

UNIVERSITI SAINS MALAYSIA
GERAN PENYELIDIKAN UNIVERSITI PENYELIDIKAN
LAPORAN AKHIR

ENHANCING ROAD TRAFFIC SAFETY: APPLICATION
OF GEOGRAPHICAL INFORMATION SYSTEM (GIS)
ANALYSIS TO IDENTIFY SPATIAL & TERPORAL
RISK FOCTORS FOR SEVERE ROAD TRAFFIC
INJURY WITHIN KOTA BHARU DISTRICT

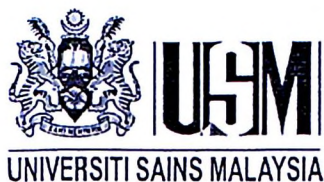
PENYELIDIK

PROFESOR MADYA DR. NIK HISAMUDDIN NIK AB.
RAHMAN

PENYELIDIK BERSAMA

DR. TUAN HAIRULNIZAM TUAN KAMAUZAMAN
DR. ABU YAZID MD MUSA
DR. KAMARUL IMRAN MUSA
DR. EMIL FAZLIQ MOHD
DR. SHAIK FARID ABDUL WAHAB
DR. MOHD HASHAIRI HAJI FAUZI
DR. NORLEN MOHAMED

2015



**UNIVERSITY RESEARCH GRANT
FINAL REPORT**
*Geran Penyelidikan Universiti
Laporan Akhir*

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 Sila emel salinan laporan ini ke rcmo@usm.my

A.	PARTICULARS OF RESEARCH / MAKLUMAT PENYELIDIKAN:
(i)	Title of Research: Enhancing Road Traffic Safety : Application of Geographical Information System (GIS) Analysis to Identify Spatial & Temporal Risk Factors for Severe Road Traffic Injury within Kota Bharu District <i>Tajuk Penyelidikan:</i>
(ii)	Account Number: 1001/PPSP/812099 <i>Nombor Akaun:</i>
B.	PERSONAL PARTICULARS OF RESEARCHER / MAKLUMAT PENYELIDIK:
(i)	Name of Research Leader: NIK HISAMUDDIN BIN NIK AB RAHMAN <i>Nama Ketua Penyelidik:</i>
	Name of Co-Researcher: <i>Nama Penyelidik Bersama:</i> <ul style="list-style-type: none"> i. <i>Dr Tuan hairulNizam Tuan Kamauzaman</i> ii. <i>Dr Abu Yazid Md Noh</i> iii. <i>Dr Kamarul Imran Musa</i> iv. <i>Dr Emil Fazliq Mohd</i> v. <i>Dr Shaik Farid Abdul Wahab</i> vi. <i>Dr Mohd Hashairi Haji Fauzi</i> vii. <i>Dr Norlen Mohamed</i>
(ii)	School/Institute/Centre/Unit: PPSP, USM <i>Pusat Pengajian /Institut/Pusat/Unit:</i>
D.	Duration of this research: <i>Tempoh masa penyelidikan ini:</i> <p style="margin-left: 20px;">*Duration : .3 TAHUN.....</p> <p style="margin-left: 20px;"><i>Tempoh :</i></p> <p style="margin-left: 20px;">From : 1 DECEMBER 2011 To : 30 NOVEMBER 2014</p> <p style="margin-left: 20px;"><i>Dari: Ke :</i></p>

E. 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)

INTRODUCTION

Road traffic injuries (RTI) is a very common cause of admission to the hospital worldwide, in particular in the developing countries (Hyder, 2014). It has been a long and agonizing disease that contributes to major cause of loss to life, long term suffering, disablement and psychological sequelae to both the victims & carer. However in particular, in Malaysia it is well known that there is lack of research into RTI epidemiology. The primary aim of this study is to document the demographic parameters, the predominant injury mechanisms and severity, geographical positioning data (i.e coordinates of the incidents locations), spatial data, mortality, length of hospital stay and finally the clinical outcome. The overall output is integrated spatial-temporal, pre-hospital and clinical data.

