

## Declaration

I, Koena Joseph Nkoko, the undersigned hereby declare that work contained in this dissertation is my original work, that all sources used or quoted have been indicated and acknowledged by means of complete references and that I have not previously in its entirety or in part submitted it at any University for a degree.

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Signature

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Date

## **Dedication**

I wish to dedicate this study to my family for the greatest and unconditional support they provided to me during the tough times of my studies.

## **Acknowledgements**

Herewith I wish to acknowledge, and thank Dr MBL Mpolokeng and his support staff for the outstanding guidance and support through out my studies starting from the initial proposal stage to the final research report.

## ABSTRACT

**Aim of the study:** To determine knowledge of CPR and heart attack or cardiac arrest signs and symptoms among university students.

**Study Design:** A questionnaire based descriptive, cross – sectional study.

**Setting:** University of Limpopo – Turfloop Campus in Limpopo Province of South Africa.

**Subjects:** A total sample of 400 students participated in the study. The sample was selected randomly using simple random sampling techniques.

**Outcome measures:** The faculty, age, gender and level of study were determined as well as the knowledge each student has on signs and symptoms of impending heart attack and CPR.

**Results:** Of the 400 students only 26% (n=104) knew the signs and symptoms of an impending heart attack as well as out of hospital management of heart attack by performing CPR. There were differences between and within faculties, age groups, gender and level of study. Based on the Bonferroni test the student from faculty of Sciences, Health and Agriculture are more likely (p-value 0017) to know when to perform CPR compared to students from other faculties. Level of study is not associated (p-value 0128) with how much the students know about the timing and indications of CPR. Overall female students performed worse with 79% (n=123) responding incorrectly to the questions compared to 69% (n=169) males.

**Conclusion:** Based on the results of this study it safely can be concluded that the students' knowledge of signs and symptoms of an impending heart attack and CPR procedure is poor. It is therefore important for the university as a center of teaching and learning to consider including as part of university curriculum, basic life support

and first aid courses which include CPR. The inclusion of basic life support and first aid in university curriculum will prepare students to be able to effectively manage out of hospital heart attack and reduce mortality resulting from the latter. The findings of this study might to a certain extent be reflecting what the public's knowledge on the subject is, hence the need for the policy makers to take serious note of the findings when public health promotion programmes are developed.

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# CHAPTER 1

## 1. INTRODUCTION

In this chapter the focus is on general introduction to the signs and symptoms of heart attack and out of hospital management of heart attack applying cardiopulmonary resuscitation (CPR) technique. The chapter further outlines the extent of the heart attack problem and the importance of by-stander cardiopulmonary resuscitation.

### 1.1 Introduction

World wide it is estimated that every year 17 million people die from cardiovascular diseases, particularly heart attacks and strokes (WHO, 2002). By 2010 Cardiovascular diseases are expected to be the leading cause of deaths in developing countries, thus surpassing the infectious diseases like AIDS (WHO, 2002). Of the global burden of cardiovascular disease, myocardial infarction is one leading cause of death in developing countries as well as in the developed world (Abdallah et al., 2006). Apart from HIV/AIDS, heart attacks and stroke are the top killers in South Africa (Heart Foundation South Africa, 2003). According to Heart Foundation South Africa (2003) there is one heart attack every 8 minutes in South Africa, however, risk factors associated with heart attack and stroke can be managed through promotion of lifestyle modification to ensure wellness and longevity and quality of life. Besides life style modification, other forms of management of cardiac problems include medication, surgery, and cardiopulmonary resuscitation (CPR).

The Heart Foundation South Africa (2003) indicates that it is very important to know the warning signs of heart attack and stroke. It is important to recognize heart attack symptoms earlier to ensure timely access to emergency cardiac care

and increase the chances of survival of the heart attack patient (Greenlund et al., 2001).

