UNIVERSITI PUTRA MALAYSIA

SEVERITY OF FALL INJURY AMONG CHILDREN BELOW 7 YEARS OLD PRESENTED TO EMERGENCY DEPARTMENT, HOSPITAL KUALA LUMPUR

HASLINA BINTI MOHD HASSAN

SEVERITY OF FALL INJURY AMONG CHILDREN BELOW 7 YEARS OLD PRESENTED TO EMERGENCY DEPARTMENT, HOSPITAL KUALA LUMPUR

HASLINA BINTI MOHD HASSAN

A THESIS SUBMITTED TO THE FACULTY OF MEDICINE AND HEALTH SCIENCES, UNIVERSITI PUTRA MALAYSIA AS PARTIAL FULFILLMENT FOR THE DEGREE OF BACHELOR OF NURSING

UNIVERSITI PUTRA MALAYSIA
SERDANG, SELANGOR

2011/2012

SEVERITY OF FALL INJURY AMONG CHILDREN BELOW 7 YEARS OLD, PRESENTED TO EMERGENCY DEPARTMENT, HOSPITAL KUALA LUMPUR

ABSTRACT

Background: Falls are the most common cause of injuries in children, with an estimated high prevalence of 80%. In most countries, falls are the most common cause of childhood injury in emergency departments. Unintentional injury is frequently associated with fall. Fall injury is an unintentional incident that results in a person to be on the ground or floor or other lower level. Deaths because of fall injuries are infrequent among children. However, there have been increasing occurrences of hospitalization and visits to the emergency department as consequences of injuries due to falls. **Objectives**: The general objective of this study is to determine severity of fall injury among children presented to Emergency Department, Hospital Kuala Lumpur. There are three main factors identified as contributing to fall injury: height of fall, mechanism of fall and location of injury. **Methods**: This is a cross sectional study involving parents, with children below the age of 7 years having injuries from a fall, and was brought to the Emergency Department, Hospital Kuala Lumpur. Data were collected over three months using a modified self-administered questionnaire. The sample size is around 270 participants. The questionnaire was pre-tested before being used for data collection. Data analysis was done using Statistical Analysis Package for Social Sciences (SPSS®). Descriptive statistics were used to describe the sample and $p < 0.05$ was considered as statistically significant. Chi-square test was used to determine associations between factors of fall injury and severity of fall injury. **Results:** Of the 270 respondents males were 171 (63.3%) and females 99 (36.7%). A total of 75 (27.8%), respondents between ages 1-3 years old had severe injury. A significant association was found between age and severity of fall injury ($\chi^2=22.82$, $p < 0.05$). There were also significant association between height of fall ($\chi^2=4.616$, $p < 0.05$) and mechanism of fall ($\chi^2=6.575$, $p < 0.05$), with severity of fall injury. However, there were no significant associations between locations of injury and severity of fall injury. **Conclusion:** The finding of this study could be used to assist healthcare providers in the development and planning in the education of parents in order to minimize and/or prevent fall injuries.

Keywords: Hospital, children, fall, injury.

KETERUKAN KECEDERAAN JATUH DI KALANGAN KANAK-KANAK DI BAWAH UMUR 7 TAHUN, YANG DATANG KE JABATAN KECEMASAN, HOSPITAL KUALA LUMPUR

ABSTRAK

Latar belakang: Jatuh adalah punca yang paling biasa kecederaan di kalangan kanak-kanak, dengan kelaziman yang tinggi kira-kira 80%. Di kebanyakan negara, jatuh adalah yang paling biasa bagi jenis kecederaan kanak-kanak di jabatan kecemasan. Kecederaan yang tidak disengajakan sering dikaitkan dengan jatuh. Kecederaan jatuh adalah satu kejadian yang tidak disengajakan menyebabkan seseorang berada di atas paras tanah atau lantai atau lebih rendah. Kematian kerana kecederaan kejatuhan adalah jarang berlaku di kalangan kanak-kanak. Walau bagaimanapun, ianya meningkatkan kadar kemasukan ke hospital dan yang datang ke jabatan kecemasan akibat kecederaan jatuh. **Objektif:** Objektif umum kajian ini adalah untuk menentukan keterukan kecederaan jatuh di kalangan kanak-kanak yang datang ke Jabatan Kecemasan, Hospital Kuala Lumpur. **Kaedah:** Ini adalah satu kajian keratan rentas yang melibatkan semua ibu bapa dengan kanak-kanak yang berumur di bawah 7 tahun, dengan kecederaan jatuh, yang datang ke Jabatan Kecemasan, Hospital Kuala Lumpur, dalam tempoh tiga bulan. Data telah dikumpulkan dalam tempoh tiga bulan menggunakan soalan kaji selidik yang telah diubahsuai. Bilangan sampel adalah sekitar 270 responden. Soal selidik telah diuji terlebih dahulu sebelum ia digunakan untuk pengumpulan data. Analisis data dilakukan dengan menggunakan "Statistical Package for Social Sciences" (SPSS ®). Statistik deskriptif telah digunakan untuk menggambarkan sampel dan $p < 0.05$ dianggap sebagai statistik yang signifikan. Ujian Chi-square digunakan untuk menganalisis hubung kait antara faktor jatuh dan keterukan kecederaan jatuh. **Keputusan:** Daripada 270 responden, lelaki sebanyak 171 (63.3%) dan perempuan 99 (36.7%). Sebanyak 75 (27.8%), responden antara umur 1-3 tahun mempunyai kecederaan serius. Hubung kait yang signifikan di antara umur dan keterukan kecederaan jatuh ($\chi^2 = 22.82$, $p < 0.05$). Terdapat juga hubung kait yang signifikan di antara ketinggian jatuh ($\chi^2 = 4.616$, $p < 0.05$) dan mekanisme jatuh ($\chi^2 = 6.575$, $p < 0.05$), dengan keterukan kecederaan jatuh. Walau bagaimanapun, tidak ada hubung kait signifikan di antara lokasi kecederaan dan keterukan kecederaan jatuh. **Kesimpulan:** Keputusan kajian ini boleh digunakan untuk membantu pegawai perkhidmatan kesihatan dalam perancangan pendidikan kepada ibu bapa untuk mengurangkan dan / atau mencegah kecederaan jatuh.

Kata kunci: Hospital, kanak-kanak, jatuh, kecederaan

ACKNOWLEDGEMENT

I would like say 'alhamdulillah' towards Allah s.w.t for giving me the strength to complete my research project titled Severity of Fall Injury among children below 7 years old, presented to Emergency Department, Hospital Kuala Lumpur. Besides that, I take this opportunity to express my boundless gratitude and thanks to the following, Puan Faridah Mohd Said, my Supervisor whose encouragement and support was the backbone that kept me going. I also owe a great deal to my co-supervisor Dr Kulanthayan K.C Mani for the guidance and motivation throughout the entire project, supporting me in the planning, execution, analysis, and write up. I would have found it an uphill task, almost impossible to complete my project if it were not for their support, encouragement and supervision.

I also thank The Director of Hospital Kuala Lumpur, Head of the Emergency Department and all the Staff of the Emergency Department whose help, directly and indirectly was and is greatly appreciated. I express special thanks to A.P. Dr Hejar binti Abdul Rahman (Department of Community Health), Cik Norafisyah binti Makhdzir (nursing tutor), my friends and my husband Shahreza Iskandar bin Selimi who were always there to give me positive support and assistance to complete my project. Only Allah S.W.T can repay their good deeds. I shall remember all of them forever.

Last but not least, to all of you, my heartfelt thanks, and my humble apologies if I have offended any one, by way of word or deed. May Allah S.W.T always bless all of us.

TABLE OF CONTENTS

CHAPTER 4

4. RESULTS

LIST OF TABLES

LIST OF FIGURE

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ED	Emergency Department
Ho	Null Hypothesis
HKL	Hospital Kuala Lumpur
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

Falls are the leading cause of unintentional injury during childhood. Fall among children is a critical and frequent occurrence and must be prevented. Although parents or guardians always protect their children, accidental "falls" cannot be avoided. Falls can occur on the same level such as when the children walk or loss of balance or from one level to another level, such as falling from a window, falling down the stairs or from the furniture. When the fall happens and medical treatment is sought or if death takes place, it will be recorded as due to a fall injury (McDonald and Gielen, 2010). National Institution of Child Health and Human Development defined falls as an external cause or type of exposure, the impact of which is "to come down by force of gravity suddenly, to tumble, topple and forcibly lose balance" (Peden et al., 2008).

According to WHO (2008), fall injury is "an incident which results in a person coming to rest accidentally on the ground or floor or any other lower level". In developing countries, fall is a mutual reason seen in hospital with 25-52% of all treated child injuries (Bartlett, 2002). According to Khambalia et al. (2006), risk factors determined as causes for fall injury are bunk beds, stairways, playgrounds or infant walkers. The risk factor that causes incidents of injury due to fall in children include age, sex, height of the fall, surface, mechanism, nursery care or home care and socioeconomic status (Khambalia et al., 2006). According to Hyder et al. (2009), out of 1559 injured children, male 1010 (65%) and age more than 5 years 941 (60%). 32 (2%) below than 1 years old and 913 (56%) involved fall.

