KNOWLEDGE AND ATTITUDE TOWARDS WILLINGNESS TO PERFORM CARDIOPULMONARY RESUSCITATION AMONG UNDERGRADUATE NURSING STUDENTS IN SCHOOL OF HEALTH SCIENCES, UNIVERSITI SAINS MALAYSIA

by

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Dissertation submitted in partial fulfilment of the requirements for the degree of Bachelor of Health Sciences (Nursing)

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TABLE OF CONTENT

LIST OF TABLES AND FIGURES

LIST OF ABBREVIATIONS

CPR	-	Cardiopulmonary Resuscitation
USM	-	Universiti Sains Malaysia
BLS	-	Basic Life Support
MUET	-	Malaysian University English Test

ABSTRACT

Cardiopulmonary resuscitation (CPR) is a critical component of basic life support (BLS) and the established first-line of response to a cardiac arrest in the interim before defibrillation and advance life support (ALS) are performed. Evidence suggests that CPR knowledge and skills are poorly retained across health care professionals, including nursing students. This is a cross-sectional, descriptive study. This study was designed to provide an understanding of nursing students' knowledge, attitude and willingness to CPR. A purposive sample of 96 undergraduate nursing students from the Nursing Programme, School of Health Sciences, Universiti Sains Malaysia participated in this study during December 2012 to February 2013. Questionnaires were used to gather the data. Descriptive statistics, independent t-test, one way ANOVA, and Pearson correlation coefficients with SPSS version 20.0 were used for data analysis. The results show that the mean score for knowledge regarding CPR was 10.84 of a total possible score of 20 and for attitude, 30.41 of a total possible score of 50. There was no correlation between age with CPR knowledge and attitude towards willingness to perform CPR. There was no correlation between gender and attitude towards willingness to perform CPR. However, there was positive correlation between gender and knowledge regarding CPR. In conclusion, in order to develop positive attitudes in nursing students towards the performance of CPR, we need to strengthen education related to CPR and create effective education programs which are focused particularly on practical training for the students.

ABSTRAK

Resusitasi kardiopulmonari merupakan komponen yang kritikal dalam proses penyelamatan asas. Resusitasi kardiopulmonari merupakan satu teknik untuk mengekalkan nyawa seseorang dalam ketika serangan jantung berlaku. Terdapat bukti bahawa pengetahuan tentang resusitasi pulmonary dan kemahiran dalam melakukan resusitasi pulmonary adalah lemah dalam kalangan professional penjagaan kesihatan, termasuk pelajar kejururawatan. Kajian ini adalah kajian kerati rentas. Kajian ini adalah bertujuan memberi pemahaman tentang pengetahuan, dan sikap terhadap kesanggupan melakukan resusitasi pulmonary dalam kalangan pelajar kejururawatan. Jumlah 96 pelajar prasiswazah kejururawatan dari program kejururawatan, Pusat Pengajian Sains Kesihatan, Universiti Sains Malaysia terlibat dalam kajian ini dari bulan Disember 2012 hingga Februari 2013. Kaedah soal selidik diguna pakai dalam pengumpulan data. Data dianalisis dengan menggunakan Statistik Pakej Sains Sosial (SPSS) versi 20.0. Kajian ini melaporkan tahap pengetahuan tentang resusitasi kardiopulmonari adalah 10.84 dari jumlah 20 markah dan sikap kesanggupan melakukan resusitasi kardiopulmonari adalah 30.41 dalam jumlah 50 markah. Tiada korelasi antara umur dan pengetahuan tentang resusitasi kardiopulmonari dan sikap kesanggupan melakukan resusitasi kardiopulmonari. Bagaimanapun, terdapat kolerasi positif antara jantina dan pengetahuan tentang resusitasi kardiopulmonari. Secara keseluruhan, kita perlu menguatkan pendidikan dan praktikal tentang resusitasi kardiopulmonari perlu ditekankan supaya sikap positif terhadap kesanggupan melakukan resusitasi kardiopulmonari dapat dibentuk dalam kalangan pelajar prasiswazah kejururawatan.

DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published / written by another person except where due reference is made in the text.

CERTIFICATE

This is to certify that the dissertation entitled 'Knowledge and Attitude Towards Willingness To Perform Cardiopulmonary Resuscitation Among Undergraduate Nursing Students in School of Health Sciences, USM' is the bonafide record of research word done by undergraduate nursing student Wong Siew Ping [Matric No: 105159] during the period of December 2012 to February 2013 under our supervision. This thesis submitted in fulfillment for the degree of Bachelor of Health Sciences (Nursing). Every research work and collection of data belongs to Universiti Sains Malaysia.

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CHAPTER 1 INTRODUCTION

Nursing students are integral part of healthcare system and are perceived to be knowledgeable in providing institutional care to the patient. The tacit assumption is that after a cardiopulmonary resuscitation (CPR) course, a student is prepared to perform CPR skills competently, if called on to perform. It is claimed that successful completion of a CPR course is required by most hospitals and clinical agencies prior to a nursing student's beginning clinical experiences (Kardong-Edgren, & Adamson, 2009). However, many studies repeatedly demonstrate that CPR knowledge and skills are poorly retained by all healthcare providers, including student nurses (Madden, 2006; Kardong-Edgren, & Adamson, 2009). It is documented that a timely performed CPR can largely prevent sudden death (Madden, 2006) and it is hence considered to be an important medical procedure. According to Chew et al., (2009) in a one year cross-sectional study from March 2005 to March 2006 in Hospital Universiti Sains Malaysia (HUSM), out of the total 63 cases of cardiac arrest with CPR performed, only six patients (9.5%) had survival to ward admission. Hence, the researcher felt that the need to conduct this research is needed to determine the knowledge and attitude of willingness to perform CPR among nursing students.

