IMPAIRED CONCIOUSNESS AND QUALITY OF LIFE AMONG POST-TRAUMATIC BRAIN INJURY PATIENTS AT HOSPITAL UNIVERSITI SAINS MALAYSIA

by

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LIST OF ABBREVATION

WHO	-World Health Organization
HUSM	-Hospital Universiti Sains Malaysia
QoL	-Quality of Life
TBI	-Traumatic Brain Injury
FIM	-Functional Independence Measure
CIQ	-Community Integration Questionnaire
QOLIBRI	-Quality of Life after Brain Injury
KTO	-Kecederaan Trauma Otak

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ABSTRACT

Traumatic brain injury is defined as a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head or a penetrating head injury. Impaired consciousness is the first change in a client who traumatic brain injury. Clients that had TBI may experience impaired consciousness as well as affect their quality of life. The objective of this study is to assess the association between impaired consciousness and quality of life among post-traumatic brain injury patients at Hospital Universiti Sains Malaysia. A cross-sectional survey using a set of self-administered questionnaire from the Quality of Life after Brain Injury Tool. This study was conducted by follow-up telephone survey. A total of 55 respondents were involved in this study. Data was analyzed using SPSS version 22.0 and Chi-Square test was used to analyze descriptive data. A total of 56.4% (n=31) reported that majority of the participants were from 18-39 years old. Majority of respondents were male patients ,45(81.8%). Most of the respondents had high severity of TBI 16 (100%) had low quality of life and mild severity of TBI 16 (76.2%) had high quality of life. This study revealed that there was a significant association between the severity of TBI and quality of life (p=0.000), while there were no significant association between location of TBI and quality of life (p=0.532) , there were not significant association between selected demographic data age (p=0.443) and gender (p=0.286) with quality of life among post TBI patients at Hospital USM. In conclusion, post-traumatic brain injury patients with severe injury experienced low quality of life.

GANGGUAN KESEDARAN DAN KUALITI HIDUP DI KALANGAN PESAKIT SELEPAS KECEDERAAN TRAUMA OTAK DI HOSPITAL USM

ABSTRAK

Kecederaan trauma otak ditakrifkan sebagai gangguan dalam fungsi normal otak yang boleh disebabkan oleh benjolan, pukulan, atau pukulan ke kepala atau kecederaan kepala tajam. Gangguan kesedaran adalah perubahan pertama yang dialami oleh pesakit kecederaan trauma otak. Pesakit yang mempunyai KTO mungkin mengalami gangguan kesedaraan serta menjejaskan kualiti hidup mereka.Objektif kajian ini untuk menilai perkaitan di antara gangguan kesedaran dan kualiti hidup di kalangan pesakit selepas kecederaan trauma otak di Hospital Universiti Sains Malaysia.Satu kajian keratan rentas menggunakan satu set soal selidik yang ditadbir sendiri dari instrumen Kualiti Hidup selepas Kecederaan Otak. Kajian ini telah dijalankan melalui telefon kajian susulan. Seramai 55 orang responden terlibat dalam kajian ini. Data dianalisis dengan menggunakan perisian SPSS versi 22.0 dan ujian Chi-Square digunakan untuk menganalisis data deskriptif. Sebanyak 56.4% (n = 31) melaporkan bahawa majoriti peserta adalah dari berusia 18-39 tahun. Majoriti responden pesakit lelaki, 45 (81.8%). Kebanyakan responden yang mengalami tahap kecederaan yang teruk 16 (100%) mempunyai kualiti hidup yang rendah dan tahap kecederaan otak yang ringan 16 (76.2%) mempunyai kualiti hidup yang tinggi. Kajian ini membuktikan bahawa terdapat hubungan yang signifikan antara tahap KTO dan kualiti hidup (p = 0.000), manakala tidak ada hubungan yang signifikan antara lokasi KTO dan kualiti hidup (p = 0,532), tidak ada hubungan yang signifikan antara dipilih umur data demografi (p = 0.443) dan jantina (p = 0,286) dengan kualiti hidup di kalangan pesakit selepas KTO di Hospital USM. Kesimpulannya, pesakit mengalami kecederaan trauma otak yang teruk mempunyai kualiti kehidupan yang rendah.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Traumatic Brain Injury (TBI) is a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head or a penetrating head injury. Not all blows or jolts to the head result in TBI (Facts about traumatic brain injury, n.d). Explosive blasts can also cause TBI, particularly among those who serve in the United States military.

Traumatic brain injury is represents a significant public health problem. This problem is one of the major causes of mortality in developing countries. Traumatic brain injury is also an assault to the brain that is capable to producing physical, intellectual, emotional, social, and vocational changes. The importance of this problem derives from high incidence rates, young, previously health adults comprising a large proportion of that injury, survivors having normal life spans and the possibility of persistent functional limitations and psychosocial problems.