According to Johnson et al. (2005), fall can be described as unintentional if it meets the following criteria which is, first, fall was witnessed by a guardian of the child and history was corroborated by a second reliable witness, second, the child was brought to an emergency department within hours after the occurrence and lastly the mechanism and nature of the fall is known. In Greece, 4400 fall injuries reported and a high percentage of high severe. Concussions 14.3%, fractures 9.4% and 10% of infants fall injury required hospitalization.

According to Dedoukou et al. (2004), 36% of fall injury is because of nursery equipment. Every year, estimated 328,500 infants been treated for unintentional injuries in the emergency department, and surprisingly fall injury is the leading cause of many of the children's injury. Majority was injured at home and male is the higher (Mack, Gilchrist and Ballesteros, 2007).

1.1 Problem Statement

Worldwide, fall injuries are the second leading cause of death among all aged due to unintentional injuries in 2002 (Hyder et al., 2007). According to SafeKids Worldwide (2004), more than 80% fall related injuries happened among children below than 4 years old and it high prevalence of occurrence at home. Moreover, it is the most common cause of injuries in children, estimated at about 66% and it is highly prevalent (Bartlett, 2002). Unintentional injury is much associated with fall. Unintentional injury ranks as the leading cause of death among children and 40% of deaths in the age group from 1 – 14 years old (Bartlett, 2002). Other studies have shown, fall injury being the highest percentage (56%) compared to others injuries caused by traffic injuries (22%), burns (13%), poisoning (4%) and near drowning or

drowning (1%) (Hyder et al., 2009). Falls are responsible for the largest percentage of unintentional injury deaths. Few studies have focused on the location of fall injury incidence. However, homes also represent an important setting for unintentional injuries (Runyan et al., 2005).

In Malaysia, there is a study regarding "Epidemiology of Home Injury in Malaysia" and fall is identified the leading (39.2%) cause of injuries involving the children, youth and elderly (Hasni, Junainah, and Jamaliah, 2003). These clearly determine that injuries due to falls are serious, of high occurrence and should be addressed. This study will be focusing on the severity of falls in relation to the factors of fall injury. The factors of fall included in this study are socio-demographic factors, height of the fall, mechanism of fall and location where injury occurs. In view of this study will found prevention how to decrease of prevalence fall injury among child percentage. Prevalence in this study is from others country and there is minor study on the prevalence of fall injury among child in Malaysia. Since this is an important area and not much had study has been done to address this subject matter, therefore this study is expected to help fill in the gap.

1.2 Benefit of the study

The finding of this study enables determining the severity of fall injury in relation to the factors of fall injury among Malaysian children in comparison to the previous study. This information will create parental awareness in order to enable appropriate action for the determination, prevention and avoidance of the causes of fall injury. Therefore, prevalence of fall injury can be significantly minimised if not eliminated.

1.3 General Objective

To determine severity of fall injury among children presented to Emergency Department, Hospital Kuala Lumpur.

1.4 Specific Objectives

1.4.1 To determine socio-demographic profile of fall injury among children.

1.4.2 To determine severity of fall injury related to fall injury among children.

1.4.3 To determine factors of fall injury among children.

1.4.4 To determine the association between socio-demographic with severity of fall injury among children.

1.4.5 To determine the association between factors of fall (height of fall, mechanism of fall and location of injury) and severity of fall injury among children.

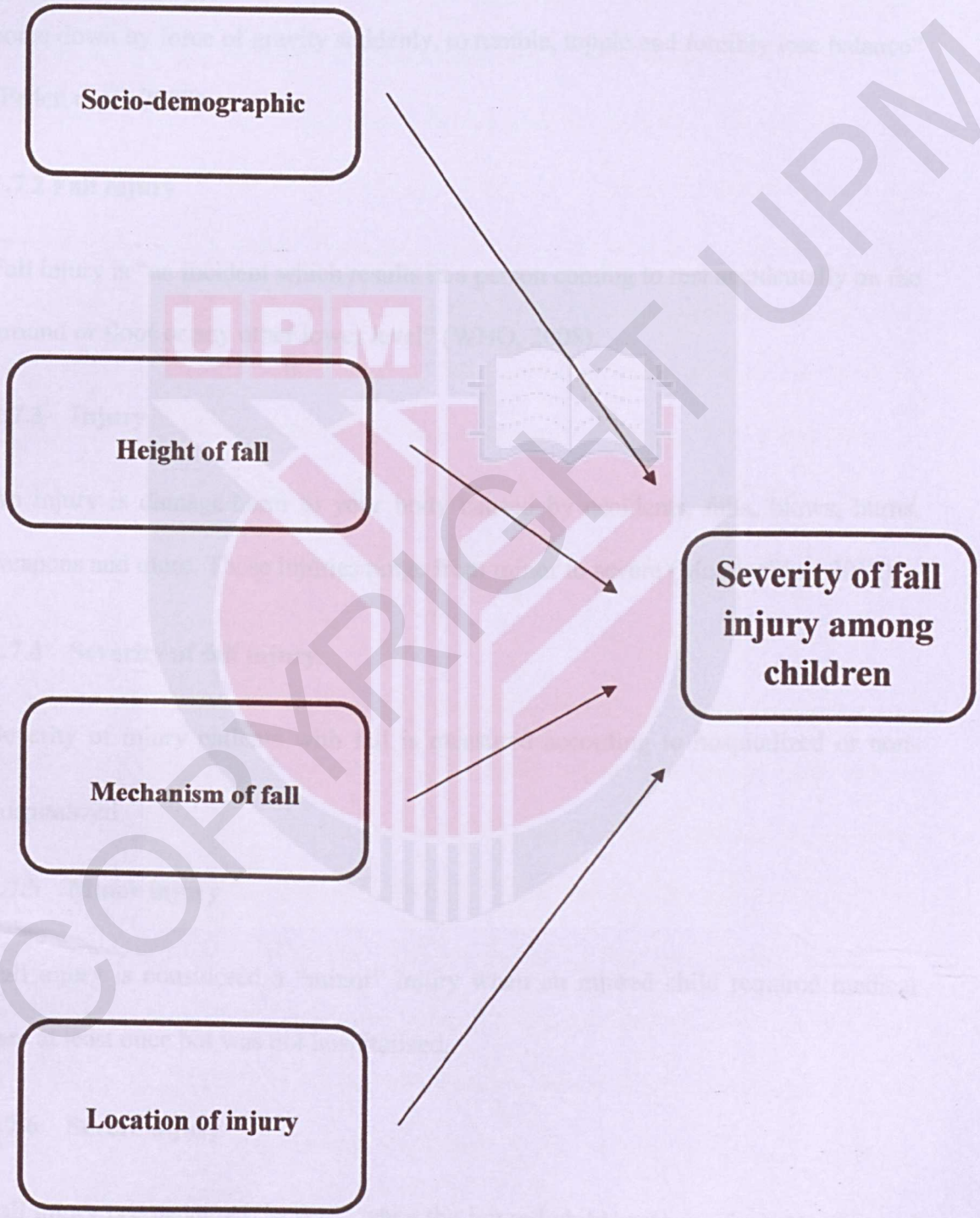
1.5 Null hypothesis

Ho 1: There is no association between socio-demographic and severity of fall injury among children.

Ho 2: There is no association between factors of fall injury (height of fall, mechanism of fall and location of injury) with severity of fall injury among children.

1.6 Conceptual framework

Figure 1: Conceptual framework factors of fall injury



1.7 Definition of Terms

1.7.1 Fall

Falls is defined as an external cause or type of exposure, the impact of which is "to come down by force of gravity suddenly, to tumble, topple and forcibly lose balance" (Peden et al., 2008).

1.7.2 Fall injury

Fall injury is "an incident which results in a person coming to rest accidentally on the ground or floor or any other lower level" (WHO, 2008).

1.7.3 Injury

An injury is damage/harm to your body caused by accidents, falls, blows, burns, weapons and more. These injuries range from minor to severe (MedlinePlus, 2012).

1.7.4 Severity of fall injury

Severity of injury patients with fall is measured according to hospitalized or non-hospitalized.

1.7.5 Minor injury

Fall injury is considered a "minor" injury when an injured child required medical care at least once but was not hospitalized.

1.7.6 Severe injury

Fall injury is considered "severe" when the injured child seeks medical attention and is hospitalized as a result of the injury.

CHAPTER 2

LITERATURE REVIEW

Fall is inevitable in normal growth and development process of a child. All children are exposed to fall and injury because their nature of physical, psychological and behavioural characteristics, that places them at risk in a largely adult world (Towner & Mytton, 2009). Incidence falls among children is a matter of concern because it is said to be the main cause of increased admission to the emergency department. This supported by Picket et al. (2003), in their studies on risk factor for unintentional injuries due to falls. Deaths because of fall injuries are infrequent among children. However, rates of hospitalization and visits to the emergency department as consequences of fall injuries are increasing (Khambalia et al., 2006). In most countries, falls are the most common type of childhood injury in emergency departments (Peden et al, 2008).