Globally, the basic nursing programs, the Diploma and Bachelor programs in nursing place emphasis on the CPR techniques. However, the retention of this knowledge and skills on CPR among the nurses can be doubtful. Since the nursing students are future front line health care provider, a desire to explore the knowledge and attitude levels of CPR among nursing students provided the inspiration and determination for the researcher to conduct the research study. This study investigates the knowledge and

attitude of undergraduate nursing students towards willingness to perform cardiopulmonary resuscitation (CPR) in Universiti Sains Malaysia (USM).

1.1 Background of the Study

Cardiopulmonary resuscitation (CPR) is a critical component of basic life support (BLS) and the established first-line of response to a cardiac arrest in the interim before defibrillation and advance life support (ALS) are performed. As reported by Parnell, Pearson, and Galletly (2006), CPR is an important medical procedure and survival from cardiac arrest is depended on the rapid institution of bystander cardiopulmonary resuscitation (CPR), combined with rapid activation of emergency medical services, increases survival rates from sudden cardiac arrest 2-3 fold (Parnell, Pearson, & Galletly, 2006).

According to the Heart Foundation of Malaysia (Yayasan Jantung Malaysia, 2008), the importance of CPR is recognised in Malaysia and rightful knowledge and skills in CPR is often associated with survival and may save a valuable life. In a complex medical setting, many times, the doctor may not be present near the patient and hence the nurses are expected to provide this emergency care. To perform CPR in a meticulous manner, the nurses should be knowledgeable and competent as well as have expertise in the procedure (Kardong-Edgren, & Adamson, 2009).

The ability to respond quickly and effectively to a cardiac arrest situation rests on nurses being competent in the emergency life-saving procedure of cardiopulmonary resuscitation (CPR). CPR competency is defined as possessing cognitive knowledge and psychomotor skills to perform CPR in a cardiac arrest situation. Despite the fact that

nurses' ability to perform CPR may be critical determinant of patient survival from cardiac arrest, there is compelling evidences to suggest that healthcare professionals, and registered nurses, including nursing students across continents lack competence in the performance of CPR (Broomfield, 1996; Madden, 2006; Kardong-Edgren, et al., 2009).

1.2 Problem Statement

Cardiac arrest is a common cause of death. Globally, cardiac arrest is the leading cause of mortality and morbidity in developed and developing countries including Malaysia. An estimated 17.1 million people dead from cardiovascular disease in the year of 2004, thus representing 29% of all global deaths. By 2030, almost 23.6 million people will die from cardiovascular disease. In Malaysia cardiac arrest accounts 30% (119,000) of all death (Alwan, 2010).

Despite the common sudden deaths that are caused by heart attacks, an early study done in 1997 to look into the outcomes of CPR performed in six Malaysian district hospitals found that up to almost 60% of cases were inadequately resuscitated. Many reasons cited were failure of nurses to initiate chest compression. Being important members of the health care team, nurses are deemed to possess the basic skills needed to perform CPR. Studies from different countries have reported poor knowledge among the nurses regarding CPR (Marzooq & Lyneham, 2009; Chen, Zhang, & Wang,2008; AlKandary et al., 2007). The lack of a national resuscitation council in Malaysia also results in a great variation of syllabus and teaching contents of basic life support for trained healthcare providers. As for willingness to perform CPR among nursing students, there is a dearth of study in Malaysia that explored the knowledge and attitudes towards CPR

among undergraduate nursing students and willingness to perform CPR. Suffice to say, the majority of the cardiac arrest cases that occur in the wards would first be attended by the house officers or the junior medical officers. Chew et al.,'s (2008) review on the current status of CPR in Malaysia highlighted factors that have a negative impact on its rate of success. Absence of a unifying body such as a national resuscitation council results in non-uniformity in the practice and teaching of CPR. In the in-hospital setting nurses were found lacking in the CPR skills and experience needed. Despite CPR guidelines were recommended for all hospital staff in Malaysia and that health care team should have the knowledge of CPR and resuscitation training; there is no regulatory mandate for registered nurses to attend CPR instruction or re-certification programmes (Chew, Idzwan, Hisammudin, Kamaruddin, & Wan Aasin, 2008). In addition, nursing students only acquired their theoretical knowledge and practice of CPR during year two semesters one nursing education. Because the patient with cardiac and or respiratory arrest is undoubtedly at risk, knowledge of CPR is important. In addition, CPR is a complex task and as future front line healthcare professionals, they are required to remember and perform this procedure competently. Retaining the capacity to perform CPR effectively is a key factor in determining CPR competence. However, there is universal evidence to suggest that CPR knowledge and skills are poorly retained across these healthcare professional populations (Madden, 2006; Kardong-Edgren et al., 2009). To investigate knowledge of CPR and attitude in willingness to perform CPR among nursing students, the researcher will questioned undergraduate nursing students about CPR knowledge, training and experiences, and how they think they would react in given cardiac arrest situations. It is recognised that the nurses' poor knowledge on CPR influence the death rate among the cardiac arrest

patients. Hence, each nursing students prior to complete their nursing education, needs to know about CPR and how to apply CPR.