METHODS

We prospectively & retrospectively identified all injured subjects who had been referred to our department after sustaining RTIs within the district of Kota Bharu. We will also obtain the data from Hospital Raja Perempuan Zainab 2 Kota Bharu (MOH) & the police POL27 (Accident computerized form) form. All patients must be diagnosed with road related injuries. For this study, we extracted age, gender, accident mechanisms and causes, and vehicle types from the police & hospital management and outcome. A set of digital maps will be obtained from the Town Planning Unit of Kota Bharu Municipal Office (local district map). Vector spaces were spanned over these maps using GIS software (*ARCGIS 10.1* licensed to USM), and data from the identified trauma cases were added. Spatial analysis and overlay tools were used to identify local clusters of events.

The data collected using manual data form will be transferred into the SPSS version 22.0 software produced by IBM and licensed to the USM. The data form comprises of several sections such as general demography, injury data, prehospital care, ED management, outcome and geographical data. The variables will be in both categorical and numerical data. The data will be analyzed by variety of methods ranging from descriptive analysis, univariate analysis and multivariate analysis.

RESULTS

A total of 439 cases were recruited over the ten month data collection period commencing August 2012 till May 2013. The data showed that motorcycle contributed most (82%) to the RTI victims. Most of the RTI cases occurred along hotspot areas within certain Mukim/Borough within the Kota Bharu District namely Kenali, Demit and Binjai areas. The factors associated with the duration of stay and disability outcome include injury severity score (ISS) and being operated in the hospital. The most common areas of occurrence of RTI include staright road, at non peak hours, in the evening and in the suburban areas.

CONCLUSION

The RTI cases within the Kota Bharu district follow the general pattern of RTI cases in other parts of Malaysia. The identification of general demographic and geographical pattern of the RTI will assist the policy maker in implementing the preventive program for road safety in future.

F. SUMMARY OF RESEARCH FINDINGS

Ringkasan dapatan Projek Penyelidikan

The research involved 2 parts: the GIS analysis for RTI hotspot for the vulnerable road users and the analysis for associated factors for disability and the prolonged hospital stay after the RTI. Overall over a half year period of data collection showed that majority of vulnerable road users involved in RTI among the motorcyclists. The pillion and main riders are equally involved in the RTI. Most of the injured involved the average age of 44 years and among the productive working group. The helmet wearing among the common geographical features where the RTI occurred are straight road, within suburban area with speed limit of 60km/hr. The buffer analysis within 100 meters of the accident showed that common build up surrounding involved include the shop lots, restaurants/cafe and villages. The geographical parameters and the clinical parameters were combined and the multiple logistic regression analysis was performed searching for the association factors for the disability and prolonged hospital stay outcome. The analysis showed that the injury severity score is the main predictive factors for both outcomes. None of the geographical factors are strong enough to predict the two outcomes.

G. COMPREHENSIVE TECHNICAL REPORT

Laporan Teknikal Lengkap

Applicants are required to prepare a comprehensive technical report explaining the project.

(This report must be attached separately)

Sila sediakan laporan teknikal lengkap yang menerangkan keseluruhan projek ini.

[Laporan ini mesti dikepilkkan]

As attached

List the key words that reflect our research:

Senaraikan kata kunci yang mencerminkan penyelidikan anda:

English	Bahasa Malaysia
INJURY	KECEDERAAN
ROAD SAFETY	KESELAMATAN JALANRAYA
TRAUMA	TRAUMA

H. a) Results/Benefits of this research

Hasil Penyelidikan

No. Bil:	Category/Number: Kategori/ Bilangan:	Promised	Achieved
1.	Research Publications (Specify target journals) <i>Penerbitan Penyelidikan (Nyatakan sasaran jurnal)</i>	4	4
2.	Human Capital Development		
	a. Ph. D Students	0	0
	b. Masters Students	4	5
	c. Undergraduates (Final Year Project)	0	4
	d. Research Officers	0	0
	e. Research Assistants	2	3
	f. Other: Please specify	0	0
3.	Patents <i>Paten</i>	0	0
4.	Specific / Potential Applications <i>Spesifik/Potensi aplikasin</i>	0	0
5.	Networking & Linkages <i>Jaringan & Jalinan</i>	3	3
6.	Possible External Research Grants to be Acquired <i>Jangkaan Geran Penyelidikan Luar Diperoleh</i>	0	0

- Kindly provide copies/evidence for Category 1 to 6.

b) Equipment used for this research.