Risk factor of fall injury among children is a disaster scenario for parent and guardians. Although they try their best to protect their children, incident always happen. There are many factors associated for unintentional fall among children. Factors that were identified by Khambalia et al. (2006) on the risk factors for fall injuries among children were age, gender, height of fall, mechanism of fall and location injuries whether home care setting or day care setting. Other studies from Falvin et al. (2006), also find out about the relationship between stages of child development and the injuries patterns which is mechanism of injuries, nature of injuries and location of injuries.

2.1 Socio demographic

2.1.1 Age

Sixty percent age below 1 year old children visit the emergency department due to unintentional injuries because of falls. According to World Report on Child Injury Prevention (2008), in high income countries, the average of fall mortality rates, by age, are similar for the first 20 years of life but in low and middle income countries, infant less than a year old has very high rates.

Moreover, according to the study by Ibrahim et al. (2006), infants were significantly more likely to be hospitalized because of low height fall compared to toddlers. On the other hand, toddler is associated with high height falls. Therefore, toddlers who fell from high heights normally sustained multiple skull fractures.

In Bangladesh, fall injuries were the second leading cause of death among infant less than one year old. In Vietnam, fall injuries were the sixth leading cause of childhood death. In Jiang Xi, China, fall injuries was fourth leading cause of death. Increase of fall injury among all infants with increasing age was statistically highly significant by 0 to 3 month (12.7%), 4 to 7 months (33.3%) and 8 to 11 months (54%) (Dedoukou et al., 2004). According to a study in Korea, falls happen specifically between the age of 0 and 3 years of age when they are infants and toddlers (Park, Cho and Oh, 2004). Therefore, study by Su, Raghupathi and Huh (2011) had a similar finding which is falls become the main mechanism of injury by the toddler age.

Children aged more than 5 years were hospitalised at 3 times the rate compared to less than 4 year olds (Helps and Pointer, 2006). On the other hand, another study

stated that children less than 5 years old suffers fall from stairs and sustained head injuries (Boele van Hensbroek et al., 2009).

Otherwise, according to Park, Cho and Oh (2004), younger children are more likely to suffer fall-related injury from a low height place compared to injuries of older children. Moreover, is similar to the study in Los Angeles stated that mechanism of injury is different among age. Toddler is more prone to get a traumatic brain injury (TBI) rather than older children because of a fall (Giza, 2006).

2.1.2 Gender

Males account for the greater number of injuries in almost all studies by two-third compare to females (Bartlett, 2002). Falls are more frequent among males compared to female with 63.5% male and 34.2% for female (Hasni, Junainah & Jamaliah, 2003). According to World Report on Child Injury Prevention (2008), boys have the highest ratio to girls at 1.2:1 in low and middle income countries (South East Asia) to 12:1 in high income countries (in the eastern Mediterranean region). Males were more susceptible than female to fall injury.

Some research attribute that males are more prone to injury because of their personality of impulsiveness, hyperactiveness, aggression and other behaviours (Peden et al., 2008). Another study regarding child injuries fall brought to emergency department indicates most falls occurred to males (Hyder et al., 2009). According to a study in Korea, more males had a fall, compared to females, most of them fall from lower-level rather than higher-level surfaces (Park, Cho and Oh, 2004). Another study from Iran had similar finding indicating that males were more frequently

hospitalized than females due to injuries (Karbakhsh et al. 2008). This is because males are most active and have greater freedom of movement than females. However, it was contradictory with the finding from a study that was perform by Tinsworth and Joyce (2001) in United States of America, females were injured slightly more frequently (55%) in playground than males (45%).

2.2 Height of fall

Studies on the height of falls have suggested that a fall below 5 feet do not commonly cause multiple or visceral injuries in young children (Khambalia et al., 2006). Data from Global Burden of Disease stated 66% of fatal falls among children occur from a height while 8% occur from same level surfaces (World Report on Child Injury Prevention, 2008).

Naturally, the greater the heights from which a child falls, the more severe the injury (American Academics of Pediatrics, 2001). According to Johnson et al. (2005), children who fall from heights are more than 1.5 meter had a probability of getting head injuries. Findings from Korea, showed high-level falls had more incidence of intracranial injuries compared to low-level falls (Helps and Pointer, 2006). Moreover, according to Jagnoor et al. (2011), falls from a height resulted in head injuries in 460 cases in their findings.

2.3 Mechanism of fall

Most falls related injuries affect children during early stages of development. Falls are most common causes of injuries among infants and they have long been studied in relation to nursery equipment such as walker. The use of infant walkers was associated with the high incidence of falls. Several studies have explored the role of specific types of nursery equipment such as infant walker in the causation of fall related injuries (Dedoukou et al., 2004).There were 80 cases of baby walker related injuries and 62.5% are falls (Hasni, Junainah & Jamaliah, 2003).

Risk of fall injuries using bunk bed increased for children below 6 years old. By World Report on Child Injury Prevention (2008), a review about fall related risk factor in the 0 to 6 years of age group found that among children using bunk beds, the risk of fall injury is greater for younger children (Khambalia et al., 2006). A study from Singapore stated, slipping were the commonest among children followed by fall from a height which is fall from bed.

2.4 Location of injury

The home can be a hazardous place for children; they spend most of their time there and it is where most accidents happen. According to the study by Marshall et al. (2005), the incidence of fall which is resulting visit to emergency department, almost 60% happen in the home. Another study has shown, fall (83.9%) is the most common mechanism of injury that happens in the home (Karbakhsh et al., 2008). Moreover, according to Jagnoor et al. (2011) most falls (70%) happen at home compared other places.

Other studies compare between home and daycare show the risk of fall injury at home was double the risk of fall in the day care (Khambalia et al., 2006). According to Kotch et al. (1997), the most common cause in all child care settings was falls (51%) and it is related to injury.

Playground injuries are also the leading cause of injuries to children in childcare facilities. Four studies on playground have recorded that the risk of fall for playground depends on the height of the equipment and the nature of the undersurface (Khambalia et al., 2006). According to World Report on Child Injury Prevention (2008), in most high income countries, elder children most likely fall from playground.

A study from Watson, Ozanne and Lough (2000), states that 83% falls from playground admissions to emergency department, 39% from climbing equipment, 18% from slide and 14% from swings. Therefore, falls from playground equipment can lead to serious injury and frequently seen in hospital admittances. Others studies said, the height that a child can fall, the surface fallen to, and the interaction of the two have been identified as causal to injury related to playground equipment (Norton, Nixon and Sibert, 2004).

2.4 Severity of fall injury

Falls are the most common environmental setting for closed head injuries treated in paediatric intensive care unit (ICU) (Holsti et al., 2005). Other than that, falls are the primary cause of traumatic brain injury (TBI) mainly among young children (World Report on Child Injury Prevention, 2008). In India, fall injuries also lead to significant disability in their population which is an estimated 375 disability-adjusted life year (DALY) per 100,000 populations (WHO, 2008). Worldwide research shows that the context, nature and severity of falls differ by age and gender (Vish et al., 2005). Furthermore, mechanism of injury has been shown to influence the result of injury (Ewing-Cobbs et al., 1998). Moreover, according to Wang et al. (2011), their finding showed that children with active personality were exposed to get injuries.

Other than that, severity of injuries due to fall from playground equipment are commonly fractures (39%), followed by laceration (22%), contusions/abrasions (20%) and strains/sprains (11%) (Tinsworth and Joyce, 2001). Therefore, most hospitalized injury cases resulted from falls from playground equipment (Tinsworth and Joyce, 2001). Generally, approximately 79% of the injuries that happened from playground equipment involved falls (Tinsworth and Joyce, 2001).

According to study by Oral (2007), severe injuries are extremely uncommon due to trivial falls. On the other hand, according to SafeKids Worldwide (2004), severity of injuries is associated with fall down stairs because more likely to result in head injury and may need admission to the hospital. One study had categorized severe injuries due to falls when the patient is requiring hospitalization of over 24 hour while minor injuries requiring hospitalization of less than 24 hour (Jagnoor et al., 2011).

According to the study in Malaysia by Hasni, Junainah & Jamaliah (2003), the most commonly presented nature of injuries due to falls was open wounds (29.6%), superficial injuries (25.4%), contusions (13.4%) and fractures (13.4%). A body part that most frequently affected is head followed by lower and upper extremities. Factors that identified by Hasni, Junainah & Jamaliah (2003) contribute to the fall are fall at the same level, followed by fall from stairs and furniture. Approximately 84.5% treated as out- patients which is non-admitted and 15.5% of falls treated as inpatient which is admitted to the ward.

A study done by Bulut et al. (2006) in Turkey, found out the most common injuries happened due to falls was head injury (50%), followed by injuries to the extremities (14.5%) and abdomen (%). Others uncommon site of injuries were at thorax, pelvic and vertebrae. Approximately 24.6% was discharged from emergency department which is non-admitted to the ward, 40% was transferred to other healthcare centres, and 34% was admitted. Moreover, head trauma was the common cause of injury (48%) followed by skeletal injuries (23%) and is supported by the study done by Vish et al. (2005). They studied among children who fall from height.

However, fracture is the most common fall related injuries at playground setting. This is supported by Norton, Nixon & Sibert (2004), which is upper limb fractures were the most common among children with fall injury. Others studies by Helps & Pointer (2006) also stated, fractures were the largest injury types due to fall from playground.