According to Kirk-Gardener (1992) the lack of awareness of symptoms of myocardial infarction and limited ability to perform CPR in emergency situations by residents may contribute to the high mortality rates as a result of heart disease including heart attack. Deficiencies in knowledge of symptoms may contribute to delay in potential heart attack patients seeking care for heart attack symptoms (Goff et al., 1998). It is important for individuals to recognize acute myocardial infarction symptoms in order to seek treatment promptly (Ryan et al., 2004).

According to Greenlund et al., (2001) public health efforts are needed to increase recognition of the major heart attack symptoms in both the general public and groups at high risk for an acute event.

It would however be futile to recognize signs and symptoms of heart attack earlier if no timeous action is taken. According to Steil (2003) there is only 5-10minutes window period for resuscitation before death following heart attack, which basically suggests that time, is of essence in the management of cardiopulmonary collapse. Zipes (2001) indicates that for every minute lost following cardiac arrest in the resuscitation process, the risk of death increases by 10 percent.

Steil (2003) further indicates that cardiac arrest victims are three times more likely to survive if they receive bystander CPR, and that the earlier cardiopulmonary resuscitation is done, the more likely that there will be less brain damage because by performing cardiopulmonary resuscitation an attempt is made to restore circulation to other vital organs. Various emergency medicine practitioners emphasize that any attempt in resuscitation is better than none,

however, knowledge of what to do is important to avoid causing further problems or complications to the patient.

About four decades have passed since the introduction of advanced cardiac life support, but 95% of out-of-hospital cardiac arrest cases still end up dying (Kaluski et al., 2005). The persistently low functional survival rate (less than 5%) of out-of-hospital cardiac arrest victims, mandates reassessment of current strategies and guidelines (Kaluski et al., 2005). Lack of knowledge of CPR was found to be one of the contributing factors to the low initiation of by-stander CPR, which consequently resulted in poor survival rate of heart attack patients.

The assessment and evaluation of baseline knowledge of signs and symptoms of heart attack and CPR is essential if interventions are to be designed and specific groups are to be targeted.

## **1.2 Definition of concepts**

### **1.2.1 Cardiopulmonary arrest**

Cardiopulmonary arrest (Heart attack) is the abrupt, unexpected cessation of spontaneous and effective ventilation and blood circulation, which usually result from abnormal heart rhythm caused by primary cardiac disease or diseases that affect organ failure (Wingfield, 1996).

### **1.2.2 Cardiopulmonary Resuscitation**

Cardiopulmonary resuscitation refers to a group of procedures that may include artificial respiration and intubation to support or restore breathing, chest compressions or use of electrical stimulation, or medication to support or restore heart function (Partnership for Caring, 1995).

### 1.2.3 Rigor mortis

Stiffening of the body 1–7 hours after death from hardening of the muscular tissues as a consequence of the coagulation of the myosinogen and paramyosinogen (Stedman's online medical dictionary, [www.onelook.com](http://www.onelook.com) Accessed on 12 Dec. 2003).

### 1.2.4 Livor mortis

A settling of the blood in the lower (dependent) portion of the body causing a purplish red discoloration of the skin (Stedman's online medical dictionary, [www.onelook.com](http://www.onelook.com), Accessed on 12 Dec. 2003).

### 1.2.5 Putrefaction

Decomposition or rotting, the breakdown of organic matter usually by bacterial action, resulting in the formation of other substances of less complex constitution with the evolution of ammonia or its derivatives and hydrogen sulfide (Stedman's online medical dictionary, [www.onelook.com](http://www.onelook.com) Accessed on 12 Dec. 2003).

## 1.3 Abbreviations

1.3.1 CPR: cardiopulmonary resuscitation

1.3.2 EMS: Emergency Medical Services

1.3.3 MI: Myocardial infarction

## 1.4 Problem statement

Heart attacks have long been one of the leading causes of mortality in many countries including South Africa. Death from cardiac arrest continues to be one of the top public health issues despite research and public education (Perina et al.,

2001). In South Africa cardiovascular diseases accounted for 92,201 of deaths per annum, second to HIV/AIDS, which is on top of the list (Medical Research Council South Africa, 2000). According to Keeton (2003) heart attacks have long been seen as a risk to men: but in South Africa, rising rates of obesity and smoking among women have also placed them in the danger zone.