A retrospective study done in 2008 that look into the outcomes of CPR performed in Hospital Universiti Sains Malaysia, found that as high as up to 59.5 percent of cases were inadequately resuscitated. Majority of the staff nurses were found to have just put up intravenous drips and oxygen through face mask to cardiac arrest patients but failed to start chest compression and positive pressure ventilation through bag-valve-mask devices. Besides that, many other reasons were cited, including the inadequacy of duration of resuscitation (less than 30 minutes in 42% of cases) as well as, incomplete resuscitation trolleys (like essential items, expired drugs and leaking bag-valve-mask devices) (Chew, et al., 2008).

Heng et al.,'s (2011) study that look to the role of nurses in the resuscitation of in-hospital cardiac arrests in Singapore found that survival rates for in-hospital cardiac arrests are disappointing. Even though such arrests are often witnessed by a nurse, inadequate training may cause these first responders to have to wait for Advanced Cardiac Life Support trained personnel to arrive to perform defibrillation (Heng, Fong, Wee & Anantharaman, 2011).

In own experience, the researcher felt the need and have interest to study the knowledge and attitudes of nursing students regarding CPR. In clinical placement, nursing students who are with patients in critical condition in the clinical setting and are future front line healthcare professionals could play one or more of the roles as a member of the resuscitation team such as the initial rescuer performing CPR. Therefore, they must be

knowledgeable and skilled in performing CPR. Due to the alarming fear of cardiac and respiratory arrest, the effort of improving the knowledge and attitude of the nurses should start from the school/college/university level. This study can help in gaining the insight of nursing students' knowledge level and status attitude level in willingness to perform CPR.

1.3 General Objectives

The present study aim to investigate the knowledge and attitude of undergraduate nursing students towards willingness to perform cardiopulmonary resuscitation (CPR) in Universiti Sains Malaysia (USM).

1.3.1 Specific Objectives

a) To determine the mean difference of knowledge among undergraduate nursing students towards CPR.

b) To determine the mean difference of attitude among undergraduate nursing students towards willingness to perform CPR.

c) To compare association between demographic characteristics (age and gender) with knowledge and attitude towards willingness to perform CPR among nursing students in USM.

1.4 Research Questions

Choosing a research question is the central element of both quantitative and qualitative research (Polit & Beck, 2010). The research question is one of the first methodological steps the investigator has to take when undertaking research i.e. the research question must be clearly defined, guides the arguments and inquiry, and provokes the interests of the reviewer (Polit & beck, 2010). The research questions that guides the arguments and inquiry of this study are:

a) What is the level of retention and necessary knowledge to perform effective CPR?

b) What is the extent to which these nursing students acquire the attitude necessary to perform effective CPR?

c) What is the difference of knowledge and attitude about CPR among undergraduate nursing students at USM?

d) What is the association between demographic variables (age and gender) and knowledge and attitude of willingness to perform CPR among undergraduate nursing students at USM?

1.5 Research Hypotheses

Hypothesis 1 - There is no significant mean difference of the knowledge level about CPR among undergraduate nursing students various academic years in USM (H_o)

There is a significant mean differences of the knowledge level about CPR among undergraduate nursing students at various academic years in USM (H_A)

Hypothesis 2 - There is no significant mean differences of the attitude about willingness to perform CPR among undergraduate nursing students at various years in USM (H_o)

There is a significant mean differences of the attitude about willingness to perform CPR among undergraduate nursing students at various years in USM (H_A)

Hypothesis 3 - There is no significant association between selected socio-demographic characteristics (age, gender) and knowledge and attitude towards willingness to perform CPR among undergraduate nursing students at USM (H_o)

- There is a significant association between selected socio-demographic characteristics (age, gender) and knowledge and attitude towards willingness to perform CPR among undergraduate nursing students at USM (H_A)

1.6 Definition of Operational Terms

1.6.1 Knowledge

- Knowledge is defined as the information and skills acquired through experience or education (Soanes, & Stevenson, 2008). In this study it is the level of knowledge related to undergraduate students' knowledge about CPR. It is a basic requirement so that the positive changes in behavior can be developed. Knowledge can further bring into awareness and in turn leads to action. To develop nursing knowledge, it raises awareness of personal and professional accountability and the dilemmas of practice (Ndikom, & Onibokun, 2007).

1.6.2 Attitude

- Attitude is defined as a combination of beliefs and feelings that predispose a person to behave a certain way (Brostrand, 2006).

1.6.3 Willingness to Perform

- Willingness to perform CPR is defined as sense of responsibility about the victims welfare which is caused by both internal factors such as bystander's humanitarian values and external factors such as availability of other potential rescuer (Axelsson, 2001). Willingness to perform is the dynamic, inner energy which makes up "willingness" and a person perceives power to choose, relate and bring about changes in self, others, and circumstances (Assagioli, 1973).

1.6.4 Cardiopulmonary Resuscitation (CPR) - Cardiopulmonary resuscitation (CPR) is defined as an immediate response to a cardiac arrest, a critical component of basic life support and the established first line before advanced life support; and is associated with survival and has the potential to prevent sudden death (Madden, 2006).

1.6.5 Degree Nursing Students - Students are individuals enrolled in a school or formal educational program (Farlex, 2010). In this study context, undergraduate nursing students refer to individuals enrolled in the Nursing Program leading to a degree in nursing at the School of Health Sciences, Universiti Sains Malaysia.

