UNIVERSITI PUTRA MALAYSIA

EPIDEMIOLOGY AND CHARACTERISTIC STUDY OF PEDIATRIC PATIENTS (0-15 YEARS OLD) ADMITTED TO ICU HOSPITAL SERDANG WITH SEIZURE (JANUARY 2009- JUNE 2013)

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Epidemiology and characteristic study of Pediatric Patients (0 -15 years old) Admitted to ICU Hospital Serdang with Seizure from January 2009- June 2013

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ABSTRACT

Introduction: Seizure is a common and frightening event in childhood.

Objective: The objective of this research is to study the factors and characteristics of pediatric patients that admitted to ICU Hospital Serdang with seizure from January 2009-June 2013.

Methods: A retrospective cross-sectional study was carried out. All patients who fulfilled the inclusion criteria are included in this study. Data was collected using pre-designed pro forma by referring to patients' medical records in pediatric ICU Hospital Serdang. Data was analyzed using SPSS version 21 of significant level $\alpha = 0.05$.

Results: The proportion of admission of pediatric patients with seizure to ICU is 16.2 %. Most of the patients are less than one year of age (51.8%), male (72.3%) and Malay (83.1%), generalized seizure (68.7%), febrile (67.5%), admitted due to meningitis (38.6%), no organ failure (89.2%) and nosocomial infection (89.2%), and 26.5% of them have poor outcome. Patients with known case epilepsy (P=0.03) and neurological/ developmental abnormality (p=0.001) are at 3.08 and 5.78 times respectively more likely to have poor clinical outcome. The duration of ICU stay is significantly associated with nosocomial infection (OR= 6.46, p= 0.015) with 6.46 times higher risk of nosocomial infection among patients with long ICU stay.

Conclusion: Seizure is common among pediatric. Children suffered with underlying epilepsy and neurologic or developmental abnormality prone to have poor outcome. The risk of nosocomial infection is higher for long ICU stay.

Keywords: epidemiology, characteristic, pediatric seizure, ICU admission

Kajian Epidemiologi dan CIri-ciri Pesakit Pediatrik (0 -15 Tahun) yang masuk ICU Hospital Serdang dengan Sawan dari Januari 2009- Jun 2013

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ABSTRAK

Pengenalan: Sawan adalah perkara yang menakutkan yang biasa terjadi pada kanak-kanak.
Objektif: Tujuan kajian ini dijalankan adalah untuk mengkaji factor dan ciri-ciri pesakit pediatric yang dimasukkan ke wad ICU Hospital Serdang akibat sawan dari Januari 2009 hingga Jun 2013.
Kaedah: Sebuah kajian retrospektif dijalankan. Semua pesakit yang menepati ciri-ciri yang ditetapkan diterima dalam kajian ini. Data diisi ke dalam proforma dengan merujuk pengkalan data pesakit di Hospital Serdang. Data di analisa menggunakan perisian SPSS versi 21dengan level signifikasi $\alpha = 0.05$.
Keputusan: Kadar kemasukan pesakit pediatrik akibat sawan dari tahun January 2009 hingga Jun 2013 adalah 16.2%. kebanyakan pesakit adalah berumur bawah setahun(51.8%), lelaki (72.3%) dan Melayu (83.1%), sawan menyeluruh (68.7%), demam (67.5%), akibat meningitis (38.6%), tanpa kegagalan organ (89.2%) dan jangkitan nosokomial (89.2%), dan 26.5% daripada mereka menerima nasib buruk. Pesakit yang diketahui mengidap epilepsi (P=0.03) dan neurologi/ketumbuhbesaran tidak normal (p=0.001) mempunyai 3.08 dan 5.78 kali ganda masing-masing untuk menerima hasil yang buruk. Tempoh menginap di ICU mempunyai hubungan yang jelas dengan jangkitan nosokomial (OR= 6.46, p= 0.015) dengan 6.46 kali ganda risiko untuk mendapat jangkitan nosokomial bagi yang menginap dalam tempoh yang lama.
Konklusi: Sawan adalah biasa pada zaman kanak-kanak. Kanak-kanak yang mempunyai sejarah epilepsi dan neurological/ tumbuhbesar tidak normal kebiasaanya memperoleh hasil yang buruk. Risiko jangkitan nosokomial adalah tinggi bagi tempoh penginapan yang panjang di wad ICU.

Kata Kunci: epidimiologi, ciri-ciri, sawan kanak-kanak, kemasukan ICU

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PICU : Pediatric Intensive Care Unit

CSE : Convulsive Status Epilepticus

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Seizure is an unprovoked attack normally presented with loss of consciousness and excess muscular activity due to excessive nerve cell discharges of brain tissues.[1] The excessive nerve-cell discharges that remind in small area of brain due to localized lesion cause partial seizure. While Generalized seizure happened when whole brain is involved either caused by excessive nerve-cell discharges generated by whole brain tissue or spread from particular part of the brain.[1] Epilepsy is defined as recurrent sudden seizures more than 24 hours apart in a child over 1 month of age.[2] Whereas status epilepticus is succession of epileptic spasm which persist at least 30 minutes without recovery between interval, thus brain damage may result.[1]

Based on a systematic review done in Asia, over half of the 50 million people with epilepsy worldwide are estimated to live in Asia.[3] The incidence and prevalence of epilepsy show a bimodal distribution with first peak in childhood and another in old age.[3] The incidence rate for pediatric epilepsy is varies between different population-based studies, from 41/100 000 (Nova Scotia) to 60/100 000 (Germany) and 52.3/100 000 (Rochester, USA)[4] The prevalence of epilepsy in developing countries is usually higher than in developed countries.[3]

Epilepsy can be caused by many reasons, such as trauma, anoxia, congenital and degenerative diseases.[1] According to Wilson L (2001), epilepsy also may due to

acute and chronic infection, toxic metal poisoning, specific nutrients deficiency, imbalance PH, and fluctuation in blood sugar.[5] The clinical manifestation of epilepsy is depends on location of onset in the brain, causes, types of seizures, severity , response to medication etc.[6] Seizure can effect sensory, motor, autonomic function, consciousness, cognition and emotional behavior.[6]

Intensive care units (ICU) are defined as department in a hospital which provide higher level of treatment equipment and highly trained staffs to look after severely ill patients with life-threatening conditions who need close monitoring and caring.[7] There are many reasons that a person need to be brought to ICU, mostly due to critical illnesses such as heart and respiratory failure, accident trauma, post-operation, infection, and burn.[7] Status epilepticus is an example when immediate therapy is needed due to the emergency of neurological attack. Hence it is necessary to admit to ICU. Recently, the data collected in studies shown the prevalence of admission to ICU due to epilepsy is in an increasing trend, estimated between 3% to 8%.[8] Therefore, it is important to study factors associated with epileptic seizure in ICU.

1.2 PROBLEMS STATEMENT

Epilepsy is a chronic disorder in which patients suffer for repeated attack, it may lead to different outcomes: some last for short time, some for whole life, while some have long-term effect on their body function or ability in life.[9] According to National Institute For Health and Clinical Excellence (2001), stated that many treatments are available to increase the prognosis and quality of life of epileptic patients such as antiepileptic drugs (AED), ketogenic diet, brain surgery, vagus nerve stimulation and

biofeedback.[9] Despite increase in data and treatment, however, mortality rate of patients related with epilepsy is much higher compare to general population, which is around 20%.[31] Especially in childhood epilepsy, the risk of death is increased.[11] These can be shown as more patients admitted to ICU due to epileptic seizure.[8] Although there was many researches done previously on epilepsy and seizure, but there is lack of local evidence or study on association of socio- demography and clinical characteristic on admission of patients to pediatric ICU due to epileptic seizure.