Symptoms of traumatic brain injury can be mild, moderate and severe. The symptom is depending on the extent damage to the brain. Mild cases may result in a brief change in mental state or consciousness. Mild traumatic brain injury is a significant public problem. It represents around 75% of all traumatic brain injury cases. According to the Centers for Disease Control and Prevention, accounted for approximately 2.5 million emergency department visits, hospitalizations and deaths in the US in 2010 (Medical News Today, 2015). Meanwhile, severe cases may result in extended periods of unconsciousness, coma or even death (American Association of Neurological Surgeons, 2014).

Traumatic brain injury can be classified based on patterns and types of injury. This is important to ensure proper treatment and long-term therapy. The damage to the brain can be separated into two parts which is primary and secondary brain damage. For primary brain damage also known as diffuse axonal injury, whereby at the moment of impact the brain may tear or rip causing the microscopic connection pathways become affected. Primary bleeding and clots, in this instance an artery or blood vessel is damaged causing bleeding or clots causing pressure and constricting the brain. For the secondary brain damage it causes brain swelling, reducing the flow of blood and oxygen to the brain cells. This situation a slow bleed may only be detected later. Something likes a slow puncture in a tire. These are called subdural, extradural or intracerebral hematoma (Team brain injury support, 2015).

Clients with traumatic brain injuries often have effects on brain function. This link between damage to particular parts of the brain and corresponding lack of brain function. If the damage on side right of the brain likes parietal lobes it causes in weakness in the limbs on the opposite side of the body. In addition, if the injury to the left side of the brain or the brain stem itself tends to cause speech and language impairment. If the damage to the brain behind the forehead likes frontal lobes it can cause behavioral problems such as loss of insight and self-restraint. However, traumatic brain injury also causes hidden disabilities that result in changes to personality, thinking and memory (Headway the brain injury association, 2015).

By observing one of the following clinical signs constitutes an alteration in brain function (Menon, Schwab, Wright, and Maas, 2010).There are clinical signs of altered brain function, the first one is any period of loss of or decreased consciousness, the second is any loss of memory for events immediately before or after the injury. Next is a neurologic deficit such as muscle weakness, loss of balance and coordination,

disruption of vision, change in speech and language or sensory loss. Last clinical sign is any alteration in metal state at the time of the injury such as confusion, disorientation, slowed thinking, or difficulty with concentration (Menon, Schwab, Wright and, Maas,2010).

Impaired consciousness is the first change in a client who traumatic brain injury. A change in the level of consciousness (LOC) is cause by altered cerebral tissue perfusion. Severity of traumatic brain injury can be measured by using Glascow Coma Scale.

The purpose of this study to assess impaired consciousness among post-traumatic brain injury patients and quality of their life after 12 months. The study from Siew et al. (2010) found that the level of consciousness of patient who survive severe brain injury is assessed clinically based on their ability to interact with the environment and communicate. Patients who, after careful testing, remain unresponsive to the environment even though their eyes may be open, are considered unconscious or in vegetative state.

A major class of cognitive abilities that may affected by traumatic brain injury is referred to as executive functions likes the complex processing of large amounts of intricate information that we need to function creatively, competently and independently as beings in a complex world. Thus, after injury, individuals with TBI may be unable to function well in their social roles because of difficulty in planning ahead, in keeping track of time, in coordinating complex events, in making decisions based on broad input, in adapting to changes in life, an in otherwise 'being the executive' in one's own life. With appropriate training and other supports, the person may be able to learn to compensate for some of these cognitive difficulties (Brainline.org, 2015).

1.2 Problem Statements

In Malaysia, severe traumatic brain injury (TBI) has been one of the major causes of death. It is leading cause of death in the younger generations which include children and adult younger than 45 years old (Siew, Johari, Nasser & Abdullah, 2010). In Malaysia, there are limited numbers if retrospective studies about impaired consciousness among traumatic brain injury patients. In Kelantan, about 129 traumatic brain injury patients were admitted to Hospital Universiti Sains Malaysia (HUSM). About 35 patients were admitted in year 2013 and 53 patients in year 2014. In year 2015 from January until September about 41 patients were admitted in HUSM (Record Unit HUSM, 2015).

According to Stancin, Drotar, Taylor, Yeates, Wade & Minich (2010), the longer-term impact of traumatic brain injury (TBI) on daily functioning, especially broader outcome domain referred to as health-related quality of life (HRQL) has been found to be relatively little.