1.7 Justification and Significance of the Study

The use of CPR dates all the way back to 1740, yet even today, most people and health care professionals don't know how to perform it. Given properly and immediately to sudden cardiac arrest victims, cardiopulmonary resuscitation (CPR) can save lives. The links in the chain of survival are early recognition of signs of cardiac arrest including early initiation of basic CPR (Chew et al., 2008). This is illustrated in the tragic death of the late Malaysian actor Hani Mohsin, the host of a popular television game show who collapsed while waiting for his flight at the Low Cost Carrier Terminal and was pronounced dead at a nearby hospital. This was a typical example where effective CPR could have been extremely vital. Although health care professionals, including nursing students are trained in CPR, there are still too many cardiac arrests victims who do not receive this early treatment.

An early study done in 2009 to look into the outcomes of CPR performed in six Malaysian district hospitals found that up to almost 60% of cases were inadequately

resuscitated. Many reasons were cited, including nurses who failed to initiate CPR (Chan, Nichol, Krumholz, Spertus, Nallamothu, 2009).

Chew et al., (2008) study on the delivery of rapid and effective emergency medical services to a cardiac arrest victim in one tertiary teaching hospital in Kelantan found that the resuscitation attended by junior doctors or nurses lacking in knowledge, skill and experience. It is very essential that the correct CPR measures is provided as this can reduced suffering, be instrumental in speeding up subsequent recovery, prevent permanent disability and even save life (Chew, et al., 2008).

In Athen, Kozamani, Kapadochos, and Kadda's (2012) study to look into the factors that influence nursing staff attitudes towards initiating CPR and in using an automatic external defibrillator revealed that there is often a gap between what is taught and what is practical in reality. They concluded that the main factor that affects the attitude of nurses in initiating CPR is their lack of systemic training (Kozamani, Kapadochos, & Kadda, 2012).

A study done by Heng, et al., (2011) in Singapore that investigates the roles for nurses in in-hospital resuscitations found that survival rates for in-hospital cardiac arrests are disappointing. The knowledge of nurses was found to be low. Even though cardiac arrests are often witnessed by a nurse, inadequate training may cause these first responders to wait for Advanced Cardiac Life Support trained personnel to arrive to perform defibrillation (Heng, et al., 2011). It has been noted that there have been deaths due to cardiac arrest and failure to initiate CPR. Thus, the poor response to initiate CPR and or willingness to perform the CPR among nurses has not yet been possible to

establish on this matter in Malaysia. The fact remains that health care professionals including nursing students lack motivation to perform CPR (Vaillancourt, Verma, & Trickett, 2007). It is imperative that nurses are knowledgeable and competent in handling patients with life threatening conditions and hence are expected to be knowledgeable in performing CPR techniques and capable to perform the CPR procedure in a meticulous manner, and have the expertise in the procedure (Heng, et al., 2011). Contrary to their roles, studies from different countries have reported a poor knowledge among the nurses regarding CPR (Hamilton, 2005; Al-Kandary, et al., 2007; Chen, et al., 2008; Marzooq, & Lyneham, 2009). Understanding of CPR knowledge can help in reviewing nursing education curriculum.

Most of the universities in Malaysia used the lecture-style training in developing information to the nursing students and multidisciplinary research suggests that resuscitation skills and knowledge on CPR decline from 3 to 6 months after the lecture-style of training on CPR and far little attention has been paid to explore the nursing students' knowledge and attitude on CPR (Chew, et al., 2008). Furthermore, to be safe healthcare professional, their initial nursing education must be sufficient to assure their competence to practice on entry to their professions of nursing and the foundation about resuscitation has been laid for them to continue to learn throughout their professional lives. In addition, there is public expectation that nurses are expected to be competent in their skills and knowledgeable in developing cardiopulmonary resuscitation. From the researcher perspective, the retention of CPR knowledge among nursing students can be doubtful. Therefore, understanding the knowledge and attitude of the nursing students is necessary.

1.8 Outline of the dissertation

This dissertation contains five chapters. Chapter 1 contains background to the research, the context of CPR including the knowledge and attitudes of nurses, including health care professionals towards CPR, the problem statement, general objectives and specific objectives, research questions, research hypotheses, definition of operational terms and justification and significance of the study.

Chapter 2 explores current knowledge of CPR and their related factors, and identified gaps in current knowledge. It concludes with a presentation of the conceptual framework guiding this study.

Chapter 3 describes the methodology and methods, data collection and data analysis.

Chapter 4 presents the results from the study and data analyses including demographic characteristics, the knowledge and attitude scores of undergraduate nursing students towards CPR, the association between the knowledge scores of the undergraduate nursing students and demographic variables (age and gender) , the association between the attitude of the undergraduate nursing students and demographic variables (age and gender) and to compare the association between demographic characteristics (age and gender) with knowledge and attitude towards willingness to perform CPR among nursing students in USM. It also present data pertaining nursing students' attitude willingness to perform CPR

Chapter 5 and chapter 6 discuss the results gained from the study, limitation and strength of this study, and recommendations for future research.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

Review of literature is a key step in research process. In general, nursing research may be considered a continuous process in which knowledge gained from earlier studies is an integral part of research.

The ultimate goal of research is to develop, refine and expand a body of knowledge (Polit, & Beck, 2004). It is necessary to conduct a review of literature on the topic to allow the researcher to have current body of knowledge on the topic before undertaking the research. These reviews provide researcher a comprehensive understanding of the topic which help researcher to be aware of what is known and what questions need to be answered based on the topic.