1.3 SIGNIFICANCE OF STUDY

I. Allow public to deeper their knowledge regard latest information of seizure in Malaysia.

II. Update the public about current proportion of seizure among hospitalized pediatric in Malaysia.

III. The positive finding in association between patient's characteristic and clinical progression and outcome remind both public and health care worker to give proper care and treatment to those with such condition.

1.4 OBJECTIVES

1.4.1 GENERAL OBJECTIVES

The general objective of this research is to study the factors and characteristics of pediatric patients that admitted to ICU Hospital Serdang with seizure from January 2009- June 2013.

1.4.2 SPECIFIC OBJECTIVES

i. To determine the prevalence of children admitted to PICU for seizure from January 2009- June 2013 in Hospital Serdang.

ii. To describe the demography factors of patients admitted to PICU with seizure.

iii. To describe the clinical characteristic of patients admitted to PICU with seizure.

iv. To describe the clinical progression of patients admitted to PICU with seizure.

v. To describe the outcome of patients admitted to PICU with seizure.

vi. To determine the association between patients characteristic with poor clinical outcome.

vii. To determine the association between patients characteristic and clinical complication in PICU

1.5 RESEARCH HYPOTHESES

Alternative Hypotheses:

- There is **association** between demography factors and clinical course of patients admitted to PICU with seizure.
- There is **association** between demography factors and clinical outcome of patients admitted to PICU with seizure.
- There is **association** between clinical etiology and clinical course of patients admitted to PICU with seizure.
- There is **association** between clinical etiology and clinical outcome of patients admitted to PICU with seizure.
- Most cases presented to PICU due to acute symptomatic etiology has good outcome.

Null hypotheses:

- There is **no association** between demography factors and clinical course of patients admitted to PICU with seizure.
- There is **no association** between demography factors and clinical outcome of patients admitted to PICU with seizure.
- There is **no association** between clinical etiology and clinical course of patients admitted to PICU with seizure.
- There is **no association** between clinical etiology and clinical outcome of patients admitted to PICU with seizure.

CHAPTER 2

LITERATURE REVIEW

2.1 SEIZURE, EPILEPSY AND STATUS EPILEPTICUS (SE)

Epilepsy can be start at any age due to various causes, some since childhood, some may get it during adulthood, while some in older age.[9] Epilepsy is a common serious neurological disorder in childhood, especially those with neurological abnormalities such as congenital brain malformation and cerebral palsy.[10] The risk of death of children is increased due to causes related to epilepsy especially those with secondary epilepsy.[11] Moreover, children with epilepsy disorder prone to have psychology or emotional behavior problems even patients attaining remission.[12] According to Austin 2002, mentioned that the distressing nature of seizure and social stigma associated with epilepsy affected the psychosocial development and quality of life of the epileptic child thus resulting psychopathology.[12] Over the past 30 years, the incidence of epilepsy in childhood has fallen in developed countries. This could be due to increased in quality of life, perinatal care and immunization programmes. Status epilepticus is a neurological emergency with successive epileptic attack more than 30 minutes without recovery or resume or consciousness between intervals.[1] According a retrospective descriptive study done in pediatric ICU of university hospital, the researchers presented that epilepsy is the main causes of status epilepticus followed by atypical febrile seizure, encephalopathy, meningitis and metabolic

disorder.[13] The mortality rate during ICU stay was 6%. The prognosis was good in most cases except those with neurological abnormalities.[13]

2.2 SOCIODEMOGRAPHIC CHARACTERISTIC OF EPILEPSY

Base on Oxford dictionary (2013), it defined demography as the study of statistics such as births, deaths, income, or the incidence of disease, which illustrate the changing structure of human populations.[14] Whereas Investopedia stated that demography is a study of a population based on factors such as age, race, sex, economic status, level of education, income level and employment among others.[15] In a cohort study done on prevalence of non convulsive and subtle status epilepticus in an ICU, the data collected shown that the prevalence is higher in European than Asian with a ratio of 105:1.[16] According an epidemiology study on convulsive status epilepsy of children in London 2007, the data shown that the incidence of CSE in children(18-20/100000) is higher than that of adult(4-6/100000), with excluding the elderly group. The incidence of CSE vary with age. Its highest among children less than 1 year of age(51/100000/year), followed by those aged 1-4 (29/100000/year), 5-9 years old (9/100000/year) and 10-15 years old (2/100000/year). Among CSE in children with age of less than 1 year, most are due to acute symptomatic etiologies.[17] Other than age, gender also playing role in affecting the CSE. In the study, the incidence of CSE in male is twice as likely as female. The different might due to hormonal factors in the termination of seizure which observed among pre-pubertal boys and girls. Whereas for the

ethnicity, the data shown that non-white population has higher incidence compared to white population in California.[17] Refer to a study done on newly diagnosed epilepsy in Malaysia (1999) by university hospital Kuala Lumpur, found that the prevalence is highest among Chinese which is 36% compared to Indian 35% and Malay 29%.[18]

2.3 CLINICAL CHARACTERISTICS OF EPILEPSY

Epilepsy can be caused by many reasons.[1] Thus wide range of clinical manifestation are shown.[6] Epileptic seizure can affect sensory, motor, autonomic function, consciousness, emotional behavior, memory and cognition.[6] Febrile convulsive status epilepticus (CSE) and acute symptomatic etiologies are most common among children less than 2 years old, whereas cryptogenic and remote symptomatic etiologies are more common in older age children.[40] Focal seizure were the initiating seizure type in one – third of children in North London while tonic-clonic CSE being the most common final seizure type. Pure tonic or clonic seizure is not common.[17] The hospitalization for status epilepticus are high compared to others major condition.[16] Base on a prevalence study done in Switzerland(2001) , out of 111 cases, there was 40 cases of SE(36%), 7 in epileptic seizures (6.3%), 31 in other neurological problems (27.9%) and 33 (29.8%) due to the reasons other than epileptological or neurological problems.[16] Most of SE were caused by neurological disorders:13.5% SE occurred after non-traumatic cerebral hemorrhage or ischemic stroke, 11.7% after brain injuries and 8.1% caused hypoxic brain damage.[16] For the SE type, 47% of them was non

convulsive, 19% convulsive and 34% was subtle. 49% of epileptic activity was focal without generalization, 38% focal with secondary generalization and 13% was primarily generalized. In generalized SE, 14.3% occurred after initiation of maxipime, 21.4% posttraumatic, 35.7% postanoxic with myoclonic and 28.6% without myocloni.[16] Based on the study done by university hospital Kuala Lumpur (1999), found that 57.6% of cases were related to partial seizure while the remaining 42.4% were generalized epilepsies. Among the generalized epilepsies, sub-classification was as follows: idiopathic generalized epilepsy 28.5%, juvenile myoclonic epilepsy 5.5%, childhood absence epilepsy 3.6%, West syndrome 3%, Lennox Gastaut syndrome 1.2% and photosensitive epilepsy 0.6%.[30] The duration of seizure attack depend on etiology and age. Based on some hospital based studies on emergency management of pediatric epilepsy in ICU in London (2004), reported that acute symptomatic CSE has longer attack time. And the risk of longer duration CSE is greatest in infants. The mean duration of SE was 90 minutes (range 30–435 minutes).[19]