Traumatic brain injury will cause the long-term effects on patients. It is important to be aware also that not all functions of the individual are impacted by TBI. Individuals with a moderate-to-severe brain injury most typically experience problems basic cognitive skills such as sustaining attention, concentrating on tasks at hand, and remembering newly learned material. They may think slowly, speak slowly, and solve problem slowly. They may become confused easily when normal routines are changed or when stimulation level from the environment exceeds their threshold. They may persevere at tasks too long, being unable to switch to a different tactic or a new task when encountering difficulties (Brainline.org, 2015).

Traumatic brain injury also may effects the systems in the brain that control our social-emotional lives often are damaged. The consequences for the individual and for this his or her significant others may be very difficult, as these changes may imply to them that 'the person who once was' is 'no longer there'. Thus, personality can be substantially or subtly modified following injury. The person who was once optimist may now be depressed. The previously tactful and socially skilled negotiator may now be blurting comments that embarrass those around him/her. The person may also be characterized by a variety of other behaviors such as dependent behaviors, emotional swings, lack of motivation, irritability, aggression, lethargy, being very uninhibited, and being unable to modify behavior to fit varying situations (Brainline.org, 2015).

A very important change affects many people with traumatic brain injury is referred to as denial or lack of awareness. The person becomes unable to compare post-injury behavior and abilities with pre-injury behavior and abilities. For these individuals, the effects of TBI are, for whatever reason, simply not perceived or whether for emotional reasons, as a means of avoiding the pain of fully facing the consequences of injury, or of neurological reasons, in which brain damage itself limits the individual's ability to step back, compare, evaluate differences, and a conclusion based on that process.

Any of the ways we have of sensing may be affected by traumatic brain injury. Vision may be affected in many ways such as loss of vision, blurred visual images, inability to track visual material, loss of parts of the field of vision, reduced depth perception and sometimes disconnection between visual perception and visual comprehension, so that the person does not know what he or she is seeing. Further, the person may have difficulty sensing the location of his or her own body in space (Brainline.org, 2015).

A relatively small percent of individuals with traumatic brain injury experience seizures. For most of these, the initial onset of seizures occurs soon after injury. For others, the onset may take place up to several years post-injury. Two types of seizures may occur. Major motor seizures refer to what were once called grand mal seizures and involve loss of consciousness and vigorous, uncontrolled movement of the major muscle systems. Local motor seizures do not lead to loss of consciousness and involve less muscle movement. Some individuals with TBI use anticonvulsive drugs to prevent seizures or stop them during the course of a seizure (Brainline.org, 2015).

The severity of the injury and resulting direct effects on the individual's body systems may not predict the amount of impacts in a person's life. This follows, first and foremost, because each of us draws in different ways on differing parts of our brains. For example, a severe injury to the frontal brain area may have less impact on an agricultural worker's job performance than a relatively mild fontal injury would have on a physicist's work. In sum, the meaning of the various patterns of injury and the associated changes in any person's life will depend on pre-injury lifestyle, personality, goals, values, resources, as well as the individual's ability to adapt to changes and to learn techniques for minimizing the effects of brain injury.

1.3 Research Objective

1.3.1 General Objective

To assess the association between impaired consciousness and quality of life among post-traumatic brain injury patient at Hospital Universiti Sains Malaysia.

1.3.2 Specific Objectives

1) To determine the association between selected demographic data (age and gender) and quality of life among post-traumatic brain injury patients at Hospital USM.
2) To determine the association between selected clinical characteristics (severity of TBI and location of TBI) and quality of life among post-traumatic brain injury at Hospital USM.

1.4 Research Questions

1) Is there any association between selected demographic (age and gender) and quality of life among post-traumatic brain injury patients at Hospital USM.
2) Is there any association between selected clinical characteristics (severity of TBI and location of TBI) and quality of life among post-traumatic brain injury patients in Hospital USM.

1.5 Hypothesis

1) H_o 1= There is no significant association between selected demographic data (age and gender) on quality of life among post-traumatic brain injury patients at Hospital USM.

   H_A 1= There is a significant association between selected demographic data (age and gender) on quality of life among post-traumatic brain injury patients at Hospital USM.

2) H_o 2= There is no significant association between selected clinical characteristics (severity of TBI) on quality of life among post-traumatic brain injury patients at Hospital USM.

   H_A 2= There is a significant association between selected clinical characteristic (severity of TBI) on quality of life among post-traumatic brain injury patients at Hospital USM.

3) H_o 3= There is no significant association between selected clinical characteristic (location of TBI) on quality of life among post-traumatic brain injury patients at Hospital USM.

   H_A 3= There is a significant association between selected clinical characteristic (location of TBI) on quality of life among post-traumatic brain injury patients at Hospital USM.