Peralatan yang telah digunakan dalam penyelidikan ini.

Items Perkara	Approved Equipment	Approved Requested Equipment	Location
Specialized Equipment Peralatan khusus	DESKTOP COMPUTER		HEALTH INFORMATICS LAB PPSK USM
Facility Kemudahan	COMPUTER LAB		PPSK USM
Infrastructure Infrastruktur			

- Please attach appendix if necessary.

[Print](#)[Close](#)

MS: 3736648451478632 - Burden of motorcycle related injury in Malaysia

From: **Latha Ganti** (editorial@intjem.com)
Sent: Tuesday, 14 Apr, 2015 11: 31 AM
To: Dr nik hisamuddin rahman (nhliza@hotmail.com)

MS: 3736648451478632
Burden of motorcycle related injury in Malaysia
Nik Hisamuddin NA Rahman, Sharifah Mastura Mohamed and Kamarul Aryffin Baharuddin

Dear Dr Rahman,

Your manuscript has been editorially reviewed, and per JEM formatting, please remove the section "what this article adds" at the end of the manuscript.

You should upload your revised manuscript through http://www.intjem.com/manuscript/login/man.asp?txt_nav=man&txt_man_id=3736648451478632. You will find more detailed instructions at the base of this email.

Please don't hesitate to contact me if you have any problems or questions regarding your manuscript.

With best wishes,

Prof Latha Ganti
The International Journal of Emergency Medicine Editorial Team

e-mail: editorial@intjem.com
Web: <http://www.intjem.com/>

To submit your revised manuscript

When you have revised your manuscript in light of the reviewer's comments and made any

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Traffic Injury Prevention - Manuscript ID GCPI-2014-0333

From: onbehalfof+dviano+comcast.net@manuscriptcentral.com on behalf of
dviano@comcast.net

Sent: Monday, 3 Nov, 2014 4: 09 PM

To: nhliza@hotmail.com

03-Nov-2014

Dear Professor Rahman:

Your manuscript entitled "Burden of Road Traffic Injury in Malaysia: An Update" has been successfully submitted online and is presently being given full consideration for publication in Traffic Injury Prevention.

Your manuscript ID is GCPI-2014-0333.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to Manuscript Central at <http://mc.manuscriptcentral.com/gcpi> and edit your user information as appropriate.

You can also view the status of your manuscript at any time by checking your Author Center after logging in to <http://mc.manuscriptcentral.com/gcpi>.

Thank you for submitting your manuscript to Traffic Injury Prevention.

Sincerely,
Traffic Injury Prevention Editorial Office



Nik Rahman <nhliza@gmail.com>

**Author Version Proof: MS International Journal of Emergency Medicine,
12245_2014_36**

2 messages

SpringerOpen Copyediting Management <springeropen_copyediting@spi-global.com>

Sat, Sep 6, 2014 at 8:36 PM

To: Nik Hisamuddin NA Rahman <nhliza@gmail.com>

MS ID: 7555306021014632

JWF MS ID: 12245_2014_36

Article Title: The display effects of patients' self-assessment on traumatic acute pain on the proportion & timing of analgesics administration in the emergency department.

Author list: Nik Hisamuddin NA Rahman, Cecilia Ananthanosamy

Journal Name: International Journal of Emergency Medicine

Article Type: OriginalPaper

Dear Dr. Nik Hisamuddin NA Rahman,

We are pleased to provide you with the text proofs of your manuscript which have been copyedited for clarity and style:

<http://springeropen.spi-global.com/authorproofs/bmcproofs/index.php?id=PNUPrBZXKY09062014203657CfIHyrTRQyp>

The URL is for proof purposes only and may not be used by third parties.