2.4 COMPLICATIONS OF EPILEPSY

Most of the complication of SE occurred are due to its underlying disease such as meningitis infection, epilepsy, traumatic brain injury and stroke. This complication includes organ failures and nosocomial infection. Organ failure in status epilepticus includes hepatic failure, adrenal failure and brain damaged. In a study reported on fulminate liver failure associated with status epilepticus in children, organ failure happened due to oxidative membrane damage by

superperoxide radical from anti-convulsant drug used such as Phenobarbital and diazepam[20]. Other then liver, there is a risk of respiratory depression following administration of over two doses of benzodiazepine ($x2 = 3.4$, $p = 0.066$). Children with SE admitted to PIC who had pre-hospital emergency treatment are more likely to receive over two doses of benzodiazepines ($x2 = 11.5$,$p = 0.001$), and to subsequently develop respiratory insufficiency ($x2 = 6.2$, $p = 0.01$).[19] The median duration of ventilation support was 15 hours (n=86, range 2–168 hours) and was independent of etiology ($x2=7.9$, $p=0.16$). In 44% of episodes, intubation and ventilation were necessary in order to give medication required to terminate SE, whereas in 56% of episodes, intubation and ventilation were necessary for respiratory insufficiency following successful termination of clinically recognized seizure activity.[19] Nosocomial infection is hospital acquired infection, either through catheter insertion or infected directly from other patient. Most frequently, nosocomial infection in pediatric intensive care unit includes primary blood stream infection, pneumonia and urinary tract infection[21]

2.5 PROGNOSIS OF STATUS EPILEPTICUS

Epilepsy is a chronic disorder which leads to various severity forms of outcomes: some may last for short time, some for whole life, while some have long-term effect on their body function or ability in life.[9] According to a study done on early diagnosis of childhood epilepsy and the prediction of its poor prognosis, reported that the 2-year outcome of childhood epilepsy is closely related to its early course. The prognosis is poor in 30% of patients.[22] The prognosis of status epilepticus is

associated with underlying causes. Patients that infected with meningitis, the prognosis of its disease usually were based on natural history of the disease.[23] The mortality rates related to status epilepticus is closely correlated with age. A population based study shows mortality rates of 13% in young adult.[24] Death of patient usually resulted by underlying brain injury. And a total of below 2% of patients have died directly from status epilepticus.[25] However, the mortality in children due to SE has a decrease trend, from 6% - 3%, probably due to early treatment, good medication, and better intensive care facilities provided. A normal neurologic status before status epilepticus and age < 4 years old found to be marker of good prognosis, while encephalitis and meningitis appear to be marker for mortality and morbidity.[13]

2.6 PEADIATRIC INTENSIVE CARE UNIT (PICU)

PICU is a multidisciplinary unit that provides care for infants, children, and adolescents that critically ill and injured.

Most common causes for admissions to PICU include:

1. Severe infections
2. Poisoning
3. Drug overdose
4. Trauma
5. Extensive surgery
6. Congenital anomalies

7. Immunological disorder
8. Neurological disorder

In a retrospective study done on admission to PICU because of status epilepticus that conducted over 10 years in a university hospital, 147 children aged 0 to 16 years old were admitted to PICU with 153 episodes of status epilepticus. Status Epilepticus was caused most often by epilepsy (n=52), atypical febrile convulsion (n=21), bacterial meningitis (n=20), encephalitis (n=20), intoxication (n=8) or a metabolic disorder (n=12). Among 114 previously normal children, 34 displayed new neurological abnormalities on discharge, among whom, 68% (23/34) still had some neurologic problem after 1 year of status epilepticus. Nine patients had died during ICU stay, mostly out of underlying disease rather than from status epilepticus.[13]

CONCEPTUAL FRAMEWORK

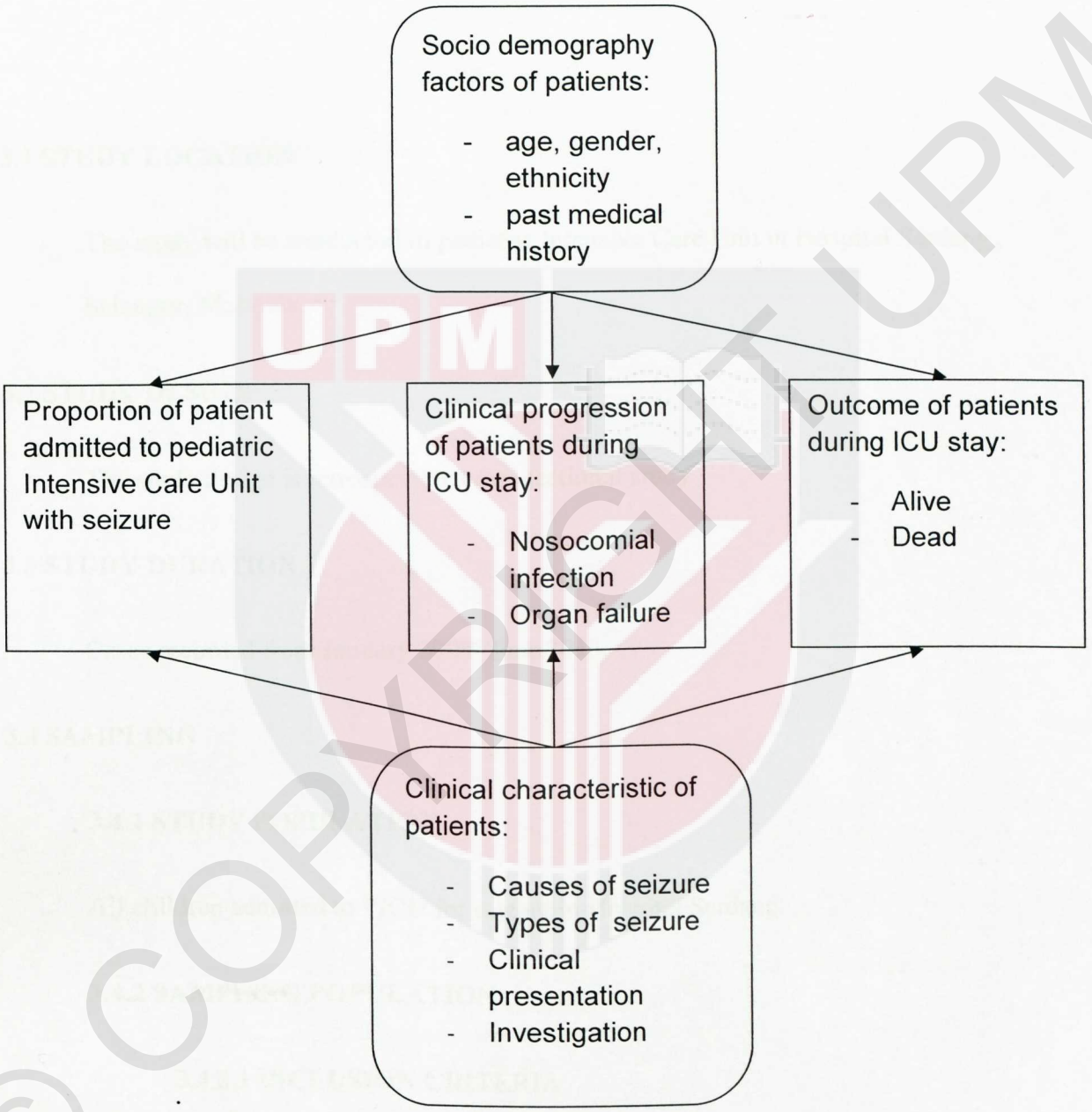

Figure 1: The figure above shows the conceptual framework of our research. The demography factors and clinical characteristic of patients are our independent variables. Whereas the clinical progression and outcome are dependent variables. These variables are studied among patients in PICU with seizure in Hospital Serdang to find out the association between these elements.

CHAPTER 3

MATERIALS AND METHODOLOGY

3.1 STUDY LOCATION

The study will be conducted in pediatric Intensive Care Unit in Hospital Serdang , Selangor, Malaysia.

3.2 STUDY DESIGN

The study design is retrospective cross sectional study

3.3 STUDY DURATION

Cases recorded from January 2009- June 2013.

3.4 SAMPLING

3.4.1 STUDY POPULATION

All children admitted to PICU for seizure in Hospital Serdang.