Latest statistics revealed that in South Africa there is one heart attack every 8 minutes (Heart Foundation South Africa, 2003). This finding by Heart Foundation South Africa supports the results of the study done by Medical Research Council in 2000 where the second leading cause of mortality was ischemic heart disease. According to Iwashyna et al (1999) the failure of bystanders to provide CPR to cardiac arrest victims remains a well-documented public health problem associated with significant mortality. CPR is one important step in the management of patients experiencing heart attack. It is not known how much the public including the university students know about CPR and signs and symptoms of impending heart attack.

### **1.5 Research question**

What do the students of University of Limpopo know about signs and symptoms of an impending heart attack and CPR?

### **1.6 Aim of the study**

The study was conducted to determine knowledge of CPR and heart attack or cardiac arrest signs and symptoms among students the University of Limpopo – Turfloop campus, Limpopo province, South Africa.



## **1.7 Objectives of the study**

- To determine and evaluate baseline knowledge regarding signs and symptoms of Cardiac arrest/cardiopulmonary arrest and out of hospital interventions.
- To identify the target groups that has insufficient or no knowledge (of CPR and signs and symptoms of heart attack) for whom educational programmes may be designed.

## **1.8 Significance of the study**

According to the Heart Foundation South Africa (2003) there is one heart attack every 8 minutes in South Africa. Smith (2001) indicated survival of cardiac arrest could depend on family members and bystanders' administration of cardiopulmonary resuscitation. Since lives could depend on immediate first aid, lack of knowledge and confidence to perform CPR need to be addressed in the community. The communities with low bystander CPR rates should invest more resources in promoting bystander CPR that has been proven to save lives of heart attack victims.

Seeing that cardiopulmonary resuscitation is an important intervention in saving the life of a heart attack patient, this study was conducted to establish how knowledgeable the students are, in intervening in out-of-hospital cardiopulmonary emergencies including heart attacks.

If it is established that the students lack knowledge on how to deal with cardiopulmonary emergencies, targeted educational programmes will be recommended. Such lack of knowledge amongst students may somehow give an indication of level of knowledge in the entire student population and the communities they originate from. The results of the study will further help the

university authorities to make informed decision on whether or not to include in the university curriculum basic life support and first aid.

It is important to determine what other authors have done in this area of study in order to build a solid foundation for the current study and aim to fill and complement the gaps that may be identified in the literature.

## **CHAPTER 2**

### **2. LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter focuses on review of already existing literature that is relevant to the current research problem to establish how other authors have investigated the same problem and what their findings were, so as to ensure that this research is meaningful and necessary.

#### **2.2 Literature review**

The first Cardiopulmonary resuscitation was an open chest heart massage that was performed in a hospital setting in the early 1950's. The patient suffered a heart attack and subsequent respiratory and cardiac arrest; the attending surgeon opened the patient's chest and began to massage the heart with his hands (Southwestern College – Community Training Center). According to Eisenberg (1998), Drs James Elam and Peter Safar have in the 1960's discovered mouth – to – mouth ventilation which was then combined with chest compressions (cardiac massage) to form CPR as is still practiced today.

The latest (2003) statistics by the Heart Foundation South Africa indicate that there is one heart attack every 8 minutes in South Africa. According to Medical Research Council South Africa (2000) cardiovascular diseases, primarily ischemic heart disease is the second highest cause of death in South Africa. In Hong Kong coronary heart diseases is the second cause of deaths accounting for 15.6% of deaths in 1999 (Hong Kong Special Administrative Region Public Health report, 1999). Unfortunately the bystander CPR rate in Hong Kong is as low as 15.6% and in 2003 the study revealed that the citizen's cardiopulmonary resuscitation knowledge was poor. The results of a study conducted in Silesia in

Poland were no better as the knowledge of basic life support of teachers and students was insufficient (Sosada et al., 2002).