Please read through the proofs and proceed as follows:

- Respond to all of the author queries in the text, which are highlighted in red, by either stating that you approve the copyeditor's corrections, or by directly editing the text with your own corrections. These will appear as tracked changes.

- During copyediting your manuscript may have been reworded in places; if errors have been introduced or the intended meaning altered, please make corrections.

- Please check the manuscript carefully for any **typographical errors** as this is the **final proofing stage**.

- Please **remove all author query text** from the text and **ensure that the text is in the final format** that you wish to be published.

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1046218461444907 Resubmission 5 Ultrasonographic Assessment of Inferior Vena Cava /Abdominal Aorta Diameter Index: A New Approach of Assessing Hypovolemic Shock Class 1

From: **G. Bobby Kapur** (editorial@intjem.com)
Sent: Wednesday, 15 Apr, 2015 10: 37 AM
To: Dr nik hisamuddin rahman (nhliza@hotmail.com)
Cc: Dr nik hisamuddin rahman (nhliza@hotmail.com)

Article title: Ultrasonographic Assessment of Inferior Vena Cava /Abdominal Aorta Diameter Index: A New Approach of Assessing Hypovolemic Shock Class 1
MS ID : 1046218461444907
Authors : Nik Hisamuddin NA Rahman, Rashidi Ahmad, Meera Mohaideen Kareem and Mohammad Iqbal Mohammed
Journal : International Journal of Emergency Medicine

Dear Dr rahman

Thank you for submitting a new version of your article.

A pdf file has been generated from your submitted manuscript and figures.

http://www.intjem.com/imedia/1046218461444907_article.pdf (208K)

For your records, please find below link(s) to the correspondence you uploaded with this submission. Please note there may be a short delay in creating this file.

http://www.intjem.com/imedia/1844535269168141_comment.pdf

http://www.intjem.com/imedia/1332740517168141_comment.pdf

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Your Submission

From: **em.mjm.0.302954.c13a5f89@editorialmanager.com** on behalf of **Medical Journal of Malaysia** (mjm@mma.org.my)

Sent: Tuesday, 1 Jan, 2013 7: 37 PM

To: **nik hisamuddin nik ab rahman** (nhliza@hotmail.com)

Ref.: Ms. No. MJM-D-12-00157R1

THE PATTERN OF DEATH RELATED TO TRAUMA CASES PRESENTED TO THE EMERGENCY DEPARTMENT OF A TERTIARY UNIVERSITY HOSPITAL
The Medical Journal of Malaysia

Dear Associate Professor Dr nik ab rahman,

I am pleased to tell you that your work has now been accepted for publication in The Medical Journal of Malaysia.

It was accepted on 30.12.2012

Comments from the Editor and Reviewers can be found below.

Thank you for submitting your work to this journal.

With kind regards

HEMA R
Journal Manager
The Medical Journal of Malaysia

Comments from the Editors and Reviewers:

Accepted after corrections made



Nik Rahman <nhliza@gmail.com>

Lecture Schedule The 21st ISCCEM, Bali 2014

2 messages

PT. Kriya Macitaraya <qcitrane@yahoo.co.id>
 Reply-To: "PT. Kriya Macitaraya" <qcitrane@yahoo.co.id>
 To: "Prof.Dr.Nik Hishamuddin" <nhliza@gmail.com>

Mon, May 26, 2014 at 6:14 PM

Dear Dr. Nik Hishamudin,

Herewith, we inform you detailed information on your presence at The 21st International Symposium on Critical Care & Emergency Medicine 2014.