3.4.2 SAMPLING POPULATION

3.4.2.1 INCLUSION CRITERIA

1. Patients admitted to pediatric Intensive Care Unit in Hospital Serdang from January 2009 to June 2013 with seizure.
2. The children are between ages of 0 to 15 year old.

3. Malaysian

3.4.2.2 EXCLUSION CRITERIA

1. Those who not fulfill the inclusion criteria are excluded from the study.
2. Children admitted to PICU without any neurological symptoms.

3.4.3 SAMPLING FRAME

The sampling frame is the name list of patients recorded in registration book of pediatric Intensive Care Unit in Hospital Serdang from January 2009 to June 2013.

3.4.4 SAMPLING UNIT

The sampling unit is the patient registered in pediatric Intensive Care Unit in Hospital Serdang who fulfilled the inclusion criteria.

3.4.5 SAMPLING METHOD

Firstly, the admission book in pediatric Intensive Care Unit is utilized for any records of admission of pediatric patient who possible presented with seizure. After acquired the admission number, patient's medical record is referred and all pediatric patients who fulfill the inclusion criteria are included in the study.

3.4.6 SAMPLE SIZE ESTIMATION

Sample size

Using the standard formula $n = \frac{t^2 \times p\,(1-p)}{m^2}$ where,

n = Required sample size
t = Confidence interval
p = Estimated prevalence of status epilepticus
m = Margin of error

Assuming 95% confidence level, margin of error = 1-(confidence level/100) = 0.05

The estimated prevalence for S.E is 0.017- 0.11 (Sheppard *et al.*, 2012)

$$n = \frac{t^2 \times p\,(1-p)}{m^2}$$

$$= \frac{(1.96)^2\,(0.017)\,(0.983)}{(0.05)^2} \text{ or } \frac{(1.96)^2\,(0.11)\,(0.89)}{(0.05)^2}$$

= 26-150 patients

Based on this value, the sample size was estimated to include 26 to 150 cases.

3.5. INSTRUMENT AND DATA COLLECTION

3.5.1 INSTRUMENT

In this study, the instruments used are admission book of patients in ICU, and medical record where data are collected: socio demography, clinical characteristics, clinical progression and their outcome after received treatment in PICU. While pro forma is used to record data needed effectively.

3.5.2 DATA COLLECTION TECHNIQUES

The data used in this study is secondary data. Data is collected by filling the pro forma by referred to the patient's medical records in pediatric Intensive Care Unit in Hospital Serdang.

3.5.3 QUALITY CONTROL

In this study, secondary data from registration book and medical record will be used. During the process of collecting and analyzing data, error may occur, therefore a proper planning is assured, not only to prevent delay at collecting data, but to minimize errors from occurring.

3.6 DATA ANALYSIS

Data is analyzed by using Statistical Package for Sciences Program (SPSS) version 21. Central tendency and dispersion such as mean and standard variation are used to describe quantitative data while frequency and percentage is used to describe the categorical data. Associations between variables are examined by using chi square and Fisher's exact test. Confidence interval is set at 95% for estimation of the mean. All significant level are set at standard p value of <0.05.

Odd ratio with the formula: Odd Ratio = $\left[\frac{\frac{No.of\ exposed\ cases}{No.of\ unexposed\ cases}}{\frac{No.of\ exposed\ non-cases}{No.of\ unexposed\ non-cases}}\right]$ is used to determine the strength of association between variables with significant relationship.

3.7 STUDY ETHICS

Prior to commencement of the study, ethical clearance will be obtained from Medical Ethics Committee of the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

3.8 VARIABLES

3.8.1 DEPENDENT VARIABLE

1. Proportion of patient admitted to pediatric Intensive Care Unit with seizure.
2. Patients' clinical outcome in PICU
3. Clinical complication patients during PICU stay..

3.8.2 INDEPENDENT VARIABLE

The socio demographic factors, clinical characteristic of patients admitted to pediatric Intensive Care Unit with seizure.

3.9 DEFINITION TERMS

Epileptic seizure:

Epilepsies is a common serious brain disorders, can occur at all ages, and have many possible presentations and causes.[26] Sudden attack in seizure is normally presented with loss of consciousness, excess muscular activity and sometimes with abnormal sensation due to excessive nerve cell discharges or excitation of brain tissues.[1]

Status epilepticus:

Status epilepticus is succession of epileptic spasm which persisted at least 30 minutes without recovery between interval.[1]It is a common yet severe condition, especially in critically ill patients. Delay in diagnosis and treatment may increase mortality rate. Status epilepticus is a heterogeneous disorder with multiple subtypes.[27] EEG has allowed

distinction between the different forms of status epilepticus. There are absence status, complex partial status and non convulsive status. [27]

Pediatric intensive care unit:

Pediatric Intensive Care Unit (PICU) provided special monitoring and continuous observation to children with critical injury or illness. Children admitted to PICU range from newborns (0 months) up to young adults with 18 years of age. Many of the patients are admitted to the PICU for one of the following reasons: [28]

1. Have been injured in an accident
2. Need close observation after surgery
3. Require treatment of an acute illness

Operational definition:

I. Patients considered having seizure if fit or staring eyes are presented; and the patient is unresponsive during the attack.

II. Patients presented with particular body excessive muscular movement grouped in partial seizure while those presented with whole body fit, staring eyes and drool are grouped in generalized seizure.

III. Febrile means the reading shown on the thermometer more than 37.5 ^{0}c when it is put on patient's body to test the core temperature.

IV. Impairment of consciousness means that the patient can't response to outside stimulate after seizure attack or due to their own underlying etiology.

v. We classified clinical outcome as good if the patients are alive and poor for those were dead.

3.10 LIMITATIONS

1. The sample limited to pediatric patients registered with seizure at Hospital Serdang.
2. Clinical record might contain insufficient data.
3. Final outcome of patients transferred to other hospital might be unavailable.
4. The patients with congenital neurological or developmental abnormality are not excluded from our study may cause bias since their growth process is different with normal children.

CHAPTER 4

RESULT

4.1 RESPONDCE RATE

There is no respondent rate in this study since all patients who fulfilled the inclusion criteria are included in our study.

4.2 UNIVARIATE/ DESCRIPTIVE ANALYSIS

4.2.1: Proportion of children admitted to PICU with seizure from January 2009 to June 2013 in Hospital Serdang.

Total number of patients below age of 15 admitted to ICU from January 2009 to June 2013 in Hospital Serdang (Any causes)

=512 patients

Total number of patients below age of 15 admitted to ICU from January 2009 to June 2013 due to seizure in Hospital Serdang

= 83 patients

Proportion = $\frac{83}{512}$ X 100% = 16.2%

4.2.2 Socio demographic factors:

As we can see in table1.2, the mean age of the patients in this study is 3.5 years old with a standard deviation of 4.12461 and mode of 0.25 which equal to 3 months of aged. Among the 83 samples available, the youngest is 1 month neonate while the eldest patient in this study is 15 years old. From this study we also found that the prevalence of seizure are more common among younger patients whom with age of less than 1 year old with a frequency of 43 patients (51.8%) compared to patients aged from 2 to 15 years old which are 40 of them (48.2%). This is shown in table 1.1.

It is undeniable stated that males are the majority in this study as there are 60 males (72.3%) compared to 23 females (27.7%) among 83 patients.

Among the 83 patients, 83.1% were Malays with a number 0f 69. This is followed by 6 Indians, 5 others and 3 Chinese patients with percentage of 7.2, 6.0 and 3.6 respectively.

Regarding the known case of epilepsy as shown in table 1.1, most of the patients without underlying epilepsy which is 72.3% (n= 60) and it is as likely triple to those with history of epilepsy attack which is 27.7% (n= 23).