1.6 Definition of Terms (Conceptual/ Operational)

Table 1.1 Definition of conceptual and operational

Impaired consciousness	Impaired consciousness is a conditions where someone injuries their brain some of these structures or connections can be damaged (Siew et al., 2010). In this study, impaired consciousness will be identified based on the respondent's Glascow Coma Scale.
Quality of life after Traumatic Brain Injury	The general well-being of person that experienced traumatic brain injury (Siew et al., 2010). Traumatic brain injury is also an assault to the brain that is capable to producing physical, intellectual, emotional, social, and vocational changes. In this study, quality of life after brain injury will be identified based on the respondents view about quality of life. The QOLIBRI questionnaire is free and open to use for researchers.

1.7 Significance of the study

The study about the impaired consciousness and quality of life among person after traumatic brain injury that has been admitted to Hospital Universiti Sains Malaysia is limited as compare to the study done among community especially in Malaysia. The study about impaired consciousness and quality of life is more focus towards community as compared to person at Hospital Universiti Sains Malaysia. The study will assess the association between impaired consciousness and quality of life among post-traumatic brain injury patients . For patient and family members this study will help them in understanding what is impaired consciousness and quality of life after traumatic brain injury. Thus , they can give fully support for the patient and improve the quality of life or person after traumatic brain injury.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, the main focus of this research is to study the impaired consciousness and quality of life among post-traumatic brain injury patients at Hospital Universiti Sains Malaysia. The literature review is to determine current research that contributing to the impaired consciousness and quality of life post-traumatic brain injury. It is necessary for researcher to assess quality of life by concerning on research questions. Health-Related and Quality of Life Model is used as theoretical framework in this study.

2.2 Review of Literature

2.2.1 Incidence and prevalence of impaired consciousness

In United States, a head injury is experienced approximately every 90 seconds. In 2010, the Centers for Disease Control and Prevention (CDC) estimated that Traumatic Brain Injury accounted for approximately 2.5 million emergency department (ED) visits, hospitalizations, deaths and either as an isolated injury or in combination with other injuries. Of these persons, approximately 87% (2,213,826) were treated in and released from emergency department another 11 % (283,630) were hospitalized and discharged, and approximately 2% (52,844) died. However, these numbers underestimate the occurrence of TBIs (Faul et al., 2010).

In Malaysia, the leading cause of traumatic brain injuries is motor vehicle accidents and head injury features a common cause of death in road traffic accidents (RTA). It probably accounts for three quarter of the morbidity and mortality rates in RTA in the country. In Malaysia, the incidence of road traffic accident is one of the highest in the world with about 22 deaths per 100,000 populations. There are about six thousands two hundreds deaths per annum recorded since year 2003, while almost ten thousands victims sustained severe disabilities (Siew, Johari, Nasser & Abdullah, 2010).

2.2.2 Impaired consciousness

From the previous study, impaired consciousness requires altered cortical function. This can occur either directly from disorders that impair widespread bilateral regions of the cortex or indirectly effects on subcortical arousal systems. Altered consciousness may occur with bilateral or dominant temporal lobe seizure involvement . In temporal lobe epilepsy, focal temporal lobe seizures produce a behavioral changes (Dario et al, 2010).

2.2.3 Quality of Life (QoL) post-traumatic brain injury

From the previous study, state that visual and auditory deficits are common effect and there are is a significant risk of post-traumatic epilepsy. Penetrating brain injury a foreign body penetrates the bony skull and passes into the substance of the brain. Blast injury without associated cranial impacts can cause traumatic brain injury (Jane and David, 2011).

2.3 Theoretical Conceptual / Framework

2.3.1 Health-Related and Quality of Life

This research used the Health-Related and Quality of Life (HRQoL) as a framework to measures of health and focuses on the quality-of-life consequences of health status. It is related to physical, mental and emotional, and social functioning. In 1995, the WHO recognized the importance of evaluating and improving people's quality of life. HRQoL was designed to indicate that behavioral techniques and physical exercise improve psychosocial functioning and HRQoL in breast cancer patients and survivors (Saskia, Mizja, Hester, Marc & Neil, 2010).

According to this model, when an individual personal perceptions of health and well-being that are paramount, rather than the physical illness itself. Functional status is defined as an individual's ability to perform normal activities, which are essential to meet basic needs, fulfil usual roles and maintain health and well-being (Saima et al., 2010).