LECTURE

As	Day	Day / Date	Venue	Time	Session	Topic	Abstrak / Paper	Slide	CV	Permission	Copy Passport
Speaker	1	Thursday, 14 August 2014	Discovery Kartika Plaza	14.05 - 14.25	TP 5	Damage Control Resuscitation in Trauma			?	?	?
Speaker	2	Friday, 15 August 2014	Discovery Kartika Plaza	11.20 - 11.40	TP 12	Burden of Road Traffic Injury					

FLIGHT SCHEDULE / ACCOMMODATION

As a speaker you are entitled to 3 (three) nights stay at Bali Rani as follows:

In / Arr	Out / Dep	Hotel
13 August 2014 / Flight data...?	16 August 2014 / Flight data...?	Bali Rani Hotel

Please submit your Flight Details, CV, Permission Letter, Abstract and other necessary documents as soon as possible. I also send you tentative Scientific Program update, please find attach.

Thank you for your cooperation and attention.

Yours Sincerely,

Tri Wahyu Murni
 Chairperson of the Organizing Committee

Joseph Varon
 Chairperson of the Scientific Committee

3 attachments

- Form CV.docx
649K
- Scientific Program BM 2014 (9 Apr).xls
89K
- Permission Form.docx
656K

PT. Kriya Macitaraya <qcitrane@yahoo.co.id>
 Reply-To: "PT. Kriya Macitaraya" <qcitrane@yahoo.co.id>
 To: "Prof.Dr.Nik Hishamuddin" <nhliza@gmail.com>

Thu, Jun 5, 2014 at 3:17 PM

[Quoted text hidden]

3 attachments

- Form CV.docx
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- Scientific Program BM 2014 (9 Apr).xls
89K
- Permission Form.docx
656K



Nik Rahman <nhliza@gmail.com>

deadline abstract (please respond)

PT. Kriya Macitaraya <qcitraneu@yahoo.co.id>

Thu, Jul 10, 2014 at 3:23 AM

Reply-To: "PT. Kriya Macitaraya" <qcitraneu@yahoo.co.id>

To: Nik Rahman <nhliza@gmail.com>

Dear Dr. Nik Rahman,

Thank you for your CV, Permission form, abstract for topic: Geriatric Trauma.
Just missing your abstract with topic: **Burden of Road Traffic Injury.**

Based on your Lecture Schedule, the Committee provide your accommodation as much as 3 nights stay at Bali Rani Hotel, check.in 13 August 2014 and check.out 16 August 2014. But I see on your flight schedule, your arrival date is 12 August. If you wanna check.in from 12 August, means you have to pay personal account.

Please let me know asap and I will send you the details of price.

All the Best,
Natalie

[Quoted text hidden]

Burden of Road Traffic Injuries in Malaysia

Abstract:

Trauma is one of the common reasons for deaths and hospitalization in Malaysia and in developing countries in general. 80% of the cause of trauma is due to road traffic injury (RTI). RTI is a very expensive disease involving young and productive age group of population. The mean age of the RTI patients in Malaysia is between 25 and 40 years. Most of the RTI cases involve the vulnerable group of road users such as motorcyclists and pedestrian. Despite the active preventive action and improvement in health care facilities, the morbidity and the mortality due to RTI over the last 10 years has shown little improvement. Additionally research and development in the field of RTI in Malaysia is very limited. Most of the RTI cases are caused by human errors such as poor attitude and behavior on the road. With the increasing number of RTI cases annually, more government and non-government organizations should involve in primary and secondary prevention strategies.

Geriatric trauma

The elderly trauma patient presents a challenging clinical dilemma to any clinical team. Multiple comorbidities, decreased physiologic reserve, and the incidence of occult hypo-perfusion often make the chance for a successful functional outcome less likely. However, the question of whether or not pre-existing disease contributes to poor outcome after injury has yet to be conclusively answered. Several studies have indicated that shock, respiratory failure, decreasing Trauma Score, increasing Injury Severity Score, increasing base deficit, and infectious complications indicate a poor outcome in the elderly. In order to overcome these challenges, the clinical team must understand that timely diagnoses and treatment is the key. Aggressive identification, correction, and monitoring of these pathophysiologic states may be able to improve outcome. Laboratory assays, such as base deficit, may have promise for measuring the adequacy and completeness of resuscitation. Proper triage, prompt recognition of shock, and close monitoring will make the difference and will allow the elderly patients to return to their pre-existing functional level.