Meanwhile, 43 out of 83 patients in our study which is 51.8% of them experienced others medical problem. Among these patients, respiratory system problems are the commonest which 9 of them with chronic lung disease, 6 patients with pneumonia or URTI, and 6 patients with asthma. This is followed by GE, anemia, brain tumor/ hydrocephalus, sepsis, heart disease, kidney disease, physiological jaundice, eczema and paraplegia with number of 5, 4, 4, 3, 1, 1, 1, 1 and 1 respectively. While the others 40 patients in this study are well before this admission.

Also, for the history of ICU admission among our sample units, only 22.9% (n=9) of them being admitted to ICU due to certain reasons before this admission while the others 77.1% (n=64) patients never admit to ICU before and this is their first admission to ICU.

Moreover, out of 83 patients, 20 patients (24.1%) are neurological or developmental abnormal whereas others 63 patients (75.9%) are both neurological and developmental normal. Among those with neurological or developmental abnormality, development delay is the highest with a frequency of 11 patients out of 20 patients. The second highest is premature which 3 patients are in this group followed by chromosomal, cerebral palsy, microcephaly and adrenal hypoplasia with frequency of 2, 2, 1 and 1 respectively.

4.2.3 Clinical characteristic:

According to table 1.1, showed that majority of the patients had generalized seizure type with a number of 57 patients (68.7%). Patients with focal typed seizure made up the other 31.3 % which is 26 of them.

For the number of seizure attack during their period of ICU stay, the mean is 2.88 episodes with mode of 1 episode, standard deviation of 3.168 and range from 1 to 20 episodes as shown in table 1.2. The patients are grouped into two according to their total number of seizure during ICU stay by using cut point classification. Almost all of them which is 91.6% (n=81) had 1-10 episodes of attack while only 8.4% (n=2) patients suffered with seizure attack range between 11- 20 episodes. It is shown in table 1.1.

Also, our study recorded 44 patients (53.0%) with duration of fit from 0-15 minutes which made them the majority followed by 29 patients (34.9%) with >15 minutes of fit and 10 patients (12.2%) with duration of seizure attack range from 5–15 minutes. The duration of seizure we took was the longest attack of each patient during their ICU stay.

Among 83 patients, 56 of them with a percentage of 67.5 are febrile. While the others 27 patients with percentage of 32.5 had normal body temperature and no fever is presented in them.

For the condition of consciousness impairment, found that there are 48 patients unresponsive to stimulus which is 57.8% of them. The other 42.2% of patients which is 35 of them are normal where they can react and give respond to stimuli given during test by doctor.

Out of 83 samples, 12 of them (14.5%) had history of head trauma and 71 patients (85.5%) without history of head trauma before this ICU admission.

Among the investigation that had been carried out on these samples, radiology is the highest which is 91.6% (n=76) compared to CSF and EEG with a percentage of 33.7% (n=28) and 14.5% (n=12) respectively. Out of these 76 patients who took radiology investigation, CT brain is the highest which is 51 patients followed by CXR (n=40), MRI brain (n=12), and ultrasound (n=2).

As we can see I table 1.1, most of the patients admitted to ICU with seizure are due to meningitis with a percentage of 38.6 (n=32) followed by others etiology 27.7% (n=23), intracranial bleed 22.9% (n=19) and epilepsy 10.8% (n=9). None of them are admitted with a reason of febrile convulsion, stroke or unknown etiology.

Regarding the duration of stay in ICU among patients in our study, the mean is 5.82 days and standard deviation of 7.558. The minimum ICU stay is 1 day and maximum of 50 days. It is showed in table 1.2. While in table 1.1, we classified the duration of ICU stay in two groups which are < 1 week and > 1 week. We can see that most of the patients had < 1 week ICU stay which 66 of them (79.5%) and 17 patients stay in ICU > 1 week (20.5%).

During the period of ICU stay, majority of the patients received ventilation support with a frequency of 74 patients (89.2%) and only 9 patients (11.8%) without any ventilation assistance. Among the 74 patients who aided with ventilation set up, the mean of duration of their ventilation assistance is 4.92 days, standard deviation of 7.458, minimum is 1 day and maximum of 50 days.

Also, for the hemodynamic support, 48 out of 83 patients (57.8%) are assisted during their ICU stay while the others 35 patients (42.2%) are not aided with any hemodynamic support.

94% (n=78) of the patients are prescribed with anti epileptic drug which majority were using phenytoin with frequency of 57, followed by BDZ, barbiturate, carbamazepine, epilim, and lamotrigine with frequency 51, 12, 11, 10, and 2 respectively. Only 6 % (n=5) of the patients didn't take any anti epileptic medication during this admission.

4.2.4 Clinical complication:

Out of 83 patients, only 9 patients (10.8%) suffered with organ failure and 74 patients (89.2%) are free from organ failure. From these 9 patients who experienced organ failure during hospitalization, 6 patients with kidney failure, 4 patients liver failure, 2 patients cardiac failure and 1 patient with respiratory failure.

As we can see in table 1.1, 9 patients (10.8%) are infected with nosocomial infection which 5 of them with nosocomial pneumonia, 1 patient with UTI, another 1 with URTI, and 2 patients with unspecified infection. While the others 74 patients (89.2%) are not infected along their ICU stay.

4.2.5 Clinical outcome:

Among 83 patients, majority of them staying alive after treatment in ICU with a frequency of 61 patients (73.5%) and 22 patients were dead during receiving treatment in ICU.

38 patients (45.8%) are followed up and we found that 23 of them stay well, no more seizure and on medication after discharge from ICU Hospital Serdang; 5 patients undergo physiotherapy, 5 patients transferred to others hospital, 3 patients experienced fit again or another admission to hospital and 2 patients dead. The others 45 patients (54.2%) are not under observation after hospital discharge.

The distribution of patients' characteristics which included socio demographic, clinical characteristics, clinical complication and clinical outcome are shown in table 1.1 and table 1.2.

Table 1.1: Characteristic Distribution of Patients with Seizure. (quantitative data)

Variable	Frequency	Percentage (%)
AGE:		
Neonates and infants(0-1)	43	51.8
Children and adolescent (2-15)	40	48.2
GENDER:		
Male	60	72,3
Female	23	27.7
ETHNICITY:		
Malay	69	83.1
Chinese	3	3.6
Indian	6	7.2
Others	5	6.0
KNOWN CASE OS EPILEPSY:		
No	60	72.3
Yes	23	27.7
OTHER PAST MEDICAL HISTORY:		
NO	40	48.2
YES	43	51,8
→lung chronic disease	9	
Pneumonia/URTI	6	
Asthma	6	
GE	5	
Anemia	4	
Brain tumor/hydrocephalus	4	
Sepsis	3	
Heart disease	1	
Kidney disease	1	
Physio jaundice	1	
Eczema	1	
Paraplegia	1	
Fever after vaccination	1	
HISTORY OF ICU ADMISSION:		
No	64	77.1
Yes	19	22.9
NEUROLOGICAL/DEVELOPMENT ABNORMALITY:		
No	63	75.9
Yes	20	24.1

➔ Development delay	11		
Premature	3		
Chromosomal	2		
Cerebral palsy	2		
Microcephaly	1		
Adrenal hypoplasia	1		
SEIZURE TYPE:			
Focal	26	31.3	
General	57	68,7	
NUM.OF SEIZURE:			
0-10	81	91.6	
11-20	2	2.4	
DURATION OF SEIZURE:			
0-5 mins	44	53.0	
5-15 mins	10	12.1	
>15 mins	29	34.9	
FEBRILE:			
No	27	32.5	
Yes	56	67.5	
IMPAIRMENT OF CONSCIOUSNESS:			
No	35	42.2	
Yes	48	57.8	
HISTORY OF HEAD TRAUMA:			
No	71	85.5	
Yes	12	14.5	
INVESTIGATION:			
CSF	28	33.7	
Radiology	76	91.6	
➔ CT brain	51		
CXR	40		
MRI	12		
US	2		
EEG	12	14.5	
ETIOLOGY:			
Febrile convulsion	0	0	
Meningitis	32	38.6	
Intracranial bleed	19	22.9	
Epilepsy	9	10.8	
Stroke	0	0	
Other	23	27.7	