CHAPTER 3

METHODOLOGY

3.1 Study location

This study was conducted at Hospital Kuala Lumpur. The collection of data was collected at Emergency Department, Hospital Kuala Lumpur.

3.2 Study design

The study design of this research was a cross-sectional study.

3.3 Sampling

3.3.1 Study population

Parents who accompanied child below than 7 years old to Emergency Department, Hospital Kuala Lumpur were the population of the study.

3.3.2 Sampling method

Purposive random sampling was used for this study.

3.3.3 Sample size

Sample size calculation is based on Daniel, 1999 formula.

$N = z^2 (p) (1-p) / d^2$

N = sample size

z = standard score corresponding to given confidence level

d = the proportion of sampling error in a given situation at 5% (0.05)

p = prevalence of fall injury among children was 80% (SafeKids Worldwide, 2004)

The calculation:

$N = z^2 (p) (1-p) / d^2$

$N = (1.96)^2 (0.8) (1-0.8) / 0.05^2$

$N = 3.8416 (0.8) (0.2) / 0.0025$

$N = 3.8416 (0.16) / 0.0025$

$N = 0.614656 / 0.0025$

$N = 245.86$

N = 245.86 equivalent to 246 respondents

N = 246 + 10%

N = the estimated sample size is 270 respondents

3.3.4 Inclusion criteria

Children with fall injury age below than 7 years old registered at the emergency department of the hospital are included in this survey.

3.3.5 Exclusion criteria

Patient aged more than 7 years old, others than injury falls and unable to understand English and Malay language are excluded in this survey.

3.4 Instrument and data collection

3.4.1 Instrument

Prior to data collection, a questionnaire was given to parents. The questionnaire consists of three sections. Section A is regarding socio-demographic which is age and gender. Meanwhile, section B is about factors of fall. Section C is about severity of injury. The questionnaire was constructed based on the Injury Surveillance System at Emergency Department in Greece (2004) with permission.

3.4.2 Data collection

Data collection of patient was for a period more than 3 months from 20 January until 31 April 2012. All the patients in the study population were injured involved in fall and visited the Emergency Department, Hospital Kuala Lumpur. Information was collected on factors related to severity of fall injury among children.

The questionnaire was self-administered and was facilitated by researcher. Consent was obtained from all parents of the children with fall injury who were satisfied with the inclusion criteria and followed explanation. All children (patients) with fall injury

aged below than 7 years old registered to emergency department (A&E), followed up patients at yellow zone or intermediate care.

All parents of children with fall injury were approached during the registration at the first counter which is handled by medical assistants or nurses. The staff usually identified patient's main problem so that they can treat it as trauma or medical cases. Emergency department usually treat the trauma and medical emergency cases that need an immediate attention. On the other hand, for common medical cases will be treated as outpatient department (OPD). Trauma cases include road traffic crashes, sports injury, fall, assault, domestic violence, poisoning, burns and industrial accident. The common medical cases which are treated at outpatient department are fever.

Therefore, at first counter the respondents that fulfilled the criteria in the study can be identified. Next, all the respondent went through registration payment inside the waiting room and was given the numbers. In between this, their name was called upon medical assistant or nurse for further personal information, vital sign checked up and dressing if necessary. At this stage, the patients were determined as a study respondent and even though the body part injured can be identified yet it was undetermined. The interview took place during the check up with medical assistant or nurse, during their waiting time and further during the check up with medical officer.

The result of patient's injury was confirmed when patients went to see the medical officer and further management whether to be treated as minor injury (discharge home or non-admitted) or further observation at the ward (admitted) as a severe injury.

3.5 Data analysis

The data were analysed using "Statistical Package for Social Science (SPSS)" version 19. Descriptive statistics used to determine the frequency and percentage of the data. A Chi-square test was used to determine association between the dependent variables and independent variables depending on the normality of data distribution. Significant level was set at p value < 0.05.

3.6 Validity

Validity is to measure the data that is supposed to be measured. In this study, the questionnaire is supervised by Co-Supervisor and doctor in charge at Emergency Department.

3.7 Reliability

Cronbach's Alpha test was used to assess the reliability in the questionnaire. Acceptable value of Cronbach's Alpha is 0.8. In this study the Cronbach's Alpha is 0.73.

3.8 Pre-test

Pre-test was done under different sample. There were 54 of patients. It is to measure the validity of questionnaire and evaluate the reliability of the questions.

3.9 Variables

The variables were divided into independent variables (socio-demographic, height of fall, mechanism of fall and location of injury) and dependent variables (severity of fall injury based on patient's admission whether patients were admitted or non-admitted).

3.9.1 Independent Variables

3.9.1.1 Age

Age at presentation is divided into four categories which is less than 1 year old, 1 to 3 years old, between 3 and 5 years old and between 5 and 7 years old.

3.9.1.2 Gender

The gender of participants was grouped into male and female categories.

3.9.1.3 Heights of fall

The heights of fall were categorized into five heights which are fall from same level, below than 1 feet, between 1 and 3 feet, between 3 and 5 feet and more than 5 feet. Later, the heights of fall were grouped into two: below than 3 feet and more than 3 feet.

3.9.1.4 Mechanism of fall

The mechanism of fall were categorized into sixth mechanisms which are slipping/tripping, push/collide, fall from furniture, fall from child equipment, fall from stairs and fall playground equipment. Later, the mechanisms of fall were grouped into three: slipping/tripping, push/collide and fall from height.

3.9.1.5 Location of injury

The locations of injury were categorized into 5 location which are injury at home, injury at baby sitter home, injury at playground, injury at day-care and injury at kindergarten. Later, the locations of injury were grouped into two: injury at home and injury outside the home.

3.9.2 Dependent Variable

Severity of fall injury

Severity of injuries patients with fall is measured according to admission or non-admission in the hospital.

4.0 Ethical consideration

Ethical approval from the Medical Ethic Committee, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia and from Medical Research Ethics Committee, Ministry of Health Malaysia.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter highlighted the findings and analysis of the data. The results are organized into a number of sections. These are social demographic elements and association of socio-demographic and severity of fall injury, height of fall, mechanism of fall and location of injury.

In this study, a total number of 270 respondents were approached and agreed to participate. Therefore, the response rate was 100%.

4.2 Distribution of respondents by socio-demographic

Socio-demographic elements of the patient include age and gender. Table 1 showed age categories of fall injury aged less than 1 year 27 (10%), followed by 1-3 years 127 (47.0%), between 3 and 5 years 57 (21.1%) and between 5 and 7 years 59 (21.9%). While, in terms of gender most fall injury occurred in males with 171 (63.3%) compared to females with 99 (36.7%).

Table 1: Distribution of respondents by socio-demographic (N=270)

Variables	n	%	Mean	Standard Deviation
Socio-demographic				
Age (years)			2.55	0.942
< 1	27	10.0		
1 - 3	127	47.0		
3 - 5	57	21.1		
5 - 7	59	21.9		
Gender				
Male	171	63.3		
Female	99	36.7		

4.3 Distribution of respondents by severity of fall injury

4.3.1 Types of injuries

Table 2 showed majority types of injuries occur from fall injury are laceration wound and swelling 71 (26.3%), followed by fracture 52 (19.3%), pain 35 (13.0), bruise 19 (17.0%) and abrasion wound 10 (3.7%).

4.3.2 Treatment received in emergency department

Table 2 showed majority of treatment received by respondents after fall injuries are only seen by doctor after that was discharge 105 (38.9%), followed by stitch the wound 62 (23%), putting Plaster of Paris (POP)/Backslab 44 (16.3%), for observation in Intermediate Care Ward (I/C) 42 (15.6%) and dressing wound 17 (6.3%).

4.3.3 After completion of treatment in emergency department

Table 2 showed majority respondents after completion the treatment they was given discharge home without follow up 148 (54.8%), followed by discharge home with follow up 83 (30.7%), admitted to ward (Neuro/Ortho) 38 (14.1%) and admitted to critical care (NICU) 1 (0.4%).

4.3.4 Level of consciousness

Table 2 showed all respondent with fall injuries coming to the emergency department is conscious 270 (100%).

Tables 2: Distribution of respondents by severity of fall injury (N=270)

Variables	n	%
Severity of fall injury		
Types of injuries?		
Pain (soft tissue injury)	35	13.0
Bleeding	12	4.4
Swelling	71	26.3
Bruise	19	7.0
Abrasion wound	10	3.7
Laceration wound	71	26.3
Fracture	52	19.3
Treatment received in emergency department?		
Seen by doctor and discharge	105	38.9
Dressing wound	17	6.3
Stitch wound	62	23.0
For observation in Intermediate Care Ward (I/C)	42	15.6
Putting Plaster of Paris (POP)/ Backslab	44	16.3
After completion of treatment in emergency department?		
Discharge home without follow up	148	54.8
Discharge home with follow up	83	30.7
Admitted to ward (Ortho/Neuro)	38	14.1
Admitted to critical care (NICU)	1	0.4
Level of consciousness?		
Conscious	270	100

Table 3 showed the distribution of admission children with fall injury. Severity of fall injury among respondents was categorized as minor injuries (non-admitted) severe injuries (admitted). Respondents who sustained minor injuries were 100 (37%) and severe injuries were 170 (63%).