The ability of a patient to identify specific symptoms can be helpful in management of cardiac arrest victims and such recognition can be improved by targeted, public educational efforts (Chanzal et al., 1995). The following are the common signs and symptoms of an impending heart attack: Chest pain that brings tremendous pressure in the chest, lameness or pain the left arm, shortness of breath, nausea, sweating and pain in the jaw or shoulder. However, women may experience slightly different symptoms particularly if they are diabetic for example, symptoms will include nausea, dizziness, stomach pain or even backache. When these signs and symptoms manifest themselves, an ambulance should be called immediately and rest is required by quietly sitting up if breathless or by lying down (Heart Foundation South Africa, 2003). Lack of knowledge of signs and symptoms of heart attack was found to be strongly associated with late presentation to health facilities for treatment, thus resulting in increased mortality due to heart attacks (Khan et al., 2007).

According to Nolan et al., (1999), the best line of defense against sudden cardiac death is to motivate the public to recognize and respond to cardiac emergencies with behavioural skills such as initiating CPR. In order to improve the survival rate of out of hospital cardiac arrests, a higher rate of bystander participation in basic life support is needed, however such participation is dependent on the knowledge of CPR among general public (Cheung, 2003).

It is important to start cardiopulmonary resuscitation in virtually all patients who are in cardiac arrest except if the patient has obvious signs of irreversible or biological death such as clinical death, absence of pulse, and not breathing along with rigor mortis, livor mortis, putrefaction of the body and evidence of non-survivable injury such as decapitation and in cases where the patient is terminally ill (Browner et al., 2002). According to Browner et al (2002) cardiopulmonary

resuscitation must be continued until the patient **starts** breathing and has pulse or the assistant is **out** of strength to continue with CPR, or the patient is **transferred** to another person who is trained in Basic Life Support, Advanced Life Support or another emergency medical responder or when a **physician** who is present assumes responsibility.

Rea (2002) indicate that death from sudden cardiac arrest can be significantly reduced if cardiopulmonary resuscitation and defibrillation (The act to arrest the fibrillation of heart muscles by applying electric shock across the chest, thus depolarising the heart cells and allowing normal rhythm to return) are administered before emergency medical services arrive. Victims who receive early cardiopulmonary resuscitation from bystanders before EMS arrives have higher survival rates than those who do not receive early CPR. For example, survival rate of 45% for dispatcher assisted CPR and 69% for bystander CPR was recorded in one study (Rea et al., 2002). Southwestern College indicates that CPR by itself is only about 5% effective, but with other links in the chain of survival the rate of survival for the victim increases to about 40%. In New Zealand the importance of CPR and basic life support is highly recognized in that the subjects are included in the school curriculum (Lafferty, 2003).

According to Becker (1999) patients in out-of hospital cardiac arrest have the best survival outcome when it is a witnessed arrest, when patients receive good, effective bystander CPR and have been found to be in ventricular fibrillation, and have access to early defibrillation. However, it is important to note that incorrectly performed bystander CPR might compromise survival of the cardiac arrest patient (Van Hoeyweghen et al., 1993).

Survival of cardiac arrest can depend on family members and bystanders' administration of cardiopulmonary resuscitation (Smith, 2001). According to Rea (2002) people at home lose precious minutes either because they are alone or because they must wait for arrival of EMS. If bystander CPR and definitive

therapy is delayed by more than 8 minutes, survival is rare. Early bystander CPR also improves post resuscitation neurological function (Sanders et al., 1987). Browner et al (2002) recommends that CPR should not be interrupted for more than a few seconds except where it is absolutely necessary. According to Mosesso (2002) the community needs to understand that what they do in the first few minutes after witnessing someone's collapse has proven to be most important determinant of whether the victim lives or dies. Despite the widespread training with CPR guidelines, CPR is often poorly performed (Brown et al., 2006).