Unknown		0	0
DURATION OF STAY IN ICU:			
Less than 1 week		66	79.5
More than 1 week		17	20.5
VENTILATION SUPPORT:			
No		9	10.8
Yes		74	89.2
HEMODYNAMIC SUPPORT:			
No		35	42.2
Yes		48	57.8
ORGAN FAILURE:			
No		74	89.2
Yes		9	10.8
➔ Kidney	6		
Liver	4		
Cardiac	2		
Respiratory	1		
NOSOCOMIAL INFECTION:			
No		74	89.2
Yes		9	10.8
➔ Pneumonia	5		
UTI	1		
URTI	1		
Unspecified	2		
ANTI EPILEPTIC MEDICATION;			
NO		5	6.0
YES		78	94.0
➔ Phenytoin	57		
BDZ	51		
Carbamazepine	11		
Epilim	10		
Barbiturate	12		
Lamotrigine	1		
OUTCOME:			
Alive		61	73.5
Dead		22	26.5
FOLLOW UP:			
No		45	54.2
Yes		38	45.8
➔ Well; no more seizure; on			

	Medication	23
	Fit again; admit to hospital	3
	Physio therapy	5
	Transfer to other hospital	5
	Dead	2

Table 1.2: Characteristic Distribution of Patients with Seizure. (Qualitative data)

		Age	Num. of seizure	Duration of Stay in ICU	Assisted ventilation duration
N	**Valid**	83	83	83	83
	Missing	0	0	0	0
Mean		3.5028	2.88	5.82	4.92
Median		2.0000	2.00	3.00	3.00
Mode		.25	1	3	1
Std. deviation		4.12461	3.168	7.558	7.458
Variance		17.012	10.034	57.125	55.615
Range		14.92	19	49	50
Minimum		.08	1	1	1
Maximum		15.00	20	50	50
Percentiles	**25**	0.5000	1.00	2.00	1.00
	50	2.0000	2.00	3.00	3.00
	75	4.5800	3.00	6.00	6.00

4.3 BIVARIATE STATISTICAL ANALYSIS

4.3.1 Association between patients' characteristics and clinical outcome

The association between characteristic of patients with seizure and their clinical outcome are shown in table 2.

Table 2: Association between patients' characteristics and clinical outcome.

		Outcome (%)		P value		X^2	df
		Alive	Dead	Chi square	Fisher's exact test		
Age	Neonates and infants	72.1	27.9				
	Children and adolescent	75.0	25.0	0.764	-----	0.090	1
Gender	Male	75.0	25.0				
	Female	69.6	30.4	0.616	-----	0.252	1
Ethnicity	Malay	71.0	29.0				
	ChineseIndianOthers	85.7	14.3	-----	0.334	---	--
Known case of epilepsy	No	80.0	20.0				
	Yes	56.5	43.5	**0.03***	-----	4.705	1
History of ICU admission	No	78.1	21.9				
	Yes	57.9	42.1	0.079	-----	3.078	1
Neuro abnormality	No	82.5	17.5				
	Yes	45.0	55.0	**0.001***	-----	10.98	1
Seizure type	Focal	76.9	23.1				
	General	71.9	28.1	0.633	-----	0.229	1
Duration of seizure	0-5 mins	75.0	25.0				
	5-15 mins	60.0	40.0				
	>15 mins	75.9	24.1	0.586	-----	1.069	2
Num. of seizure	0-10	75.3	24.7				
	11-20	0.0	100.0	-----	0.068	----	---

Etiology	Meningitis	75.0	25.0				
	Intracranial bleed	78.9	21.1				
	Epilepsy	77.8	22.2				
	Others	65.2	34.8	0.748	-----	1.211	3
Duration of ICU stay	< 1 week	74.2	25.8				
	>1 week	70.6	29.4	-----	0.764	---	--

***Statistically significant with p < 0.05**

From table 2, 43.5% of patients with underlying epilepsy are dead compared 20.0% of patients whom without history of epilepsy. There is a significant association (p=0.03) between known case of epilepsy and poor clinical outcome. Thus, the null hypothesis of no association between these two variables is rejected.

In addition, the history of neurological/ developmental abnormality is significantly associated with the poor clinical outcome with a p value of 0.001. 55% of the patients with underlying neurological/ developmental problems are dead compared to 17.5% in patients whom both neurological and developmental normal.

There is no significant association between poor clinical outcome and patient's age, gender, ethnicity, history of ICU admission, seizure type, duration of seizure, number of seizure, etiology of ICU admission and duration of ICU stay.

4.3.2 Association between patients' characteristics and organ failure

The association between characteristic of seizure patients and organ failure are shown in table 3.

Table 3: Association between patients' characteristics and organ failure.

		Organ failure (%)		P value		X^2	df
		No	Yes	Chi square	Fisher's exact test		
Age	Neonates and infants	90.7	9.3				
	Children and adolescent	87.5	12.5	-----	0.732	---	--
Gender	Male	90.0	10.0				
	Female	87.0	13.0	-----	0.703	---	--
Ethnicity	Malay	88.4	11.6				
	ChineseIndianOthers	92.9	7.1	-----	1.000	---	--
Known case of epilepsy	No	88.3	11.7				
	Yes	91.3	8.7	-----	1.000	---	--
Other past medical history	No	92.5	7.5				
	Yes	86.0	14.0	-----	0.485	---	--
History of ICU admission	No	90.6	9.4				
	Yes	84.2	15.9	-----	0.421	---	--
Neuro abnormality	No	88.9	11.1`				
	Yes	90.0	10.0	-----	1.000	---	--
Seizure type	Focal	88.5	11.5				
	General	89.5	10.5	-----	1.000	---	--
Etiology	Meningitis	87.5	12.5				
	Intracranial bleed, Epilepsy, stroke, Others, unknown	90.2	9.8	-----	0.728	---	--
Duration of ICU stay	< 1 week	90.9	9.1				
	>1 week	82.4	17.6	-----	0.381	---	--

***Statistically significant with p < 0.05**

In the study of association between patients' characteristic and organ failure, all the p value are >0.05. The null hypothesis which stated that there is no association between

patients' characteristic and organ failure cannot be rejected. Thus there is no significant association between organ failure and age, gender, ethnicity, known case of epilepsy, other past medical history, history of ICU admission, neurological/ developmental abnormality, seizure type, etiology of ICU admission and duration of ICU stay.

4.3.3 Association between patients' characteristics and nosocomial infection.

The association between characteristic of patients with seizure and nosocomial infection are shown in table 4

Table 4: Association between patients' characteristics and nosocomial infection.

		Nosocomial infection (%)		P value		X^2	df
		No	**Yes**	**Chi square**	**Fisher's exact test**		
Age	Neonates and infants	93.0	7.0				
	Children and adolescent	85.0	15.0	-----	0.302	---	--
Gender	Male	88.3	11.7				
	Female	91.3	8.7	-----	1.000	---	--
Ethnicity	Malay	88.4	11.6				
	ChineseIndianOthers	92.9	7.1	-----	1.000	---	--
Known case of epilepsy	No	86.7	13.3				
	Yes	95.7	4.3	-----	0.433	---	--
Other past medical history	No	92.5	7.5				
	Yes	86.0	14.0	-----	0.485	---	--
History of ICU admission	No	87.5	12.5				
	Yes	94.7	5.3	-----	0.577	---	--
Neuro abnormality	No	88.9	11.1`				

	Yes	90.0	10.0	-----	1.000	---	--
Seizure type	Focal	100.0	0.0				
	General	84.2	15.8	-----	0.051	---	--
Etiology	Meningitis	90.6	9.4				
	Intracranial bleed, Epilepsy, stroke, Others, unknown	88.2	11.8	-----	1.000	---	--
Duration of ICU stay	< 1 week	93.9	6.1				
	>1 week	70.6	29.4	-----	**0.015***	---	--

***Statistically significant with p < 0.05**

In table 4, shown that the p value in Fisher's exact test for the study of association between duration of stay in ICU and nosocomial infection is 0.015, which means there is a significant association between duration of stay in ICU among seizure patients and the consequence of nosocomial infection. The null hypothesis of no association between these two variables is rejected.