In the theoretical framework, it is about revision of Wilson and Cleary's (1995) model of HRQoL is shown in the Figure. Our primary focus was the five boxes in the center of the model, which are five types of measures of patient outcomes. First, biological function which is originally biological and physical variables is described as focusing on the function of cells, organs, and organ systems. Biological function would be assessed through such indicators as a laboratory tests, physical assessment, and medical diagnoses. Second, symptoms which is original symptom status, refers to physical, emotional, and cognitive symptoms perceived by a patients. Functional status , the third component, is composed of physical, psychological, social, and role function. Fourth, is general health perceptions, which refers to a subjective rating includes all the

health concepts that precede it. Fifth , overall quality of life, is described as subjective well-being, which means how happy or satisfied someone is with life as a whole. The arrows indicate the dominant causal associations (Carol, Julie, Jo, & Janet, 2015).

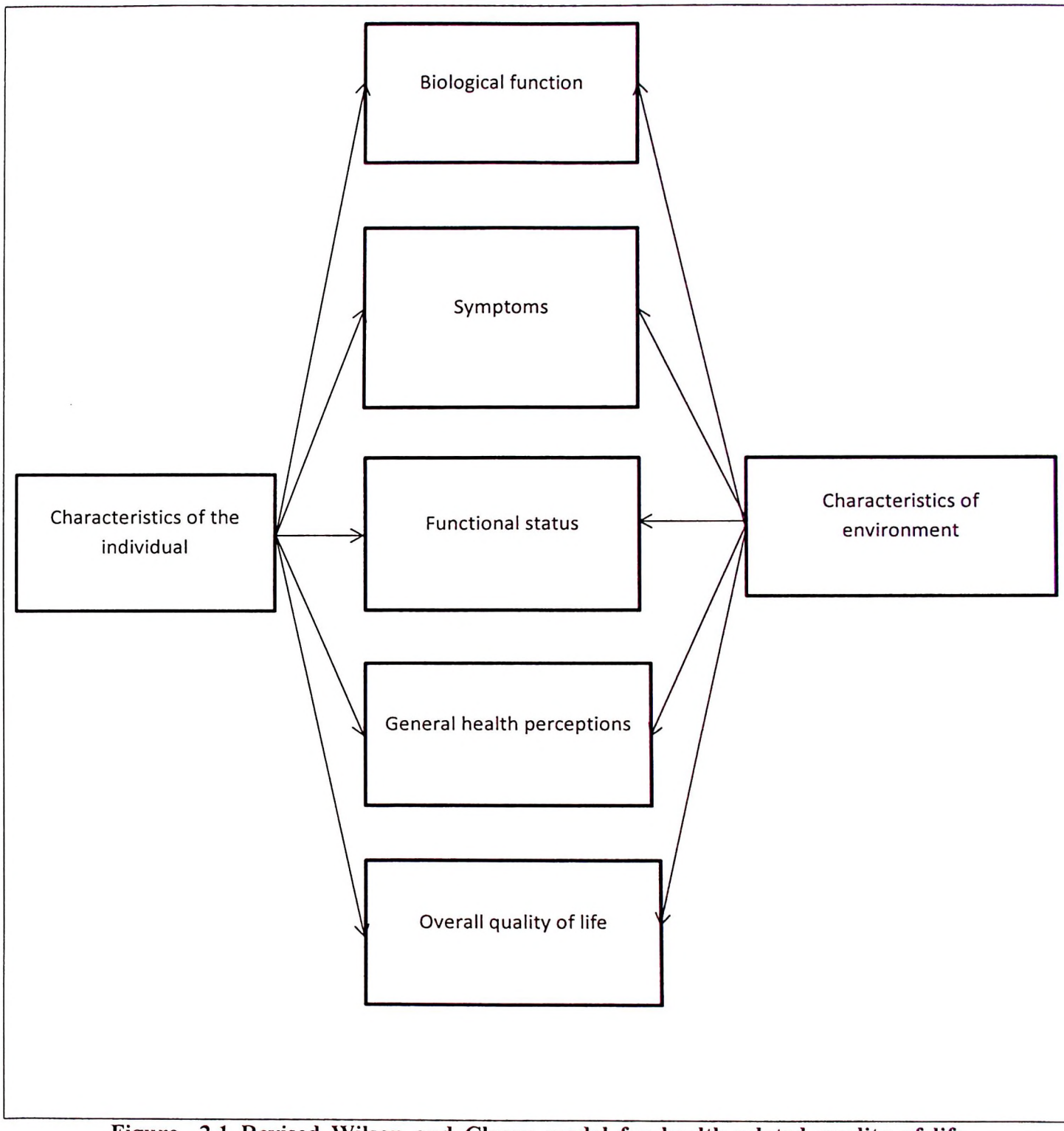

Figure 2.1 Revised Wilson and Cleary model for health-related quality of life. Adapted from "Linking Clinical Variables with Health-Related Quality of Life : A Conceptual Model Of Patient Outcomes," By I.B. Wilson and P.D. Cleary, 1995

For the conceptual framework , the modified from the model of HRQoL is used. Characteristics of individual is the demographic factors because of the variables that consist of age of person, gender and clinical characteristics. For characteristics of the environment is the influence of family, friends and healthcare providers. Biological function change to impaired consciousness. Other than that for the symptoms refer to symptoms decreased consciousness such as mild, moderate and severe. Functional status as the ability to perform tasks in multiple domains such as thinking abilities, emotions, physical function and social relationships. For general health perceptions is to ask patient to rate their health on a Likert scale ranging from not at all satisfied to very satisfied. For the overall quality of life is to show either patient has low, moderate or high quality of life.