INTRODUCTION

Road traffic injuries (RTI) is a very common cause of admission to the hospital worldwide, in particular in the developing countries (Hyder, 2014). It has been a long and agonizing disease that contributes to major cause of loss to life, long term suffering, disablement and psychological sequelae to both the victims & carer (Nhac-Vu, 2014). Specifically, it is frequently related to high morbidity and mortality among the young age groups (NAR, 2013). The most productive group of population has been mostly inflicted by the injury. Lost of days of work, schooling and earning as a result of the injuries contribute to further socioeconomic deprivation in the society. According to WHO, RTI is ranked ninth among the leading causes of loss of disability-adjusted life years (DALYs) worldwide, and is anticipated to rise to become the third leading cause by 2020 (WHO Global Status Report on Road Safety, 2013). In Malaysia, it is the fourth common cause of death and admission to the hospital over the last 5 years (Health Facts MOH Malaysia, 2012). Considering the global burden of disease per 100,000 population, Malaysia is at the 20th in the world ranking in terms of prevalence of RTI (34.5 injured per 100,000). It is an ever increasing problem and it is the leading cause of morbidity and mortality in the under 40s age group (Road Safety Annual Report, 2013).

Thus, the main challenge for public health in this century is to decrease the burden of injuries. RTI should be considered as a disease. It has a host (the patient), and it has a vector of transmission (e.g motor vehicle, fall etc.). To reduce morbidity and mortality related to RTI, trauma care planning, injury prevention and systems improvement is extremely important (Larson, 2013). In a developing nation such as Malaysia, there are currently multiple efforts aimed at strengthening disease burden surveillance as well as addressing issues which have been

kept aside for far too long. Preventive programs have been taken with much enthusiasm by multi agencies such as Ministry of Transportation, Polis DiRaja Malaysia, Jabatan Keselamatan Jalanraya & MIROS (Ministry of Transport Malaysia, 2014). Much of the preventive programs and efforts are based solely on the non clinical data. Certain aspect has been neglected such as integrated data gathering and keeping which can be the main pillar of future preventive program. Systematic integrated database and surveillance system are much required to enlighten the involved agencies the actual burden of the disease in particular in relation to the clinical outcome (Sabariah, 2008). The knowledge of the epidemiological and clinical characteristics of trauma related RTI is the backbone for trauma care planning, injury prevention and systems improvement. The integration between the pre hospital and in hospital data will assist the policymakers and the clinicians in promoting the preventive programs and hence enhance the road safety programs locally and nationwide. Specifically, very little information has been gathered pertaining to the relationship between the spatial information and the actual clinical outcome of the patients who sustain RTI. Much of the studies in the past just identified clinical parameters of RTI but no correlation analysis has been done in relation to spatial factors (Zulkipli et al., 2012; Ramli et al., 2008). It would be ideal and interesting for the policymakers to know this correlation so that effective preventive and sustainable surveillance programs can be implemented. It can also be a tool for certain agencies like PDRM and JKR to implement their safety program for the road users. Determination of causes will help to create concrete measures to decrease injury fatality. For example creating a proper zebra crossing or bridge for pedestrian at a very busy intersections will reduce pedestrian related RTI (Senserrick et al., 2014). The development of prevention strategies, such as education, environmental

improvements (spatial parameters), and changes in vehicle design need to be correlated with the actual severity of the disease and clinical outcome of the patients.