As discussed in the introductory chapter of this study, there has been considerable scrutiny of health care providers' knowledge and attitude towards caring for patient especially nurses need to think critically during emergency for example during cardiac arrest. Most of the published studies on cardiopulmonary resuscitation (CPR) in optimizing survival indices, new developments or adjuncts in resuscitation, and the level of preparedness of healthcare professionals in providing effective CPR (Hamilton, 2005). This literature review presented algorithms of cardiopulmonary resuscitation, components of resuscitation, knowledge and attitude on CPR and theoretical framework used in this study.

2.2 Cardiopulmonary resuscitation (CPR)

Cardiopulmonary resuscitation (CPR) is a vital medical procedure which is needed for individuals who face sudden cardiac arrest. It is a combination of rescue breathing and

chest compressions which is delivered to the victims who are thought to be in serious conditions. CPR can save lives by maintaining some circulation to vital organs until the arrival of the emergency medical services (EMS) with their means of further treatment with a defibrillator. CPR has potential to save life-threatening emergencies such as stroke, respiratory arrest, trauma, drowning and airway obstruction. CPR is associated with survival and can prevent impending death (Moser, & Coleman, 1992). CPR combines compression of chest with rescue breathing to keep blood flowing through the body and brain while delivering oxygen to the bloodstream. The benefit of early CPR has been shown repeatedly. According to the American Heart Association released its 2010 guidelines for lay persons is followed. It is C-A-B (Circulation – Airway – Breathing): the chest compression come first, only then do focus on airway and breathing. No looking, listening, and feeling but is an action, no assessment. Push at least 2 inches deep on the chest and at the rate, 30 compressions should take 18 seconds.

CPR is deemed an essential competency and mandatory that all students must satisfactorily achieve. CPR is a series of life saving actions that improve the chance of survival following cardiac arrest (Sasson, Rogers, Dahl, & Kellermann, 2010). In essence, CPR is an attempt to restore spontaneous circulation by performing chest compressions with or without ventilation (Jacobs, Nadkarni, & Bahr, 2004).

Modern CPR concept was introduced by Peter Safar way back in the 1960s (Oransky, 2003), CPR technique has been refined from time to time, with the international resuscitation councils like the International Liaison Committee on Resuscitation (ILCOR), the American Heart Association (AHA) as well as the European

Resuscitation Council (ERC) playing important roles in coming up with evidence based recommendations.

CPR is a technique used to sustain life in first critical minutes of cardiac arrest. It establishes the function of the heart and lung until the advanced life support is available. The oxygen we breathe travels to our lungs is picked up by the blood and then it is pumped to the body tissue and organs. When a person experience cardiac arrest, either due to heart failure, stroke or any injury such as drowning, severe trauma which causes the heartbeat goes from normal beat to an arrhythmic pattern known as ventricular fibrillation and eventually, the heart ceases to beat normally. This prevents oxygen from circulating throughout the whole body, results in killing body cells and tissues. The importance of cardiopulmonary resuscitation (CPR) serves as an artificial respirator. Sudden cardiac death from the coronary heart disease occurs over 900 times per day in United States. The risk in adults is estimated to be 1 per 1,000 adults 35 years of age and older per year. Sudden cardiac death in the young people (less than 35 years old) is much less common in adult, occuring in only 0.5 to 1 child per 100,000 per year (Adult CPR review, 2007).

Cardiopulmonary resuscitation is an emergency substitution of heart and lungs action to restore life of someone who appears dead. Two main components of Cardiopulmonary resuscitation are chest compression to make the heart pump and mouth-to-mouth ventilation to provide oxygenation and improve ventilation on the victims (Lewis, 2004).

The survival rate after cardiac arrest depends on the quality of cardiopulmonary resuscitation (CPR), alarm response time and time to defribrillation (Herlitz, Aune,

Bang, Fredriksson, Thoren, Ekstrom, & Holmbergs, 2005). All healthcare professionals should be able to perform CPR with competence,especially among the physicians and nurses. Some studies done suggested that too much emphasis is placed upon verbal information and too little on practical skills during training (Roppolo, Pepe, Campbell, Ohman, Kulkarni, Miller, Idris, Bean, Bettles, & Idris, 2007). Therefore, nursing students must first possess a theoretical knowledge of the CPR and its related subject.

Cardiac arrests both in and out of hospitals remain a leading cause of death. The incidence of in-hospital cardiac arrest ranges from 1 to 5 arrests per 1000 patients admissions, with survival rates to discharge between 15% to 20% (Nadkarni, Larkin, & Peberdy, 2006; Sandroni, Nolan, & Antonelli, 2007). Regardless of where a cardiac arrest occurs, the shorter the time between that event and receiving quality CPR, with compressions of adequate depth (between 38 and 51mm) and ventilations of adequate volume (between 500 and 800ml) (Kramer-Johansen, Edelson, Losert, Kohler, & Abella, 2007), the better the chance of survival (Abella, Alvarado, & Myklebust, 2005; Wik, Myklebust, Auestad, & Steen, 2005; Perkins, Boyle, & Bridgestock, 2008). Studies have found, however, that the quality of CPR is often not optimal, even among physicians and nurses who were trained previously in CPR (Nyman, & Sihvonen, 2000; Dine, Gersh, Leary, Riegel, Bellini, & Abella, 2008; Smith, Gilcreast, & Pierce, 2008) The lack of resuscitation skills of nurses and doctors in basic and advanced life support is a contributing factor to poor outcomes in post cardiac arrest. In the event of cardiac arrest situation, the nurses are perceived by the community to perform effective CPR. Findings from studies stated that the resuscitation skills of nurses are poor at performing CPR and have a low overall level of ability (Hamilton, 2005; Al-Kandary, et al., 2007; Chen, et al., 20; Marzooq et al., 2009).