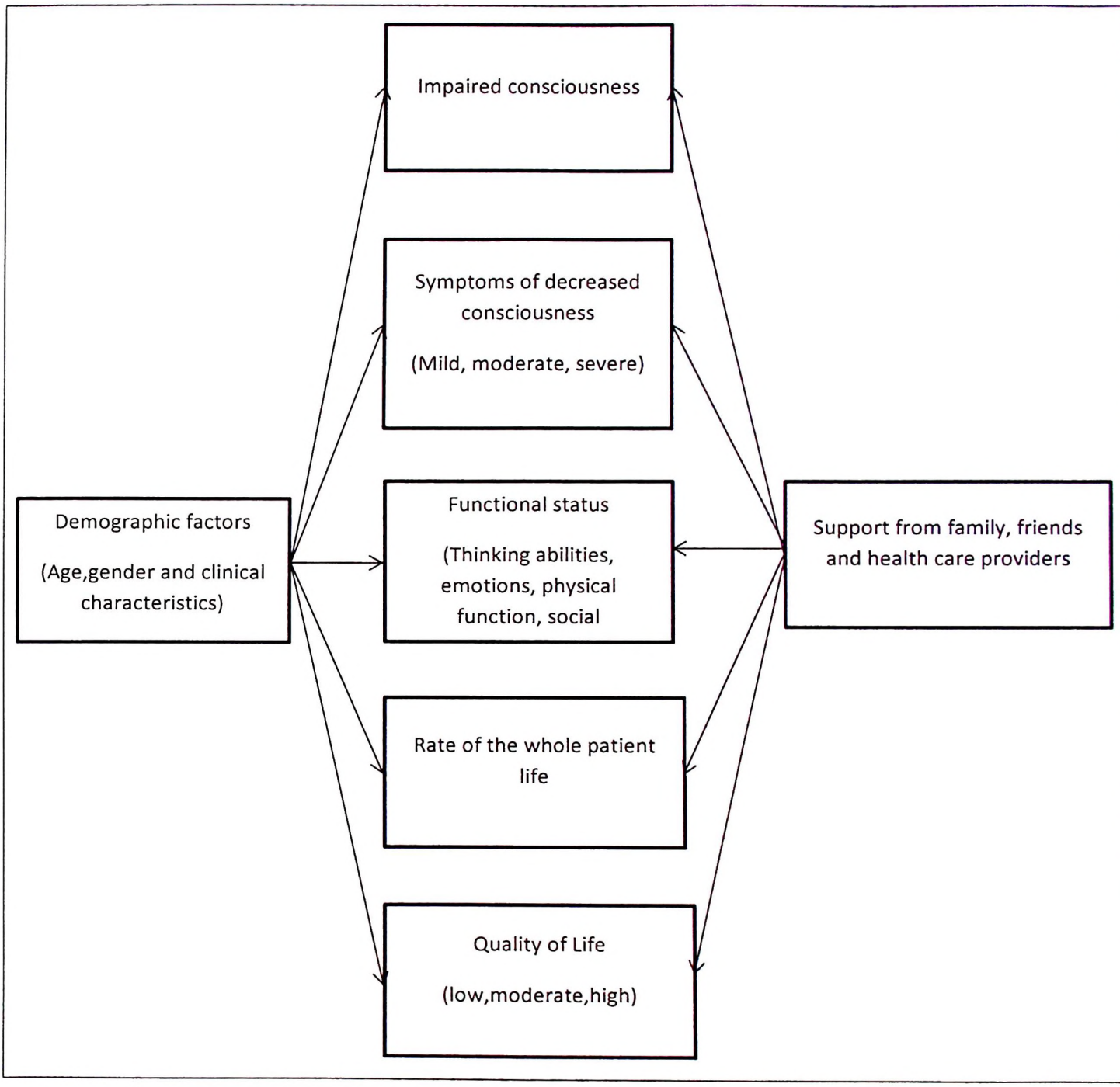

Figure 2.2 Conceptual Framework : Health-Related Quality of Life

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Design

This is a cross-sectional study and quantitative study. The objective of the study was to assess the association between impaired consciousness and quality of life among post-traumatic brain injury in Hospital Universiti Sains Malaysia. The data had been collected from December until February 2016.

