).

2.7.1. REVISED TRAUMA SCORE

Trauma scoring has emerged as a means of describing injury severity and has become an essential component of quality improvement. It can facilitate the prediction of patient outcomes and the evaluation of aspects of care (David, 2006).

The Revised Trauma Score is a physiological scoring system, with high inter-rater reliability and demonstrated accuracy in predicting death. It is scored from the first set of data obtained on the patient, and consists of Glasgow Coma Scale, Systolic Blood Pressure and Respiratory Rate (Champion et al., 1989; Wang, 2005)

Values for the RTS are in the range 0 to 7.8408. The RTS is heavily weighted towards the GCS to compensate for major head injury without multisystem injury or major physiological changes. A threshold of RTS < 4 has been proposed to identify those patients who should be treated in a trauma centre, although this value may be somewhat low (Champions et al., 1989).

The RTS has 2 forms depending on its use. When used for field triage, the RTS is determined by adding each of the coded values together. Thus, the RTS ranges from 0-12 and is calculated very easily. An RTS of less than 11 is used to indicate the need for

transport to a designated trauma center. The coded form of the RTS is used more frequently for quality assurance and outcome prediction.

The coded RTS is calculated as follows, in which, GCSc, SBPc and RRc, represent the coded values of each variable:

$$\mathbf{RTSc = 0.9368\ GCSc + 0.7326\ SBPc + 0.2908\ RRc}$$

The main advantage of the coded RTS is that the weighting of the individual components emphasizes the significant impact of traumatic brain injury on outcome (Patrick, 2002).

CODED VALUE (c)	GLASGOW COMA SCALE	SYSTOLIC BLOOD PRESSURE (mm Hg)	RESPIRATORY RATE (breath/min)
4	13 - 15	> 89	10 – 29
3	9 - 12	76 – 89	> 29
2	6 – 8	50 - 75	6 – 9
1	4 - 5	1 - 49	1 – 5
0	3	0	0

RTS = 0.9368GCS(c) + 0.7326SBP(c) + 0.2908RR(c) where the subscript c refers to coded value.

Shoemaker et al. (1992) defined the acute, critical illness as a disease process with a predicted mortality in excess of 30%. Looking at the figure shown below, this percentage correlates with the RTS of 3 and below; whereas those with higher RTS values will have