Since lives could depend on immediate first aid, lack of knowledge and confidence to perform CPR need to be addressed in the community and communities with low bystander CPR rates should invest more resources in promoting bystander CPR. Citizen initiated CPR is strongly and independently associated with better quality of life (MBF, 2003 & Steill, 2003). According to Rasmus et al (2000) the teaching of CPR has had a positive public health impact beyond resuscitating cardiac arrest victims to include recognition of signs and symptoms and prevention of heart attacks.

According to MBF (2003) knowledge of first aid including CPR is sadly lacking, amongst other reasons due to lack of training in first aid, failure to do refresher courses on CPR by those who had training. Several studies have shown that most of individuals do not and would not initiate bystander CPR due to lack of knowledge (Locke et al., 1995). Inadequate knowledge of how to perform CPR was found to be one of the reasons for Japanese's reluctance to perform CPR when faced with heart attack cases (Taniguchi et al., 2007).

There is an urgent need to improve the public's knowledge of and ability to perform CPR as part of an overall strategy to decrease mortality from ischemic heart diseases (Bury et al., 1990). Smith et al (2003) concurs that there is a need for increased public education in the recognition of heart attack symptoms and appropriate steps to be taken in a cardiac event, because public education would

be one important step in shortening patients' response time from the onset of symptoms to arrival of EMS personnel. According to Lester et al., (1994) all social classes and ethnic groups could be reached and skills could be retained by teaching CPR in secondary schools. The survival rate of cardiac arrest patients is high in communities that have correspondingly high bystander CPR, while the opposite occurs in communities with low bystander CPR (Superior North EMS, 2003).

Various methodologies were applied in many studies that were cited in this study to determine the knowledge of CPR and signs and symptoms of heart attack in various other parts of the world. The next chapter will focus on the research methodology used in the current research at the University of Limpopo.

## **CHAPTER 3**

### **3. METHODOLOY**

#### **3.1 Introduction**

This chapter deals with the research methodology employed and shall include study site, study design, ethical considerations, sampling, data collection, and data analysis.

#### **3.2 Study Site**

The study was conducted at the University of Limpopo (Turfloop Campus) in the rural Limpopo Province of South Africa. The Turfloop campus of the university is situated 35km from the capital city of Limpopo Province, called Polokwane. The University of Limpopo (Turfloop Campus) has a total of approximately 14,457 enrolled students in both undergraduate and postgraduate studies in the following faculties: - Management Sciences and Law, Humanities, Sciences, Health and Agriculture (University of Limpopo Turfloop campus, 2005). The University of Limpopo is a product of amalgamation of MEDUNSA and University of the North.

#### **3.3 Study design**

The study was a descriptive, cross – sectional survey which is based on positivist philosophy which assumes that there are social facts with an objective reality apart from the beliefs of individuals (Firestone, 1987). Moreover this design was used to study the level of knowledge regarding signs and symptoms of heart attack and cardiopulmonary resuscitation amongst students of Limpopo University (Turfloop campus) in Limpopo Province of South Africa.



### **3.4 Ethical considerations**

The University of Limpopo Ethics and the Senior Degrees Committee approved the research proposal. Permission to collect data on the university premises was obtained from university authorities. In the present study, participants who are university students were adequately informed of the intention of the researcher, the aims, the purpose, potential risks of the study, and a discomfort it may entail. The participants were also informed of the right to abstain from participation in the present study or withdraw consent to participate at any time without reprisal. After ensuring that the participants have understood the information, researcher obtained the participants' freely given verbal informed consent.

No force or coercion was used on participants. Participants were assured of the strictest confidentiality and voluntary participation without any compensation. To safeguard confidentiality of participants' information, all questionnaires were sealed in envelopes after completion. Participants were further given assurance that the information gathered in this study will be coded and no names will be linked to the latter, and that the information will be used solely for the purpose of the study.