However in particular, in Malaysia it is well known that there is lack of research into RTI epidemiology (Tran et al.,2009; Sabariah, 2008). Thus, the goal of this study is particularly to collect data on the epidemiology, pattern of injury and to relate with spatial data in the district of Kota Bharu. We plan to utilize the geographical information system (GIS) software and perform the temporo-spatial analysis in relation to clinical data for RTI cases attending the emergency department. The primary aim of this study is to document the demographic parameters, the predominant injury mechanisms and severity, geographical positioning data (i.e coordinates of the incidents locations), spatial data, mortality, length of hospital stay and finally the clinical outcome. The overall output is integrated spatial-temporal, pre-hospital and clinical data. We hope this reliable and integrated data can be used for planning current and future trauma care related to RTI in Kota Bharu specifically and in Malaysia generally.

OBJECTIVES

PHASE 1 OBJECTIVES (THE APPLICATION OF GIS ANALYSIS TO IDENTIFY THE SPATIAL & TEMPORAL FACTORS FOR ROAD TRAFFIC INJURIES AMONG VULNERABLE ROAD USERS (MOTORCYCLISTS & PEDIATRIC AGE)

GENERAL OBJECTIVES:

To analyze geospatial & temporal (3 layers) distribution of road traffic injuries cases within the district of Kota Bharu.

(Layers for road layout, landuse & building infrastructure)

SPECIFIC OBJECTIVES:

1. To perform general spatial analysis (point coordinate mapping) for the vulnerable road users (motorcyclists & pediatric age group) involve in RTI based on the injury severity score, polytrauma cases, triage code of injuries in the ED, motorcycle crash, injury severity score, temporal pattern, age group, driving license, hospital admission, body parts injured, ED interventions and outcome at discharge.
2. To perform hotspot analysis on “layer Mukim” for the vulnerable road users (motorcyclists & pediatric age group) involve in RTI based on the injury severity score, polytrauma cases, triage code of injuries in the ED, motorcycle crash, injury severity score, temporal pattern, hospital admission, body parts injured, ED interventions and outcome at discharge.
3. To determine the common geographical factors within 100 meters of Buffer analysis for each of polytrauma, disable outcome, injury severity, age group and motorcycle related RTI cases

PHASE 2 OBJECTIVES (STATISTICAL ANALYSIS OF DATA FROM THE MANUAL DATABASE SYSTEM & GIS ANALYSIS)

GENERAL OBJECTIVES OF STUDY:

To determine the predictors of morbidity and hospital admission patterns among vulnerable road users based on the manual database related to road traffic crash within the district of Kota Bharu

SPECIFIC OBJECTIVES:

1. To analyze the general demographic pattern of cases related to motor vehicle crash among the vulnerable road users (motorcyclists & pediatric age) attending the ED of HUSM & HRPZ
2. To determine the predictive factors for the disability at discharge post motorvehicle crash injuries among the vulnerable road users in the district of Kota Bharu
3. To determine the predictive factors for the admission to the hospital post motorvehicle crash among the vulnerable road users in the district of Kota Bharu
4. To evaluate whether injury severity (based on Injury Severity Score) are different among risky behaviors of road users (age group, gender, driving license possession, road layout, location & helmet wearing)

METHODOLOGY

1.0 GENERAL METHODOLOGY

1.1 Study design.

Prospective Cohort Study from July 2011 until June 2013

1.2 Study Venue:

Emergency Department, Hospital Universiti Sains Malaysia & Hospital Raja Perempuan Zainab 2 (HRPZ 2) Kota Bharu Kelantan.

1.3 Study reference

All patients attended the Emergency Department in Hospital Universiti Sains Malaysia & HRPZ 2.

1.4 Study population. (Reference population)

All trauma patients with road related injury.

1.5 Study Sample (Sample population)

All patients with road-related injuries within the district of Kota Bharu who attended the emergency departments in Hospital University Sains Malaysia & HRPZ 2 from 1st July 2011 to 30th June 2013.