3.2 Population and Setting

The study were conducted on both male and female patients that had been experience traumatic brain injury and received initial treatment and admitted to ward 2 Intan, 1 Fairuz, 2 Delima and 1 Mutiara and 3 Utara at Hospital Universiti Sains Malaysia one year ago.

3.3 Sampling Plan

3.3.1 Sample

Inclusion criteria

1) Male and female patients of Hospital Universiti Sains Malaysia
2) Age 18 years old and above
3) Patients that experience Traumatic Brain Injury one year ago
4) Able to speak and write in Bahasa Malaysia.

Exclusion Criteria

1) Pediatric patients

2) Not willing to participate in this study.

3.3.2 Sampling Method

This study had been used a probability and random sampling method. The male and female patients will be selected based on inclusion and exclusion criteria. The researcher had been follow-up the patient that fulfil the criteria by telephone call. By using this sampling methods, it prevented from bias during the study was conducted. The sample size was calculated by using the Raosoft sample size software to ensure the accuracy of the data and with a confidence level at 95% and margin of error is 5%. These types of sampling method allow the researcher to make a self-selection of patients that willing to participate.

3.3.3 Sampling Size

The recommended sample sizes for traumatic brain injury patients were 57. Then, the drop out for this study was 10% of calculated sample size is determined. Therefore , the total patients involved for this study was:

=50+ drop out of 10 %

=50 + 5

=55 participants

3.4 Variable

3.4.1 Independence Variables

The independent variables were selected based on the demographic data including age, gender and clinical characteristics likes severity of TBI, location of TBI.

3.4.2 Dependent Variables

For dependent variables was the quality of life among post-traumatic brain injury patients at Hospital Universiti Sains Malaysia.

3.4.3 Variables Measurement

For measurement variables, in section A were filled with independent variables were demographic data (age, gender) and clinical characteristics (severity of TBI, location of TBI). Respondents will be mark in the box that suitable for them. In section B and C, the respondents will be marked at the best answer and suitable for them.

3.5 Instrumentation

3.5.1 Instrument

A self-administered questionnaire is use in this study. The questionnaire Glascow Coma Scale and Quality of Life After Brain Injury are the open questionnaire that is freely to use. The questionnaire are categorize into three sections as follows:

Section A: The demographic data and clinical characteristics which comprise of 5 questions of personal profile respondent including age, gender and score of Glascow Coma Scale (GCS), severity of TBI and location of TBI.

Section B: For this section, respondents will be given questions related to Glascow Coma Scale to measure the level of consciousness. Some correct answer will be marked and choose the one they are most preferred.

Section C: For this section consists of questions about quality of life post-traumatic brain injury. Some correct answer will be marked.

3.5.2 Translation of instrument

The questionnaire and consent form will be prepared in dual language which are English and Malay language version for easy understanding by the respondents during filling of the form. The process of translation was still maintaining the original meaning of the questionnaire. By using forward and backward translation, the instruments were translated into the Malay version of questionnaire for this type of study. First of all, the instrument will be translated into Malay language by researcher and nursing lectures. After that, the Malay version was sent to one English lecturer with certificate at the Pusat Pengajian Bahasa Literasi dan Terjemahan Universiti Sains Malaysia(USM). After that, the supervisor was rechecking to compare the meaning of the questionnaires are not change and correction was done

3.5.3 Validity and Reliability

A pilot study was conducted to check the validity of the instrument. The pilot study was also important for this study to ensure the questionnaire given could be easily understand and answered by the respondents. It is also to improve the questionnaire. The pilot study was carried out on 20 respondents at Hospital USM at another independent patient ward.

3.6 Ethical Consideration

The study got ethical approval from the Human Research Committee (HREC) Universiti Sains Malaysia (USM). A written consent required to verify that the respondent agreed to participate in this study. The explanation of the purposes of study was also explained to the respondents. Respondents also had been informed of their right to decline participation and their confidentiality and anonymity will be protected. The participants had been informed that the study will be used for academic and research purposes only. To use the original question , gaining approval from the author was obtained.

3.7 Data Collection Plan

After gaining approval from the Human Research Committee (HREC) Universiti Sains Malaysia (USM), and respondents have been approach. The written consents were sought from respondents who fulfil the inclusion criteria. The respondents had been informed that the questionnaire will take approximately 10 to 15 minutes and will be collected after 30 minutes so that the respondents have enough time to complete the questionnaires. In order to avoid the error in the result, the researcher monitored the session by standing in front of the respondent. Then, after 15 minutes, the questionnaire were collected. The proposed study was carried out from December 2015 to February 2016. The flow of data collection is shown in Figure 3.1.