### **3.5 Sampling**

The size of the population of the present study was 14457 students. Based on Morgan and Krejcie (1994) study, simple random sampling technique was employed to select 400 university students from different faculties, levels of study, degree, gender and age. The sample was made up of 243 males and 157 females, majority 45.80% of which were from the faculty of Management Sciences and Law.

### **3.6 Data collection**

A standardized structured questionnaire was used to collect the data from the participants to ensure reliability of the study. Some of the questions in the questionnaires are similar to those asked in the study in Beijing by Zhang et al., (2007). For the current study 400 questionnaires were administered to collect data from the participants relating to their knowledge of signs and symptoms of impending heart attack and out of hospital management by applying cardiopulmonary resuscitation. Clarification of items and concepts used in the questionnaire was provided to the participants, for example the definition of rigor mortis and so forth. The questionnaire contained sections regarding participant demographics, questions on signs and symptoms of impending heart attack, and questions on how the cardiopulmonary resuscitation is performed. Informed consent was obtained from the participants before the questionnaire could be completed.

### **3.7 Data analysis**

To answer the research question, the following universally acclaimed statistical data analysis tools were employed: -

- A t-test was used to compare the knowledge of signs and symptoms of heart attack and CPR procedure by student, level of study as well as sex/gender in which the statistical significance was determined using 95% confidence interval.
  
- One-way ANOVA was used to compare the knowledge of signs and symptoms of heart attack and CPR procedure, between and within different faculties and age groups.

- Bonferroni test (a post hoc test used to determine the significant differences between group means in an analysis of variance setting ([www.babylon.com](http://www.babylon.com). Accessed 12 September 2007)) was used to determine which groups have differences between and within themselves from the other groups.
  
- All statistical analysis was performed using computer package program called Statistical Product for Service Solutions (SPSS).

## CHAPTER 4

### 4. RESULTS AND INTERPRETATION

#### 4.1 Introduction

This chapter focuses on the results or findings of the study. The chapter further looks into what results uncovered in the context of the research question. The results are divided into three sections the demographic information and results on signs and symptoms as well as performance of CPR. To ensure interpretive validity the study was conducted in one language using standardized data collection techniques and protocols.

##### 4.1.1 Demographics

A total of 400 questionnaires were distributed to students from different faculties, age groups, gender, and level of study

##### 4.1.1.1 Gender and level of study

**Table 4.1 Participation by gender and level of study**

<b>Gender and Level of study</b>				
	<b>Males</b>	<b>Females</b>	<b>Total count</b>	<b>Total %</b>
1st & 2nd year	116	76	192	48%
3rd yr & Post grad	128	80	208	52%

Table 4.1 shows participation by gender and level of study. In this study the participants were divided into two categories of levels of study namely, 1<sup>st</sup> and 2<sup>nd</sup> year and 3<sup>rd</sup> year and postgraduate. Of the 192 (48%) participants from 1<sup>st</sup>