Other than that, there is no significant association between nosocomial infection and age, gender, ethnicity, known case of epilepsy, other past medical history, history of ICU admission, neurological/ developmental abnormality, seizure type, and etiology of patients ICU admission.

4.3.4 Strength of significant association between variables

Odd ratio is calculated by using the formula: Odd Ratio = $[\frac{\frac{No.of\ exposed\ cases}{No.of\ unexposed\ cases}}{\frac{No.of\ exposed\ non-cases}{No.of\ unexposed\ non-cases}}]$, to determine the strength of association among variables with significant relationship. The result is shown in table 5.

Table 5: Strength of association among variables with significant relationship

Association between variables	Odd ratio
Known case epilepsy and clinical outcome	3.08
Neurologic/ development abnormality and clinical outcome	5.78
Duration of stay in ICU and nosocomial infection	6.46

Based on the odd ratio calculated, found that the risk of poor clinical outcome among patients with underlying epilepsy are 3.08 times higher compare to those without previous history of epilepsy. The patients with neurologic/ development abnormality have 5.78 times higher of risk of dead compare to patients with neurologic and developmental normal. Moreover, patients with longer duration of ICU stay have 6.46 times larger probability to get nosocomial infection compare to those who have short ICU stay.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Discussion

Seizure is a common and frightening event in childhood. Each year, 120 of every 100,000 persons in the United States seek medical attention for a newly recognized seizure and 40% (120,000) are children who under 18 years old.[2,29] Although hospitalization of children with seizure is quite common in Malaysia [30] and the mortality rate of patients related with epilepsy is 20% higher compare to general population[31]. However, the information on pediatric patients with seizure is lacking in Malaysia. Therefore this research is conducted to study the characteristics among pediatric patients with seizure. In this study, a pre- designed pro forma which consisted of patients' characteristics such as sociodemographic factors, clinical characteristic, clinical complication and clinical outcome is used and filled based on patients' medical record in ICU Hospital Serdang.

Based on our finding, the proportion of pediatric patients admitted to ICU with seizure is 16.2% out of total number of pediatric patients admitted to ICU. The proportion is much more higher compared to others population based studies done before which is 4 to 10 children per 1000 population [29,,32] since our study is hospital base with sample population of pediatric patients with certain disease. With the proportion of 16,2% out of

total pediatric ICU admission, we can say that seizure is common among pediatric and it is a common causes of hospitalization among children in Malaysia.[30]

In our study, we found that most of the patients with seizure are infants whom less than one year of age (51.8%) compared to elder children (48.2%) between aged of 2 to 15 years old. This is in agreement with research of epidemiology of convulsive status epilepticus in children done in London 2007 [17]; epidemiology and prognosis of pediatric epilepsy [2]; and study of epidemiology and clinical feature of febrile seizure among children in Malaysia[30]. The incidence of CSE in childhood is highest among children less than 1 year of age (51/100,000/year) compared to those aged 1–4 (29/100,000/year), 5–9 (9/100,000/year), and 10–15 years (2/100,000/year).[17] Children in their first year of life are at the highest risk for developing epilepsy.[2] And the highest number of febrile seizures was in the 6 to 12 months age group.[30] The immature/ not fully developed CNS of patients among this age group caused them easy to seize[33]. Regarding gender, we found that the prevalence of seizure among male pediatric 72.3% is higher than in female 27.7%. This finding is supported by the research carried out by Deng C.T el at (2004) [30], where the ratio of boy to girl is 1.5:1 though Verity *et al* in the Child Health and Education Study (CHES) found no statistical difference between boys (2.29%) and girls (2.12%) [34] The different in prevalence of seizure between two gender might due to hormonal factors in the termination of seizure which observed among prepubertal boys and girls.[17] Whereas for ethnicity, Malay patients made up the major group in our study (83.1%) followed by Indian (7.6%), others group of ethnicity in Malaysia (6.0%) and Chinese (3.6%). This finding was also found in a prospective study done in Hospital Kuala Lumpur from August 1990 to April 1991, where 62.4% out of 117 seizure children

were Malays followed by Indians (26.5%), Chinese (8.5%) and others (2.6%).[30] But it was different with a study done on newly diagnosed epilepsy in Malaysia (1999) by university hospital Kuala Lumpur. The researcher found that the prevalence is highest among Chinese which is 36% compared to Indian 35% and Malay 29%.[18] The different in result may be due to different of sample population that been selected since there are larger proportion of Chinese compare to other ethnicity in university hospital. In short, we found that patients whom less than 1 year old, male and Malay are prone to get seize compare to the others.

As defined earlier in introduction, partial seizure is caused by excessive nerve-cell discharges that happened in particular area of brain due to localized lesion while generalized seizure involved whole brain. In our research, more patients are diagnosed with generalized seizure (68.7%) compared to focal seizure (31.3%). This is supported by a study done by Vigneswari.G et al in Hospital Kuala Lumpur 2001.[35] Out of 27 epileptic children, 6 children (22%) had partial seizures while the remaining 21 (78%) had generalized seizures[35] However, Sillanpaa et al who studied the distribution of seizure types in a population-based sample of 245 subjects with childhood-onset epilepsy from Turku, Finland found that 64% of the cohort had partial seizures.[36] Different methodologies used which included different study, age limits, definitions of seizures and epilepsy, and the evaluation method will affect the result.[37]

From this study, we found that more patients reported with meningitis (38.6%) followed by others etiology such as underlying neurologic problem and electrolyte imbalance (27.7%), intracranial bleed (22.9%) and epilepsy (10.8%). In the study carried

out by Shinnar et al (1997), stated that the cause of CSE varies with age; in children younger than 2 years, febrile CSE and acute symptomatic etiologies are most common, whereas cryptogenic and remote symptomatic etiologies are more common in the older children.[40]

For the clinical complication, we found that both organ failure and nosocomial infection are not very common among seizure children since there are only 9 cases respectively out of 83 patients as reported in our study. Hence, we made an inference that the probabilities of both organ failure and nosocomial infection are not influence by the history of seizure attack among pediatric patients. However, we fail to find support for this finding since there is no previous research study on this.

Although the clinical outcome is favorable in most case but the mortality of children with seizure is still high. In our study, 22 out of 83 patients (26.5%) were dead. In the study done by Art et al (1999) on early prognosis of epilepsy in childhood, stated that the prognosis of childhood epilepsy is closely related to their early course and the outcome is poor in ~30% patients.[22] The main predictors of mortality were etiology, preexisting neurologic abnormalities and type of seizures (generalized convulsive SE); whereas age, duration of seizure, treatment, and preexisting epilepsy did not influence the outcome. This finding is found in the study done by Kravlianac et al (2011).[41]

We determined three significant associations among variables studied in this research. The history of underlying epilepsy is associated significantly with patient's clinical outcome ($p= 0.03$). Since there are very few researches carried out to investigate the relationship between patients' past medical history and clinical outcome, therefore, we

have no suitable study that can provide us information to compare with. The patients with neurological/ developmental abnormality found to have poor clinical outcome compare to those without these kind of problem (p= 0.001). This finding is consistent to the report did by Shinnar et al on epidemiology and prognosis of pediatric epilepsy in year 2002.[10] They reported that children with developmental disabilities are more likely than developmental normal children to have multiple and prolong seizure.[10] Mortality risk is increased among patients with neurologic abnormality.[10] Also, duration of ICU stay found significantly associated with nosocomial infection (p= 0.015). The longer the patients' ICU stay duration, the greater the probability of hospital-acquired infection. Our finding is supported by a case control study did by Yang L.Q et al on risk factor for nososcomial infection of epilepsy in hospitalized children.[38] They suggested that nosocomial among children with epilepsy is correlated with hospital stay > 14 days, usage of antibiotic and gastrogarage.[38]

5.2 Limitation

Firstly, this study was carried out by self-administered pro forma which consisted of four parts regarding patients' socio demographic factors, clinical characteristics during their ICU stay, clinical complications and clinical outcomes. The pro forma prepared might not fully complete with necessary questions which should be involved in study of seizure patients and ICU stay. This short coming will bring an effect on the accuracy of result.