3.6.3 Flow Chart of Data Collection

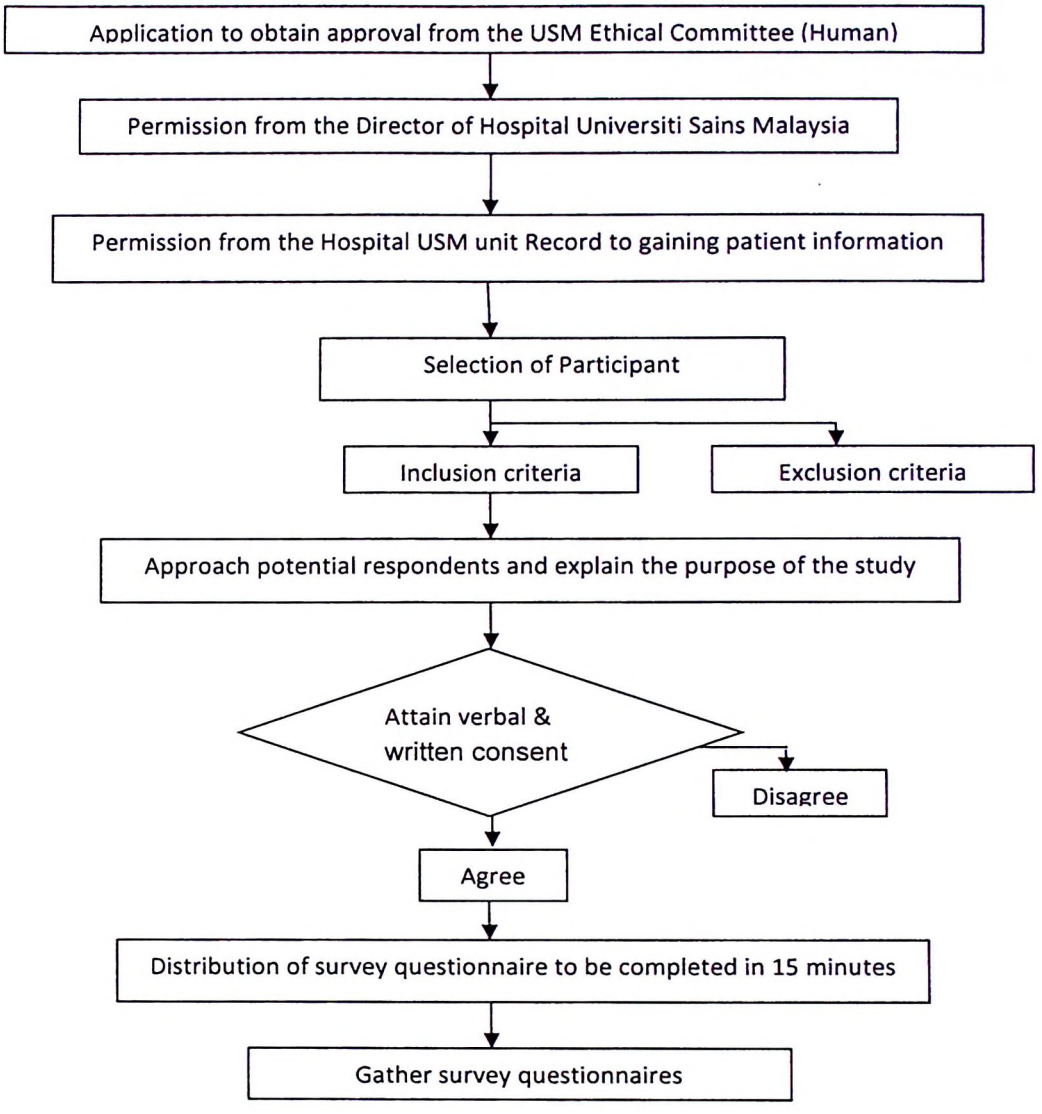

Figure 3.1 Flow Chart of the Data Collection Plan

3.9 Data Analysis

Data collected will be gathering by using Statistical Package for Social Science (SPSS) software version 20.0. Prior to statistical test, the distribution normality will be checked. At the 5% level significant, all null hypothesis (H_o) will be rejected if $p<0.05$.

Table 3.1 Measurement of Data Analysis

Research objectives	Analysis
1) To determine the association between selected demographic (age and gender) and quality of life among post-traumatic brain injury patients at Hospital USM.	Chi-square
1) To determine the association between selected clinical characteristics (severity of TBI and location of TBI) and quality of life among post-traumatic brain injury patients at Hospital USM.	Chi-square