Table 3: Distribution of admission respondents with fall injury (N=270)

Variables	n	%
Severity of fall injury		
Minor	100	37
Severe	170	63

4.4 Distribution of respondents by factors of fall injury

4.4.1 Height of fall

Table 4 showed the distribution of height of fall among children. Heights of fall among children were falls from the same level, below than 1 feet, between 1 and 3 feet, between 3 and 5 feet and more than 5 feet. Majority child fall were from same level 138 (51.1%), followed by between 1 and 3 feet 86 (31.9%), between 3 and 5 feet 36 (13.3%), more than 5 feet 8 (3.0%) and below than 1 feet 2 (0.7%). Later, the height of fall will be categorized into two groups: below 3 feet and more than 3 feet.

4.4.2 Mechanism of fall

Table 4 showed the distribution by mechanism of fall among children. Majority mechanism of fall among children because of slipping/tripping 85 (31.5%), followed by fall from furniture 62 (23.0%), fall from child equipment 39 (14.4%), fall from playground 35 (13.0%), push/collide 34 (12.6%), and fall from stairs 15 (5.6%). The causes for falling can be further categorized into three groups: a) slipping/tripping b) push/collide and c) falling from height respectively.

4.4.3 Location of injury

Table 4 showed the distribution by location of injury among children. Majority location of injury among children is at home 203 (75.2%), followed by playground 31 (11.5%), day care 13 (4.8%), baby sitter home 12 (4.4%) and kindergarten 11 (4.1%). Later, the location of injury will be categorized into two groups: home and outside home.

4.4.4 Body part fall injured

Table 4 showed the distribution by body part injured among children. Majority are injured in hand 87 (32.2%), face 73 (27%), head 67 (24.8%), leg 35 (13%), abdomen/thorax 5 (1.9%) and others 3 (1.1%)

Table 4: Distribution of respondents by factors of fall injury (N=270)

Variables	n	%
Factors of fall injury		
Height of fall		
Fall from same level	138	51.1
< 1 feet	2	0.7
< 3 feet	86	31.9
< 5 feet	36	13.3
> 5 feet	8	3.0
Mechanism of fall		
Slipping/tripping	85	31.5
Push/collide	34	12.6
Fall from furniture	62	23.0
Fall from child equipment	39	14.4
Fall from stairs	15	5.6
Fall from playground	35	13.0
Location of injury		
Home	203	75.2
Baby sitter's home	12	4.4
Playground	31	11.5
Day care centre	13	4.8
Kindergarten	11	4.1
Body part injured		
Head	67	24.8
Face	73	27.0
Hand	87	32.2
Leg	35	13.0
Abdomen/thorax	5	1.9
Others	3	1.1

4.5 Association between socio-demographic respondents and severity of fall injury

4.5.1 Association between age respondents and severity of fall injury

Table 5 illustrates association between age respondents and severity of fall injury. Chi-square test was performed to analyse the association between age and severity of fall injury. There is significant association between age and severity of fall injury among children (χ^2= 22.828; p= 0.001).

4.5.2 Association between gender respondents and severity of fall injury

Table 5 illustrates association between gender respondents and severity of fall injury. There is no significant association between gender and severity of fall injury among children (χ^2= 0.008; p= 0.931).

Table 5: Association between socio-demographic respondents and severity of fall injury

Variables	Severity of fall injury		Total	χ^2	df	p-value
	Minor	Severe				
Socio-demographic						
Age (years)						
< 1	17 (6.3%)	10 (3.7%)	27 (10%)	22.828	3	0.001*
1-3	52 (19.3%)	75 (27.8%)	127 (47.0%)			
>3-5	23 (8.5%)	34 (12.6%)	57 (21.1%)			
>5-7	8 (3.0%)	51 (18.9%)	59 (21.9%)			
Gender						
Male	63 (23.3%)	108 (40.0%)	171 (63.3%)	0.008	1	0.931
Female	37 (13.7%)	62 (23.0%)	99 (36.7%)			

*p <0.005

4.6 Association between factors of fall injury and severity of fall injury

4.6.1 Association between height of fall and severity of fall injury

Table 6 illustrates association between height of fall and severity of fall injury. There is significant association between height of fall and severity of fall injury among children (χ^2= 4.616; p= 0.032).

4.6.2 Association between mechanism of fall and severity of fall injury

Table 6 illustrates association between mechanism of fall and severity of fall injury. There is significant association between mechanism of fall and severity of fall injury among children (χ^2= 6.575; p= 0.037).

4.6.3 Association between location of injury and severity of fall injury

Table 6 illustrates association between location of injury and severity of fall injury. There is no significant association between location of injury and severity of fall injury among children (χ^2= 0.003; p= 1.000). This indicates that there is no significant difference between children who are falling at home compared to those outside the home.

Table 6: Association between factors of fall injury and severity of fall injury

Variables	Severity of fall injury		Total	χ^2	df	p-value
	Minor	Severe				
Factors of fall						
Height of fall						
<3 feet	90 (33.3%)	136 (50.4%)	226 (83.7%)	4.616	1	0.032*
>3 feet	10 (3.7%)	34 (12.6%)	44 (16.3%)			
Mechanism fall						
Slipping/tripping	35 (13.0%)	50 (18.5%)	85 (31.5%)	6.575	2	0.037*
Push/collide	18 (6.7%)	16 (5.9%)	34 (12.6%)			
Fall from height	47 (17.4%)	104 (38.5%)	151 (55.9%)			
Location injury						
Home	75 (27.8%)	128 (47.4%)	203 (75.2%)	0.003	1	1.000
Outside home	25 (9.3%)	42 (15.6%)	67 (24.8%)			

*p <0.05

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

This chapter deliberates the finding of the study. The discussion includes the descriptive findings of socio-demographic characteristic (age and gender), height of fall, mechanism of fall and location of injury. The association between socio-demographic characteristics and factor related to severity of fall injury accordingly and supporting literature was provided. All collected data were tested on the severity of fall injury (minor and severe injuries) by chi-square test.

5.2 Socio-demographic

In this study, 270 parents of patients were interviewed at Emergency Department, HKL. It shows male respondents make up more than half of participants 171 (63.3%) while female were 99 (36.7%). Therefore, it is found mostly male's get fall injury compared to females. Thus, in a similar study conducted by Hyder et al. (2009), they found most falls occurred in males compared to females. Then a study by Mack, Gilchrist & Ballesteros (2007), shows that more males were injured and hospitalized than a female. This finding is consistent with study from Malaysia by Hasni, Junainah & Jamaliah (2003), shows that males had higher percentage than females which is males (65.2%) and females (33.3%).

5.3 Hypothesis testing

5.3.1 Ho 1: There is no association between age and severity of fall injury

The chi-square test was used to test the null hypothesis as stated above. The result of p value was 0.001. Since the value was less than 0.05, thus, the null hypothesis was rejected and conclusion was made that there is significant association between the age with the severity of fall injury among children.

In this study, the finding of this result shows that children 1 to 3 years old are more likely exposed to hazard 127 (47.0%) than under 1 year old 27 (10%). This result was similar from the study of Flavin et al. (2006), which is fall injury occur within age 1 to 3 years is 1160 (55.3%) and below 1 year old is 262 (60.4%).

The result shows that many children who get severity of injury are those aged 1 to 3 years old. This is because the respondents in this age as they are most exposed to injury because they take the first step at this age and had an active personality (Wang et al., 2011). They try exploring what their would like to do and become more vulnerable in getting serious injuries 75 (27.8%) compared to minor injuries 52 (19.3%) because of their young age. This result was similar to Dedoukou et al. (2011), a higher percentage of serious injuries were detected and most of the serious injuries are concussions (14.3%) and fractures (9.4%) which required hospitalization in 17.3% and 61.7%.

However, it contradicted with the finding from Lallier et al. (1999), which is children over than 3 years are more exposed to injury compared with children below than 3 years old. This is because children more than 3 years old able to absorb and dissipate the energy released by falls.

5.3.2 Ho 1: There is no association between gender with severity of fall injury

The chi-square test was used to test the null hypothesis as stated above. The result of p value was 0.931. Since the value was more than 0.05, thus, hypothesis was accepted and conclusion was made that there is no significant association between gender with the severity of fall injury among children. The finding indicates that gender does not influence the severity of fall injury. This could be due to the fact that there are no difference severity of fall injury between male and female.

In this study, the results show more males 108 (40.0%) get serious injury compared to females 62 (23.0%). This is because males are more prone to get serious injuries because of their personality of impulsiveness, hyperactiveness, aggression and other behaviour (Peden et al., 2008). Even though males are mostly to get all the particular types of injury than females; distribution of types of injury is almost the same for both genders (Helps & Pointer, 2006). This could be also due to other possibilities such as dissimilar gender groups which were exposed to the fall injuries in a different way.

However, it is contradictory with the findings from Bulut et al. (2006). In their study, childhood falls happen most frequently among preschool boys which are 64% and 56% were children below 5 years of age. Hyder et al. (2009) also stated that most falls occurred in males (65%). Moreover, according to Flavin et al. (2006), males are getting higher annual rates of injury compared to females. Similar to the study by Mack et al. (2007), shows that more males were injured and hospitalized than a female.