2.0 SAMPLE SIZE CALCULATION

2.1.1: Sampling For Phase 2 Objectives:

i. Demographic characteristics of road traffic injuries & deaths

Zeng Hao Wong. A Review of Fatal Road Traffic Accidents in Singapore from 2000 to 2004. Annals Academy of Medicine. July 2009, Vol. 38 No. 7

Yen PT, Radin Umar RS. Fatal Injuries in Malaysian Motorcyclists. International Medical Research Journal. 1999 3(2), 115-119

Male factor (Single proportion): 82.8%, $z=1.96$, precision=5%

Sample required=218

Young age (Less than 30): 39.7%, $z=1.96$, precision=5%

Sample required=367

Motorcyclist (Single proportion): 67.7%, $z=1.96$, precision=5%

Sample required=334

Pedestrian (Single proportion): 33.8%, $z=1.96$, precision=5%

Sample required=343

Car occupants (Single proportion): 14.8%, $z=1.96$, precision=5%

Sample required=193

ii. Predictive factors for Morbidity among all the road users:

Zeng Hao Wong. A Review of Fatal Road Traffic Accidents in Singapore from 2000 to 2004. Annals Academy of Medicine. July 2009, Vol. 38 No. 7

(Two proportion sampling: Alpha=0.05, power 80%, m (ratio)=1, P1=experimental, P0=control

Gender as risk factor: Male= 73%, predicted for female (control)=40%, Sample required=34 per arm (Total=68)

Motorcycle as a risk factor: Motorcyclist=67.7%, predicted for car occupants (control)=50%
Sample required=120 per arm (Total 240)

Pedestrian as a risk factor: pedestrian=33.8%, predicted for general population (control)=20%
Sample required=161 per arm (Total 322)

Young age (less than 30) as a risk factor: Young age=39.7%, predicted for adult population (control)=20%
Sample required=89 per arm (Total 178)

Night as risk factor: 68%, predicted daylight (control)=50%
Sample required=116 per arm (Total 232)

iii. Predictive factors of Disability among the motorcyclists

Yen PT, Radin Umar RS. Severe Injuries among Malaysian Motorcyclists. International Medical Research Journal. 1999 3(2), 115-119

(Two proportion sampling: Alpha=0.05, power 80%, m (ratio)=1, P1=experimental, P0=control)

Teenager as risk factor=56.4%, predicted for adult population (control)=40%
Sample required=145 per arm (Total sample 290)

Male as risk factor=73%, predicted for female population (control)=35%
Sample required=26 (Total sample 52)

Multiorgan injuries as risk factor=33%, Predicted Single organ injury (control)=15%
Sample required=87 (Total sample 184)

Traumatic brain injury as risk factor=63%, Predicted other organ injuries (control)=45%

Sample required=119 (Total sample 238)

2.1.2: Sampling For Phase 1 Objectives:

- i. Weiner & Tepas: Application of Electronic Surveillance & Global Information System Mapping to Track the Epidemiology of Pediatric Pedestrian Injury. *Journal of Trauma-Injury Infection & Critical Care*: March 2009-Vol 66 Issue 3 S10-S16.

 - ii. Abdul Razak J. *Application of Geographical Information System (GIS) for mapping road traffic injuries using existing source of data in Karachi, Pakistan — A pilot study. J Pak Med Assoc. Vol. 61, No. 7, July 2011. P 640-643*
 - iii. D'Alessandro D, Paone M, Salvatori R, Ciaramella I. *Mapping of road traffic accidents with pedestrians in the territory of a Local Health Unit of Rome through integration of administrative and health data. Ann Ig. 2010 Sep-Oct;22(5):419-29.*
 - iv. Yen PT, Radin Umar RS. *Fatal Injuries in Malaysian Motorcyclists. International Medical Research Journal. 1999 3(2), 115-119*
 - v. Donroe J, Tincopa M, Gilman RH, Brugge D. *Pedestrian Road Traffic Injuries in Urban Peruvian Children and Adolescents: Case Control Analyses of Personal and Environmental Risk Factors. <http://www.plosone.org/home.action>*
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Based on common geographical locations (At road intersections: 40.3%). Predicted incidence on state roads (control)=25%

Sample required=152 (Total samples 304)