2.3 Algorithms of Cardiopulmonary resuscitation (CPR)

An algorithm is defined as a procedure or formula for solving a problem (Tawfiq, & Ali, 2006). It emphasizes the key components that any rescuer can and should perform (see Figure 2.1)

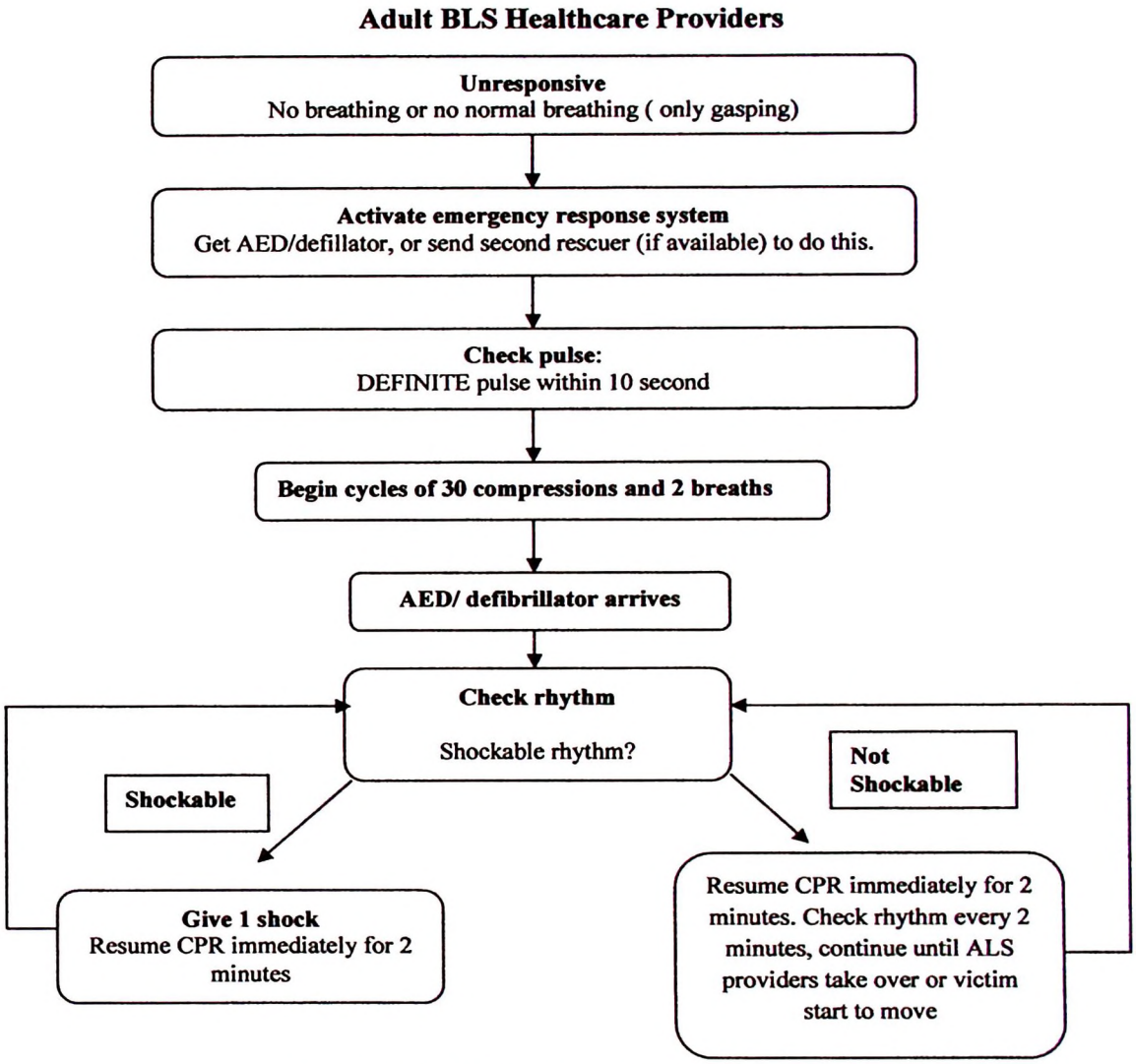

Figure 2.1: BLS Health care provider algorithm

Cardiopulmonary resuscitation (CPR) is a life saving measure which consists of series of sequential assessments and interventions aimed in supplying oxygen to the vital organs. Standardized algorithms for the conducts of CPR were developed and are

continually being evaluated and revised based on the difference in need for the various emergency situation that arise, for example sudden cardiac arrest (SCA), heart attack, stroke, trauma and foreign-body airway obstruction (FBAO).

The conventional cardiopulmonary resuscitation algorithms has been simplified and streamlined to emphasize the importance of high quality CPR, including compressions of adequate rate and depth, allowing complete chest recoil after chest compressions and avoiding excessive ventilation and the actions should be organized around uninterrupted periods of CPR (Hazinski, Chameides, Hemphill, Samson, Schexnayder, & Sinz, 2010). There have been the need to harmonize the standardized steps while performing CPR. This became necessary because there were variations and even differences in approach from one association/ council to the next. These variations had the potential to create some confusions in resuscitation team, whose team members among the health care providers were trained by different resuscitation councils or associations. According to study by Vincent (2003) the need to standardized became necessary because at first the conduct of CPR was empirical and idiosyncratic and therefore, American Heart Association published a standardized guidelines for CPR and ECC (Hazinski, et al., 2010) which helps the health care providers to perform a standardized care for the patients.