5.5 Ho 2: There is no association between heights of fall with severity of fall injury

The chi-square test was used to test the null hypothesis as stated above. The result showed p value was 0.032. Since the value less than 0.05, the null hypothesis was rejected and the conclusion was made that there is significant association between heights of the fall with severity of fall injury among children.

In this study, the results showed that more children get serious injuries from heights of the fall below 3 feet compared to more 3 feet. This assumption could be due to the majority of the children in this study fall below 3 feet 226 (83.7%) than above 3 feet 44 (16.3%). According to Park, Cho & Oh (2006), children who experienced low-level falls sustained fractures than children high-level falls, and children with high-level falls sustained more intracranial haemorrhage than children low-level falls. It means that whether the children fall below 3 feet or more than 3 feet, the children are exposed to get serious injury.

While, according to the study done by Johnson et al. (2005), showed that when a child fell from height of over 1.5 meter (>3 feet) the child will get a serious injuries especially head injury. Moreover, another study from Korea had similar findings which is high-level falls had a probability greater incidence of extracranial injuries than lower-level falls. American Academics of Pediatrics (2001), also stated that greater the height from which a child falls, the more severe the injury.

5.6 Ho 2: There is no association between mechanisms of fall with severity of fall injury

The chi-square test was used to test the null hypothesis as stated above. The result showed p value was 0.037. Since the value less than 0.05, the null hypothesis was rejected and the conclusion was made that there is a significant association between mechanisms of the fall with severity of fall injury among children.

In this study, the results showed mechanism of fall due to fall from height get severe injury 104 (38.5%), followed by slipping/tripping 50 (18.5%) and push/collide 16 (5.9%). It means that children who get more severe injuries when they are fall from furniture, children equipment, stairs or playground compared to slipping, tripping, push and collide. This result was similar to other study, children under 5 years old suffers fall from stairs and sustained head injuries (Boele van Hensbroek et al., 2009).

It is contradicted to one study, which shows that most falls happen among toddler from stairs, high chairs, beds and table and are commonly related with minor injury (Lallier et al., 1999).

5.7 Ho 2: There is no association between locations of injury with severity of fall injury

The chi-square test was used to test the null hypothesis as stated above. The result of p value was 1.000. Since the value was more than 0.05, thus, hypothesis was accepted and conclusion was made that there is no significant association between the locations of injury with the severity of fall injury among children. The finding indicates that location of injury does not influence the severity of fall injury.

In this study, the results show children fall at home 203 (75.2%) get severe injury compared to outside home 67 (24.8%). Sometimes, there are children who fall and get severe injuries at home while they can also get severe injuries outside the house. Children who fall will have minor injuries or severe ones depending on how the child had fallen. Therefore, severity of the fall injury is not due to the fall at home, day care or at the playground.

One study has pointed out that incidences of falls are approximately 60% which happen in the home which results in a visit to an emergency department (Marshall, 2005). Another study has similar findings, which is majority of the children injured were at home (Mack, Gilchrist & Ballesteros, 2007).

However, according to Helps & Pointer (2006), 85.2% of cases were fractures and it is the largest injury type due to fall from playground equipment. This is because the mechanism of injury at the playground is due to climbing equipments. However, no deaths are attributed to playground injuries which were identified in the reporting period.

5.4 Conclusion

This study evaluates severity of fall injury among children below than 7 years old. In this study, the severity of fall injury among children is influence by many factors such as socio-demographic factors (age and gender), height of the fall, mechanism of the fall and location of the fall.

Therefore, in socio-demographic factors there is a significant association between age and severity of fall injury but it is no significant association between gender and severity of fall injury. Moreover, there is also a significant association between height of the fall and severity of fall injury and between mechanism of fall and severity of fall injury. While, there is no significant between location of injury and severity of fall injury.

Conclusion can be made that age, height of the fall and mechanism of fall are associated with the severity of fall injury. Otherwise, gender and location of injury does not influence the severity of fall injury.

5.5 Limitations of study

There are some limitations in this study. The parents may not bring the children to the emergency department if their children only experienced light injuries, instead they choose to treat their children at home. Therefore, the sample could not define the population of all the children with fall. This study was focused on only a definative time, a certain date, and only patients who registered at the Emergency Department, Hospital Kuala Lumpur. Therefore, the finding of the study cannot be used to represent the general population.

5.6 Recommendations

From this study, several steps and recommendations were identified to reduce the incidences of fall injury among children. The study will provide information that could assist health care providers to enhance health education, increase awareness and to take steps that will prevent the occurrence of falling down among children.

Everyone should be educated about the dangers of falling down by children as to detect the cause of injury and the consequences if a child gets injured. Awareness among parents and carers is essential to reduce the incidences of falls among children.

Health care providers must be actively involved in developing strategies to decrease the occurrence of fall injuries by counselling the parents and or caregivers to increase supervision during play activities and to restrain and educate children from playing without supervision on stairs, furniture and playground equipment. Moreover, even though the children are male or female, both are required for same supervision under their parents.

Further research is needed in order to determine and reduce the risk of the incidences of fall injuries among children. Moreover, health care providers should give more attention to develop more nursing care to the patient with fall injury.

REFERENCES

American Academy of Pediatrics. (2001). Falls from heights: windows, roofs and balconies. *Pediatrics*, *107*, 1188–1191.

Bartlett, S. N. (2002). The problem of children's injuries in low-income countries: a review. *Health Policy and Planning*, 1-13.

Boele van Hensbroek, P., Mulder, S., Luitse, J. S. K. Van Ooijen, M. R., & Goslings, J. C. (2009). Staircase falls: high-risk groups and injury characteristics in 464 patients. *Injury*, *40*(8), 884-889.

Bulut, M., Koksal, O., Korkmaz, A., Turan, M., & Ozguc, H. (2006). Childhood falls: characteristics, outcome, and comparison of the Injury Severity Score and New Injury Severity Score. *Emergency Medicine Journal*, *23*(7), 540-545.

CDC Childhood Injury Report. (2008). *Electronic references.* Retreived January 1, 2012, from http://www.cdc.gov/safechild/images/CDC-ChildhoodInjury.pdf

Daniel, W.W. (1999). *Biostatistics: A Foundation for Analysis in the Health Sciences* (7th ed.). New York: John Wiley & Sons.

Dedoukou, X., Spyridopoulos, T., Kedikoglou, S., Alexe, D. M., Dessypris, N., & Petridou, E. (2004). Incidence and risk factors of fall injuries among infants: a study in Greece. *Archives of Pediatrics & Adolescent Medicine, 158*(10), 1002-1006.

Ewing-Cobbs, L., Kramer, L., Prasad, M., Canales, D. N., Louis, P. T., Fletcher, J. M., Vollero, H., Landry, S. H., & Cheung, K. (1998). Neuroimaging, physical, and developmental findings after inflicted and noninflicted traumatic brain injury in young children. *Pediatrics*, *102*(2), 300-307.

Flavin, M. P., Dostaler, S. M., Simpson, K., Brison, R. J., & Pickett, W. (2006). Stages of development and injury patterns in the early years: a population-based analysis. *BMC Public Health, 6*, 1-10.

Giza, C. C. (2006). Lasting effects of pediatric Traumatic Brain Injury. *Indian Journal of Neurotrauma, 3*(1), 19-26.

Hasni, H., Junainah, S., & Jamaliah, J. (2003). Epidemiology of home injury in Malaysia. *Jurnal Kesihatan Masyarakat*.

Helps, Y. L. M., & Pointer, S. C. (2006, October). *Child injury due to falls from playground equipment, Australia 2002–04*. Retrieved March 20, 2012, from http://www.nisu.flinders.edu.au/pubs/reports/2006/injcat91.pdf

Holsti, M., Kadish, H., Sill, B., Firth, S., & Nelson, D. (2005). Pediatric closed head injuries treated in an observation unit. *Pediatric Emergency Care*, *21*(10), 639-644.

Hyder, A. A., Sugerman, D. E, Puvanachandra, P., Razzak, J., El-Sayed, H., Isaza, A., & Fazlur Rahman, Peden, M. (2009). Global childhood unintentional injury surveillance in four cities in developing countries: a pilot study. *Bulletin of the World Health Organization, 87*(5), 345-352.

Ibrahim, N. G., Wood, J., Margulies, S. S., & Christian, C. W. (2012). Influence of age and fall type on head injuries in infants and toddlers. *International Journal of Developmental Neuroscience: The Official Journal of the International Society for Developmental Neuroscience*, *30*(3), 201-206.

Jagnoor, J., Keay, L., Ganguli, L., Dandona, R., Thakur, J, S., Boufous, S., Cumming, R., & Ivers, S. (2011). Fall related injuries: A retrospective medical review study in North India. *Injury-International Journal Care Injured.*

Johnson, K., Fischer, T., Chapman, S., & Wilson, B. (2005). Accidental head injuries in children under 5 years of age. *Clinical Radiology*, *60*(4), 464-468.

Karbakhsh, M., Zargar, M., Zarei, M. Z., & Khaji, A. (2008). Childhood injuries in Tehran: a review of 1281 cases. *The Turkish Journal of Pediatrics, 50*, 317-325.