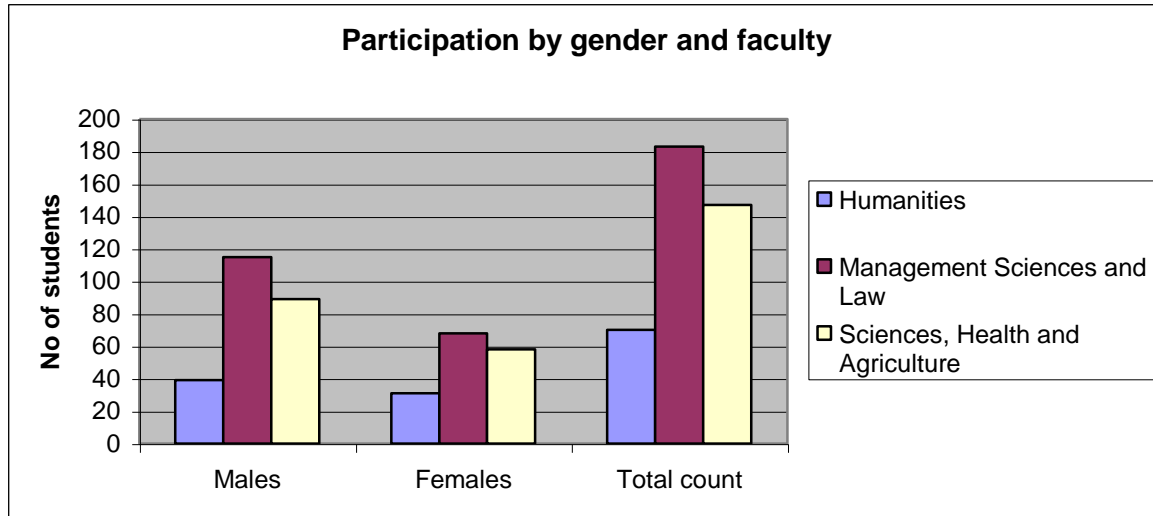
and 2<sup>nd</sup> year students 40% were females and the remainder was males. A total of 208 (52%) participants were from the 3<sup>rd</sup> year and postgraduate, 62% of which were males.

#### 4.1.1.2 Gender and faculty

**Table 4.2 Participation by gender and faculty**

<b>Gender and Faculty</b>				
	Males	Females	Total count	Total %
Humanities	39	31	70	18%
Management Sciences and Law	115	68	183	46%
Sciences, Health and Agriculture	89	58	147	37%

Table 4.2 shows participation by gender and faculty. About 46% participants were from the faculty of Management Sciences and Law, with 18% and 37% being from faculties of Humanities and Sciences, Health and Agriculture respectively. A total of 243 male students, 47% of which were from faculty of Management Sciences and Law, while 16% and 37% were from the faculties of Humanities and Sciences, Health and Agriculture respectively, participated in this study.



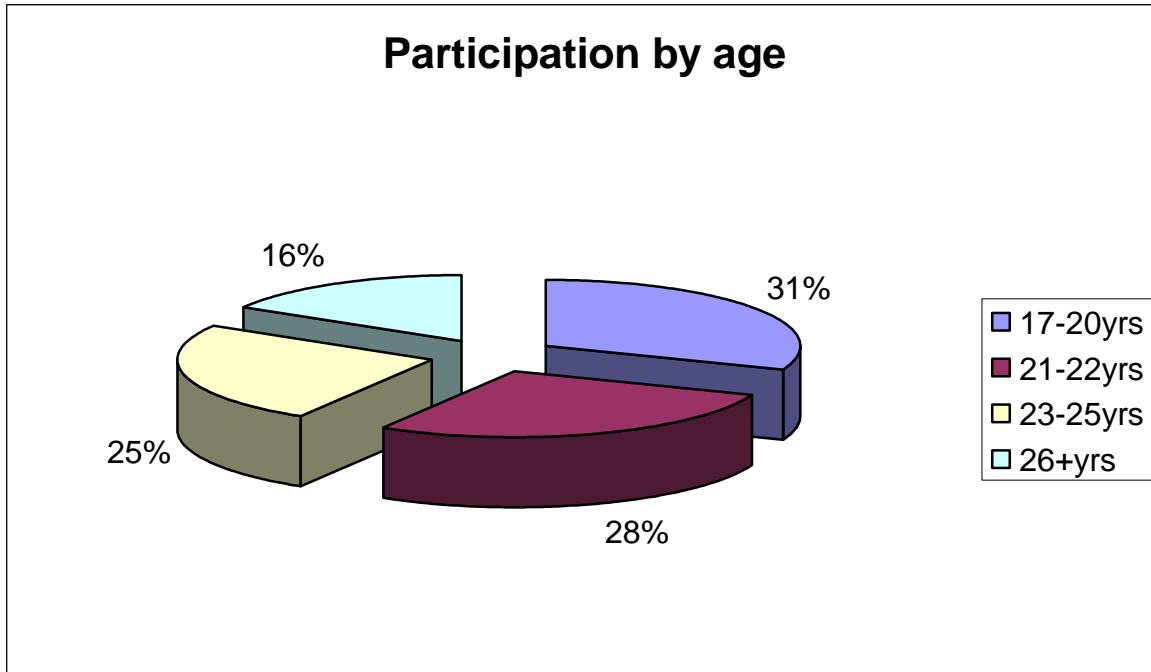
**Figure 4.1: Participation by gender and faculty.**