Immediate recognition of arrest is the necessary first step in the treatment. Bystanders may witness the sudden collapse of a victim or someone who apprears lifeless. Before approaching the victim, scene should be safe enough for any emergency activities to take place.

Healthcare provider should check for the responsiveness of the victim and check for breathing of the victim. If the victim remains unresponsive with no normal breathing, the rescuer should assume the victim is in cardiac arrest and immediate emergency response system should be done (Bohm, Rosenquist, Hollenberg, Engerstrom, & Svensson, 2007; Clawson, Olola, Scott, Heward, & Patterson, 2008; Berdowski, Beekhuis, Zwinderman, Tijssen, & Koster, 2009).

According to Hazinski, et al., (2010), pulse check as a mechanism to identify cardiac arrest was indicated in the American Heart Association Guidelines for CPR and ECC. Studies have shown that both laypersons and healthcare providers have difficulty in detecting a pulse on the victim (Chamberlain, Smith, Woolard, Colquhoun, Handley, Leaves, & Kern, 2002; Frederick, Bixby, Orzel, Stewars-Brown, & Willett, 2002, Graham, & Lewis, 2002 ; Owen, & Wyllies, 2004; Sarti, Savron, Ronfani, Pelizzo, & Barbi, 2006).

Several studies showed that healthcare providers are often unable to accurately determine the presence of pulse within 10 seconds (Graham, et al., 2002, Lapostolle, Le Toumelin, Agostinucci, Catineau, & Adnet, 2004; Owen, et al., 2004). Two studies in infants reported that rescuers rapidly detected cardiac activity by direct chest auscultation but were biased because they knew that the infants were healthy (Tanner, Nagy, & Peat, 2000; Inagawa, Morimura, Miwa, Okuda, Hirata, & Hiroki, 2003).

2.4 Components in CPR

2.4.1 Chest Compressions

New guidelines released by the American Heart Association (AHA) recommend that doing chest compressions first are crucial for keeping the blood circulating. The guidleines apply to adults, children, and infants but exclude newborns. The AHA recommended that the new way is C-A-B- for compressions, airway, and breathing. The three steps of cardiopulmonary resuscitation (CPR) be rearranged.

According to Handley (2004), chest compressions should be provided when the patient is supine on a firm surface and position with rescuer kneeling beside thee victim's chest or standing beside the bed (Handley, 2004). Chest compressions are performed by applying pressure with both hands (heel of one hand on sternum, other hand on top of the first) to the lower sternum. Compressions should be delivered at the rate of 100 compressions per minute for adults, children and infants (Berg, Schexnayder, & Chameides, 2010a; Berg, Hemphill, & Abella, 2010b). The depth of the compressions should be 2 inches for adults and children and 1.5 inches for infants.

Deep compressions with full chest recoil allow for maximal venous return of blood to the heart. When complete chest recoil does not occur, coronary perfusion pressure, cardiac index, myocardial and cerebral perfusion may all be negatively impacted (Berg, et.al., 2010b). In studies of CPR in out-of-hospital by Aufderheide, Pirrallo, Yannopoulous, Klein, Von Briesen, Sparks, Deja, Conrad, Kitscha, Provo, and Lurie, (2005) and in-hospital settings (Niles, Nysaether, Sutton, Nishisaki, Abella, Arbogast, Maltese, Berg, Helfaer, & Nadkarni, 2009; Sutton, et al., 2009a; Sutton, et al., 2009b), incomplete chest wall recoil was common, particularly when the rescuers were fatigue

(Aufderheide, et al., 2005; Sutton, 2009b). Incomplete recoil during CPR is associated with higher intrathoracic pressures and significantly decreased hemodynamics, including decreased coronary perfusion, cardiac index, myocardial blood flow and cerebral perfusion (Yannopoulos, McKnite, Aufderheide, Sigurdsson, Pirrallo, Benditt, & Lurie, 2005; Zuercher, Hilwig, Ranger-Moore, Nysaether, Nadkarni, Berg, Kern, Sutton, & Berg, 2010).

Additional evidence of the importance of minimizing interruptions in chest compressions comes from nonrandomized studies suggesting that survival from out-of-hospital cardiac arrest may be improved by the initial healthcare provider delivery of continuous chest compressions without initial assisted ventilations (Bobrow, Clark, Ewy, Chikani, Sanders, Berg, Richman, & Kern, 2008; Kellum, Kennedy, Barney, Keihauer, Bellino, Zuercher, & Ewy, 2008) or by healthcare providers using a higher compression-to-ventilation ratio (50:2) (Garza, Gratton, Salomone, Lindholm, McElroy, & Archer, 2009).

According to (Nishisaki, Nysaether, Sutton, Maltese, Niles, Donoghue, Bishnol, Helfaer, Perkins, Berg, Arbogast, & Nadkarni, 2009; Noordergraff, Paulussen, Venema, Van Berkom, Woerlee, Scheffer, & Noordergraft, 2009), the best way to deliver chest compressions is on a firm surface. For an infant, lone rescuers , especially healthcare providers should compress the sternum with two fingers and the compression should not be done on xiphoid and ribs.Compression for an infant should be at least one third of the depth of the chest, or about 4cm. For a child, compression can be done at the lower sternum at leact one third of the AP dimension of chest or approximately 5cm (Stevenson, McGowan, Evans, & Graham, 2005).