Khambalia, A., Joshi, P., Brussoni, M., Raina, P., Morrongiello, B., & Macarthur, C. (2006). Risk factors for unintentional injuries due to falls in children aged 0-6 years: a systematic review. *Injury Prevention: Journal of the International Society for Child and Adolescent Injury Prevention*, *12*(6), 378-381.

Kotch, J. B., Dufort, V. M., Stewart, P., Fieberg, J., McMurray, M., O'Brien, S., Ngui, E. M., & Brennan, M. (1997). Injuries among children in home and out-of-home care. *Injury Prevention: Journal of the International Society for Child and Adolescent Injury Prevention, 3*(4), 267-271.

Lallier, M., Bouchard, S., St, V. D., Dupont, J., & Tucci, M. (1999). Falls from heights among children: A retrospective review. *Journal of Pediatric Surgery, 34*(7), 1060-1063.

Mack, K. A., Gilchrist, J., & Ballesteros, M. F. (2007). Unintentional injuries among infants age 0–12 months. *Journal of Safety Research, 38*, 609-612.

Marshall, S. W., Runyan, C. W., Yang, J., Coyne, B. T., Waller, A. E., Johnson, R. M., & Perkis, D. (2005). Prevalence of selected risk and protective factors for falls in the home. *American Journal of Preventive Medicine, 28*(1), 95-101.

Mcdonald, E. M., & Gielen, A. C. (2010, December 16). *Injury prevention: Falls.* Retrieved December 29, 2011, from http://www.child-encyclopedia.com/documents/McDonald-GielenANGxp1.pdf

MedlinePlus. (2012). *Electronic references*. Retreived April 21, 2012, from http://www.nlm.nih.gov/medlineplus/

Norton, C., Nixon, J., & Sibert, J. (2004). Playground injuries to children. *Archives of Disease in Childhood, 89*(2), 103-108.

Park, S. H., Cho, B. M., & Oh S. M. (2004). Head injuries from falls in preschool children. *Yonsei Medical Journal, 45*(2), 229-232.

Oral, R., Floryanovich, A., Goodman, J., & Türkmen, M. (2007). Characteristics of household falls in children under 2 years of age. *The Turkish Journal of Pediatrics*, *49*(4), 379-384.

Peden, M., Oyegbite, K., Ozanne-Smith, J., Hyder, A. A., Branche. C.,Fazlur Rahman, Rivara, F., & Bartolomeos, K. (2008). *World Report on Child Injury Prevention.* Switzerland: World Health Organization.

Pickett, W., Streight, S., Simpson, K., & Brison, R. J. (2003). Injuries experienced by infant children: a population-based epidemiological analysis. *Pediatrics, 111*(4), 365-370.

Runyan, C. W., Casteel, C., Perkis, D., Black, C., Marshall, S. W., Johnson, R. M., Beasly, T. C., Waller, A. E., & Viswanathan, S. (2005). Unintentional injuries in the home in the United States Part I: mortality. *American Journal of Preventive Medicine*, *28*(1), 73-79.

Safe Kids Worldwide (2004). *Electronic references*. Retrieved November 18, 2012, from http://www.preventinjury.org/PDFs/FALLS.pdf

Su, F., Raghupathi, R., & Wuh, J. W. (2011 November, 2). *Traumatic Brain Injury in Children*. Retrieved February 1, 2012, from http://emedicine.medscape.com/article/909105-overview#showall

Tinsworth, D. K., & McDonald, J. E. (2001). *Injuries and death associated with children's playground equipment.* Retrieved December 23, 2011, from http://www.cpsc.gov/library/foia/foia01/os/equipmnt.pdf

Towner, E., & Mytton, J. (2009). Prevention of unintentional injuries in children. *Paediatrics and Child Health, 19*, 517-521.

Vish, N. L., Powell, E. L., Wiltstek, D., & Sheehan, M. K. (2005). Pediatric window falls: not just a problem for children in high rises. *Injury Prevention, 11*, 300-303.

Wang, H., Liu, X. X., Liu, Y. X., Lin, Y., & Shen, M. (2011). Incidence and risk factors of non-fatal injuries in Chinese children aged 0-6 years: a case-control study. *Injury*, *42*(5), 521-524.

Watson, W., Ozanne, S. J., & Lough, J. (2000, April). *Consumer product-related injury to children.* Retrieved January 23, 2012, from http://www.monash.edu.au/miri/research/reports/muarc168.pdf

World Health Organization. (2008). Retrieved March, 11, 2012, from http://www.who.int/mediacentre/factsheets/fs344/en/

World Report on Child Injury Prevention. (2008). *Electronic references*. Retrieved January 2, 2012, from http://whqlibdoc.who.int/publications/2008/9789241563574_eng.pdf

APPENDICES

Appendix I

Approval Letter from Medical Research Committee Universiti Putra Malaysia

Appendix III

Investigator's Agreement, Head of Departments and Institutional Approval

Appendix IV

Research Submission

Research Submission

Date Printed : 14-12-2011 15:35:21

ResearchID :	10566
Research Title :	RISK FACTORS OF FALL INJURY AMONG CHILDREN PRESENTED TO EMERGENCY DEPARTMENT,HOSPITAL KUALA LUMPUR.
Research Abbreviation :	RISK FACTORS OF FALL INJURY AMONG CHILDREN PRESENTED TO EMERGENCY DEPARTMENT,HKL.
Approval Type :	Research Registration & Notification

Built PDF By : HASLINA BINTI MOHD HASSAN

Built PDF Date : 14-12-2011 15:35:21

Research Details

Date Printed : 14-12-2011 15:35:21

ResearchID : 10566 **Correspondence Person :** HASLINA BINTI MOHD HASSAN

RISK FACTORS OF FALL INJURY AMONG CHILDREN PRESENTED TO EMERGENCY DEPARTMENT,HOSPITAL KUALA LUMPUR.

1.2. Title abbreviate : RISK FACTORS OF FALL INJURY AMONG CHILDREN PRESENTED TO EMERGENCY DEPARTMENT,HKL.

1.3. Collaborative research :

- ☑ This is NOT a collaborative work with any of the NIH institutes
- ☐ Clinical Research Centre (CRC)
- ☐ Institute for Medical Research (IMR)
- ☐ Institute of Public Health (IPH)
- ☐ Institute for Health Management (IHM)
- ☐ Institute for Health Systems Research (IHSR)
- ☐ Institute for Health Behavioural Research (IHBR)

1.4. Submission purpose :

IRB/IEC Medical Research Ethics Committee (MREC)

IRB/IEC Jawatankuasa Etika Penyelidikan Perubatan (UPM)

Research Registration

2.1. Protocol ID :

2.2.1. Student Academic Project : Bachelor

2.2.2. Student Academic Project Specify :

2.3. Research Type : Health System

2.4. Clinical Research Sub Type :

Clinical Research

3.0.1. Research Purpose : The purpose of this study is to determine the risk factors of fall injury among children presented to Emergency Department,Hospital kuala Lumpur

3.0.2. Research Description : Research about Risk Factors of Fall Injury among children presented to Emergency Department, Hospital Kuala Lumpur. This research is a cross sectional study will assess severity injury of fall among children presented to Emergency Department, Hospital Kuala Lumpur.

3.0.3. Keywords : Risk factors of fall injury among children presented to Emergency Department, Hospital Kuala Lumpur

3.0.4. Research Date Start : 20/01/2012 **3.0.5. Research Date Completed :** 05/05/2012

3.0.6. Research Duration (months) : 4.0

3.0.7. LinkURL :

3.0.8. Recruitment Status : Not applicable

3.0.9. Condition : All parents of children aged 0 -7 years old arrival at Emergency Department, HKL

3.0.10. Age Limit : ☐ **3.0.10.1. Not Available - Not Applicable** **3.0.10.2. Age Limit Min :** 0.0

3.0.10.3. Age Limit Max 7.0

3.0.11. Gender : Both

3.0.12. Eligibility : All parents of children aged 0 -7 years old arrival at Emergency Department, HKL

3.0.13. Acceptable Participant : Yes

3.0.14. Target No Subject - All / Msian : 439 / 439

3.0.15. Target Number Subject in Malaysia : **1.Total in number :** 439

2.Number by site in text:

Clinical Trial

3.1.1. Study Phase :

3.1.2. Purpose :

3.1.3. Allocation :

3.1.4. Masking :

3.1.5. Control :

3.1.6. Assignment :

3.1.7. Endpoint :

3.1.8.1. OutcomeMeasure Primary :

3.1.8.2. OutcomeMeasure Secondary :

3.1.9.1. Name of intervention under investigation :

3.1.9.2 Intervention Type :

3.1.10. Therapy Area :

Observational Study

3.2.1.1. Disease Area :

3.2.1.2. Disease Area Specific Disease :

3.2.1.3.Disease Area Other Specify :

3.2.2. Purpose :

3.2.3. Selection :

3.2.4. Duration :

3.2.5. Timing :

Appendix V

National Institutes of Health for Conducting Research in Ministry of Health Malaysia