Secondly, we only study samples from one hospital which is Hospital Serdang. The sample size is limited where we can only get 83 patients over four and a half years from January 2009 to June 2013. The conclusion made base on this small group samples might not represent the real situation of whole population in Malaysia

Thirdly, the seizure patients with underlying neurological or developmental abnormality are not excluded from our study. This might cause bias and confounding for our study since the growing process of patients with neurological or development problems are different from those without such abnormality. And we cannot confirm whether their underlying neurological / developmental abnormality cause seizure to occur or oppositely seizure bring neurologic problems in them.

Lastly, there is lack of previous study on admission of pediatric patients to ICU with seizure in Malaysia. The finding we obtained from this study might not be consistent to previous study done in overseas due to different culture, population, genetic properties, medication system and etc.

5.3 Recommendation

As reported in our study, underlying neurologic/ development abnormality do affect the clinical outcome of children with seizure. The prognosis was good in most case of CSE among children admitted to ICU except those with neurologic abnormality[13].With respect to this issue, we recommend that study of risk factors of poor clinical outcome among epilepsy children with neurologic/ development disabilities should be carried out in future. This is important to verify the reasons of poor outcome in children with underlying neurologic problem so that better interventions can be implemented and thus improve the prognosis.

Other than that, the impacts of childhood seizure on long term psychosocial outcome also need to be concern [2]. Children with epilepsy disorder prone to have psychology or emotional behavior problems even patients attaining remission.[12] According to study did by Austin in year 2002, mentioned that distressing nature of seizure and social stigma associated with epilepsy affected the psychosocial development and quality of life of the epileptic child thus resulting psychopathology.[12] However, whether these problems are caused by the seizure disorder and anti-seizure medications or are simply part of the seizure disorder remains unclear. [39] Regarding to this aspect, we would like to recommend our society to look deeper in future study on psychosocial outcome among epileptic children. This can improve the level of understanding on epileptic children' psychology behavior problems. Thus there is a probability that the prevalence of psychology problems among epileptic children can be reduced by implementing proper interventions on epileptic pediatric and their family, and educating the public.

5.4 Conclusion

Based on our study, we found that the proportion of admission of pediatric patients with seizure to ICU is 16.2%. Patients with less than one year of age, male and Malay are at higher risk to get seizure attack. Other than that, we found that there is significant association between known case of epilepsy and poor clinical outcome; underlying neurological/ developmental abnormality and poor clinical outcome and lastly the duration of ICU stay and nosocomial infection.

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Gantt chart

Weeks	1	2	3	4	5	17	18	19	20	21	22	23	24
Research Proposal Draft	S												
Research Proposal		S		P									
Preparation of Letters					S								
Data Collection and Analysis								S	P				
Report Writing											S		
Final Presentation Seminar												P	
Final Report													S
Result													

S : Submission

P : Presentation

Admission : number
Patient code:

PROFORMA (Admission of children to PICU due to seizure in hospital serdang from 2006 to 2012)

A. SOCIODEMOGRAPHIC DATA

Age : (in years)

Gender : male ☐ Female ☐

Races : Malay ☐ Chinese ☐ Indian ☐ Others ☐

known case of epilepsy : No ☐ Yes ☐ _____

Others past medical history: No ☐ Yes ☐ _____

History of ICU admission : No ☐ Yes ☐ _____

Neurologically/development Abnormal : No ☐ Yes ☐ _____

B. CLINICAL PRESENTATION

Seizure types : Focal ☐ Generalized ☐

Number of seizure : _____

Duration of seizure : 0-5 mins ☐ 5-15 mins ☐ >15 mins ☐

Febrile : No ☐ Yes ☐

Impairment consciousness : No ☐ Yes ☐

History of head trauma : No ☐ Yes ☐ _____

C. INVESTIGATION

CSF : NO ☐ Yes ☐ _____

Radiology : No ☐ Yes ☐ _____

EEG : No ☐ Yes ☐ _____

D. ETIOLOGY

Febrile convulsion ☐
Meningitis ☐
Intracranial bleeding ☐
Epilepsy ☐
Stroke ☐
Others ☐
Unknown ☐

E. ICU COURSE

Duration of stay in PICU : _____ (in days)

Assisted ventilation : No ☐ Yes ☐ _____

Assisted ventilation duration : _____(in days)

Hemodynamic support : No ☐ Yes ☐ _____

Organ failure :No ☐ Yes ☐ _____

Nosocomial infection : No ☐ Yes ☐ _____

Anti epileptic medication. :No ☐ Yes ☐ _____

F. OUTCOME (at discharge or transfer)

Alive ☐
died ☐

G. FOLLOW UP

No ☐
Yes ☐ _____
_____

RESEARCH TEAM

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Co-Supervisor	Dr.Mohd Azri Zainal Abidin Dept. of Peidatric 012-3325389
Leader	Ng Yien Ting; 164922
Member	Mohd Sharil bin Sulaiman; 164133

BUDGET PLANNING

ITEM	QUANTITY	PRICE
Photostating	1 copy of proposal 3 copies of final report	RM 100
Printing	1 proposal 1 final report Journals and articles	RM 50
TOTAL		RM 150

JKEUPM Ref No. : FPSK_Mei (13) 69

Members of the JKEUPM who reviewed the documents:

Prof. Dr. Zamberi Sekawi

Date of approval: 17/6/2013

Endorsed at JKEUPM Meeting on 5/7/2013, attended by:

NAME	DESIGNATION	GENDER	TICK IF PRESENT
Prof. Dr. Norlijah Othman	Paediatrics& Dean, Faculty of Medicine and Health Sciences	Female	
Prof. Dr Zamberi Sekawi	Medical Microbiologist & Deputy Dean of Research and Internationalization, Faculty of Medicine and Health Sciences	Male	√
Prof. Dato' Dr. Lye Munn Sann	Medical Statistician, Dept of Community Health, Faculty of Medicine and Health Sciences	Male	√
Prof. Dr. Tengku Aizan Abd Hamid	Gerontologist & Director, Institute of Gerontology	Female	
Prof. Dr. Lekhraj Rampal	Medical Statistician, Dept of Community Health, Faculty of Medicine and Health Sciences	Male	
Prof. Dr. Elizabeth George	Pathologist, Dept of Pathology, Faculty of Medicine and Health Sciences	Female	√
Prof. Dr. Lim Thiam Aun	Anesthesiologist, Dept of Surgery, Faculty of Medicine and Health Sciences	Male	√
Prof. Dr. Wan Omar Abdullah	Medical Parasitologist, Dept of Medical Microbiology and Parasitology, Faculty of Medicine and Health Sciences	Male	√
Prof. Dr. Patimah Ismail	Professor of Biomedicine, Dept of Biomedical Sciences, Faculty of Medicine and Health Sciences	Female	√
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