2.4.2 Compression-Ventilation Ratio

Compression-ventilation ratio of 30:2 is reasonable in adults, but studies show that further validation of this guideline is needed (Dorph, Wik, Stromme, Eriksen, & Steen, 2004). This 30:2 ratio in adults is based on a consensus among experts and on published case series (Rea, Helbock, Perry, Garcia, Cloyd, Becker, & Eisenberg, 2006; Steimetz, Barnung, Nielsen, Risom, & Rasmussen, 2008; Sayre, Cantrell, White, Hiestand, Keseg, & Koser, 2009; Hinchey, Myers, Lewis, De Maio, Reyer, Licatese, Zalkin, & Synder, 2010; Aufderheide, Yannopoulos, Lick, Myers, Romig, Stothert, Barbard, Vartanian, Pilgrim, & Benditt, 2010). Further studies are needed to define the best method for coordinating chest compressions and ventilations during CPR and to define the best compressions and ventilation ratio in terms of survival and neurologic outcome in patients with or without an advanced airway in place.

During basic life support, constant ventilation volume is recommended with consistent amount of ventilation volume which would ordinarily make the chest rise and fall in a normal fashion. Coronary blood flow during resuscitation- a critical determinant for recovery which significantly higher with rapid and effective chest compressions.

2.4.3 Airway and Ventilation

The healthcare provider should use the head tilt-chin lift maneuver to open the airway of a victim with no evidence of head or neck trauma. This maneuver is performed by placing one hand on the patient's forehead and the fingers of the other hand under the bony portion of the patient's chin. Pressure is then applied to the forehead, while the chin is lifted.

This maneuver should not be attempted in a situation where spinal injury is suspected (Berg, Hemphill, & Abella, 2010b). Studies showed that between 3.7% of victims with blunt trauma have spinal injury, (Rhee, Kuncir, Johnson, Brown, Velmahos, Martin, Wang, Salim, Doucet, Kennedy, & Demetriades, 2006; Milby, Halpern, Guo, & Stein, 2008) the risk of spinal injury is increased if the victim has a craniofacial injury (Mithani, St-Hilaire, Brooke, Smitch, Bluebond-Langner, & Rodriguez, 2009). For victims with suspected spinal injury, rescuers should initially use manual spinal motion restriction (by placing one hand on either side of the patient's head to hold it still) rather than immobilization devices. Healthcare provider should open the airway using jaw thrust without head extension if cervical spine injury occurs (Berg, et al., 2010b). Maintaing a patent airway and providing adequate ventilation are priorities in CPR, head tilt-chin maneuver is used if jaw thrust does not adequately open the airway. Once the airway is open, the rescuer should assess for breathing. If no breathing is detected, the rescuer should assume that the patient is not breathing and provide two rescue breaths that last one second each and cause the chest to rise (Berg, et al., 2010b).

While performing cardiopulmonary resuscitation, the primary purpose of assisted ventilation is to maintain adequate oxygenation and the secondary purpose is to eliminate carbon dioxide. However, the optimal inspired oxygen concentration, tidal volume and respiratory rate to achieve those purposes are not known. During the first minutes of sudden cardiac arrest, rescue breaths are not as important as chest compression (Kern, et al., 2002; Sayre, Berg, Cave,Page, Potts, & White, 2008) because the oxygen content in the noncirculating arterial blood remains unchanged until CPR is started; the blood oxygen content then continues to be adequate during the first several minutes of CPR. In addition, attempts to open the airway and give rescue breaths (or to

assess and set up airway equipment) may delay the initiation of chest compressions (Wang, Simeone, Weaven, & Callaway, 2009). These issues are supported by 2010 AHA Guidelines for CPR and ECC(Hazinski, et al., 2010).

CPR on infant or child is done with a compression-to-ventilation ratio of 30:2 which is recommended by American Heart Association. In an unresponsive child, the tongue may obstruct the airway of the child which interfere the ventilations. Head tilt-chin lift maneuver for both injured and noninjured victims can be done to improve the airway. Mouth-to-mouth and nose technique is suitable way to give breaths to an infant.

According to study conducted by Tonkin, & Gunn (2001) , it is necessary to move the child's head through a range of positions to provide optimal airway patency and effective rescue breathing. According to Tonkin, there will be difficulties in performing effective seal over the mouth and nose,therefore, mouth-to-mouth or mouth-to-nose ventilation is performed on infants (Tonkin, & Gunn, 2001).

2.4.4 Defibrillation

Basic Life Support providers should be trained to provide defibrillation because ventricular fibrillation is a common and treatable initial rhythm in adults with witnessed cardiac arrest (Hallstrom, Ornato, Weisfledt, Travers, Christenson, McBurnie, Zalenski, Becker, Schron, & Proschan, 2004). For victims with ventricular fibrillation, survival rates are highest when immediate bystander CPR is provided and defibrillation occurs within 3 to 5 minutes of collapse(Chan, et al., 2009; Rea, Cook, Stiell, Powell, Bigham, Callaway, Chugh, Aufderheide, Morrison, Terndrup, Beaudoin, Wittwer, Davis, Idris, & Nichol, 2010 ; Sasson, et al., 2010).