NATIONAL INSTITUTES OF HEALTH APPROVAL FOR CONDUCTING RESEARCH IN THE MINISTRY OF HEALTH MALAYSIA

PENGESAHAN INSTITUSI PENYELIDIKAN NEGARA UNTUK MENJALANKAN PENYELIDIKAN DI KEMENTERIAN KESIHATAN

This is an auto computer - generated document.It is issued by one of the research institute under the National Institutes of Health (NIH). These are the Institute for Medical Research (IMR), Clinical Research Centre (CRC), Institute of Public Health (IPH), Institute for Health Management (IHM), Institute for Health Systems Research (IHSR), and Institute for Health Behavioural Research (IHBR)

Dokumen ini adalah cetakan berkomputer. Borang ini dikeluarkan oleh salah satu institusi dibawah National Institutes of Health (NIH) iaitu Institut Penyelidikan Perubatan (IMR), Pusat Penyelidikan Klinikal (CRC), Institut Kesihatan Umum (IKU), Institut Pengurusan Kesihatan (IPK), Institut Pergurusan Sistem Kesihatan (IPSK), Institut Penyelidikan Tingkahlaku Kesihatan (IPTK)

Unique NMRR Registration ID : [Nombor Pendaftaran]	NMRR-11-928-10566
Research Title : [Tajuk]	RISK FACTORS OF FALL INJURY AMONG CHILDREN PRESENTED TO EMERGENCY DEPARTMENT,HOSPITAL KUALA LUMPUR.
Protocol Number if available : [Nombor Protokol jika ada]	

#	**Investigator Name** [Name Penyelidik]	**Institution Name** [Nama Institusi]
1	HASLINA BINTI MOHD HASSAN	Kuala Lumpur Hospital

I have reviewed the above titled research, and approve of its design and conduct.

Saya telah menyemak kajian yang bertajuk seperti di atas dan meluluskan rekabentuk dan perlaksanaannya.

Name of Director : *[Nama Pengarah]*	Dr. Azman Abu Bakar
NIH Institute (IMR, CRC, IPH, IHM, IHSR and IHBR) *[Nama Institusi di bawah NIH]*	Institute for Health Systems Research (IHSR)
Signature & Official stamp : *[Tandatangan dan Cop Rasmi]*	This is computer generated document, therefore no signature is required.
Date : *[Tarikh]*	18-01-2012

(Note: This is a computer generated document. It may not carry any signature)

Appendix VI

Approval Letter from the Medical Ethical, Ministry of Health Malaysia

Appendix VII

Information Sheet (English & Malay)

FAKULTI PERUBATAN DAN SAINS KESIHATAN
FACULTY OF MEDICINE AND HEALTH SCIENCES
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

RESPONDENT'S INFORMATION SHEET

Please read the following information carefully, do not hesitate to discuss any questions you may have with your researcher.

STUDY TITLE

Severity of fall injury among children below than 7 years old presented to Emergency Department, Hospital Kuala Lumpur.

INTRODUCTION

You have been invited to take part in a research study. Before you make a decision, it is important for you to understand why the research is being done and what it will involve. Please take some time to read the following information carefully. Please do not hesitate to ask any question if you are not clear and would like more information. We like to thank you for reading this information sheet.

The purpose of this study to determine severity injury of fall injury among children presented to emergency department, Hospital Kuala Lumpur. This information will be used to identify factors related to fall injury among children.

WHAT WILL YOU HAVE TO DO?

You will only be required to provide information as stated in the questionnaire form that provided, which should take about ten minutes.

WHO SHOULD NOT ENTER THE STUDY?

If you not agreeable to take part in this study

WHAT WILL BE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

Your contribution is valuable in providing information for further understanding of determinants of fall injury among children.

(b) TO THE INVESTIGATOR?

The information and data from this study will be used to improve the quality of services either hospital or primary care setting.

ARE THERE ANY RISKS?

The study will not cause any harm or risk to you.

WHAT ARE THE POSSIBLE DRAWBACKS?

It is up to you to participate or not. Even you are decides to take part, you are still free to withdraw at any time without giving any reason

WILL THE INFORMATION AND MY IDENTITY REMAIN CONFIDENTIAL?

All information you are giving to us in this study will be kept strictly confidential and only will be used in this study

WHO SHOULD I CONTACT IF I HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

If you have any question about this questionaire, please do not hesitate to contact the following personnel :

Researcher :

i) **Research student, Bachelor of Nursing**

Haslina binti Mohd Hassan
Department of Nursing unit,
Faculty of Medicine and Health Sciences,
43400 UPM, Serdang.
Tel. No: 013- 3939397
Email address: shlinamh@yahoo.com

FAKULTI PERUBATAN DAN SAINS KESIHATAN
FACULTY OF MEDICINE AND HEALTH SCIENCES
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

HELAIAN MAKLUMAT RESPONDAN

TAJUK PROJEK

Keterukan kecederaan disebabkan jatuh dikalangan kanak-kanak di bawah umur 7 tahun yang datang ke Jabatan Kecemasan, Hospital Kuala Lumpur.

PENGENALAN

Anda dijemput untuk menyertai projek ini. Sebelum anda membuat keputusan, adalah penting untuk anda mengetahui tujuan projek ini dijalankan dan siapa yang akan terlibat. Sila baca maklumat berikut dengan teliti. Sila bertanya jika ada perkara yang anda ragui atau tidak jelas. Kami amat berterima kasih atas kesudian anda membaca maklumat yang disediakan.

Tujuan kajian ini dijalankan adalah untuk mengetahui keterukan kecederaan disebabkan jatuh dikalangan kanak-kanak yang datang ke Jabatan Kecemasan, Hospital Kuala Lumpur.

APA YANG AKAN SAYA LAKUKAN DALAM PENGAJIAN INI?

Anda hanya perlu memberi maklumat dengan menggunakan borang soal selidik yang akan mengambil masa dalam 10 minit.

SIAPAKAH YANG TIDAK PATUT MELIBATKAN DIRI DALAM PENGAJIAN INI?

Jika anda tidak bersetuju untuk mengambil bahagian dalam kajian ini.

APAKAH KEBAIKAN MELALUI PENYELIDIKAN INI?

(a) KEPADA ANDA SEBAGAI SUBJEK:

Sumbangan anda dalam memberikan maklumat dalam penyelidikan ini amatlah dihargai dan lebih memahami faktor-faktor jatuh di kalangan kanak-kanak.

(b) KEPADA PENYELIDIK

Data yang diperolehi daripada kajian ini akan dapat meningkatkan kualiti perkhidmatan dan jagaan pesakit sama ada di peringkat hospital atau komuniti.

ADAKAH SAYA AKAN MENGALAMI KEMUNGKINAN RISIKO APABILA MELIBATKAN DIRI DALAM PENGAJIAN INI?

Kajian ini tidak akan membawa sebarang risiko dan kerugian pada anda.

APAKAH KEMUNGKINAN JIKA MENARIK DIRI?

Terpulang pada diri anda sendiri untuk melibatkan diri dalam kajian ini atau tidak. Walaupun anda telah mengambil keputusan untuk melibatkan diri, tetapi anda boleh untuk menarik diri.

ADAKAH PENGLIBATAN SAYA DALAM PENYELIDIKAN INI SULIT?

Segala maklumat yang diperolehi adalah dianggap sebagai sulit. Nombor kod akan digunakan dan hanya diketahui oleh penyelidik.

JIKA ANDA PERLU INFORMASI

Sila hubungi personel berikut untuk mendapatkan maklumat yang selanjutnya.

Researcher :

i) **Research student, Bachelor of Nursing**

Haslina binti Mohd Hassan
Department of Nursing Unit,
Faculty of Medicine and Health Sciences,
43400 UPM, Serdang.
Tel. No: 013-3939397
Email address: shlinamh@yahoo.com

Appendix VIII

Questionnaire (English & Malay)

Appendix IX

Questionnaire permission (email)

Hi Mr Nick Dessypris

Sorry for disturbing. I am a student who asked the question before this regarding "Questionnaire of Injury". May I know, this form will be filled by whom? Did the hospital staff or parents of patients? Does this form have validity and can use for any hospital? Does this form have made publication?

Thank you in advance.

Haslina
Student UPM, Malaysia

Dear Haslina,

I am sending you the basic questionnaire that we used in our data collection. But I think that more important is the code that we have used. The attached code covers most of the variables of the questionnaire. The remain variables are either self-explanatory or you can develop your own code based on the answers you will get. I hope that these will help you to organize your research

Best
Nick

15/11/2011

Hello Haslina,

This questionnaire is filled at the emergency departments of the hospitals by special training personnel.
Information concerning the accident characteristics (like place, time, mechanism ,etc) were collected by interviews with the parents (in case of a injured child) or the injured person (in case of an adult) or the person who was with the injured person (in case of a serious accident). Information concerning the injury (like type of injury, injured body part, treatment etc etc) were collected by the hospital records or the treated physicians.
The basic questionnaire (you can find it in the coding manual which I have already send to you) is/was used in the EU in many hospitals for many years. You may try to find some information about the EHLASS program (initially) or the HLA or the IDB (last one). All the publications concerning injuries of our center, are based on this questionnaire and to some extra information depending the needs of each study.
If you have any other question you may contact with us.

Best
Nick