#### 4.1.1.3 Gender and age group

**Table 4.3 Participation by gender and faculty**

Gender and age group				
	Males	Females	Total count	Total %
17-20yrs	74	49	123	31%
21-22yrs	64	48	112	28%
23-25yrs	73	26	99	25%
26+yrs	32	34	66	17%

Table 4.3 shows participation by gender and age groups. The age groups represented in the study were as follows: -The participants aged 17-20 years accounted for about 31% of the sample population, followed by those aged 21-22 years at 28% .The other groups aged 23-25years and those above 26years participated at 25% and 17% respectively.



**Figure 4.2: Participation by age**

## 4.2 Results of the study

There were four categories of questions to which the participants had to respond, namely:

- ❑ Knowledge of signs and symptoms of heart attack
- ❑ Knowledge of CPR procedure
- ❑ Knowledge of timing and indications of CPR
- ❑ Difference of CPR in infants and adults, as well as who can perform CPR.

### 4.2.1 Results on signs and symptoms of an impending heart attack

When asked about the signs and symptoms of an impending heart attack only 25% (n=101) of the 400 participants responded correctly. Seventy percent (n=299) knew nothing about the signs and symptoms of an impending heart attack. Female students performed worse than male students as 81% (n=126) of all female students that participated did not know the signs and symptoms of an

impending heart attack, which means females are less likely to recognize signs and symptoms of an impending heart attack.

Based on the t-test there is no significant difference between knowledge of males and females (p-value 0.827) on signs and symptoms of heart attack. Applying a t-test on the same sample but now comparing the differences in levels of study, the results indicated that there are no significant differences in knowledge of signs and symptoms of heart attack between different levels of study as shown by the p-value of 0.236 (table 4.4).

**Table 4.4 Comparison of knowledge of signs and symptoms of an impending heart attack and CPR by level of study**

<b>Knowledge and level of study</b>					
	1st & 2nd year students (N=192)		3rd year & post graduate students (N=207)		
	Mean	Std. Dev	Mean	Std. Dev	P-Value
Knowledge of signs and symptoms of heart attack	1.84	1.298	1.99	1,254	0.236
CPR Procedure	2.56	1.627	2.95	1.702	0.02
When to commence CPR	4.82	2.1	5.14	2.181	0.128

Table 4.4 shows the comparison of knowledge of signs and symptoms of heart attack, CPR procedure and when to commence CPR, between and within the 1<sup>st</sup> and 2<sup>nd</sup> year and 3<sup>rd</sup> year and postgraduate students. However the focus in this section (4.3.1) is on results regarding signs and symptoms of heart attack.

In determining the knowledge difference between and within groups One-Way ANOVA was applied. ANOVA results indicated that there were no significant differences regarding the knowledge of signs and symptoms of heart attack



between and within different age groups with the a p- value being 0.878 (table 4.6).

There were no significant differences between and within the different faculties when it came to the knowledge of signs and symptoms of an impending heart attack as indicated by p-value 0.186 (table 4.7).

#### 4.2.2 Results on CPR procedure

Seventy two percent (n=287) students did not know the CPR procedure as reflected by the incorrect answers provided when asked about the procedure. Of the 287 students that did not know CPR procedure, 41 %( n=119) were females and 59% (n=168) were males. The remaining 28% (n=113) of the 400 students knew the CPR procedure which amongst other include the need to check for response, clear the airway, do mouth to mouth respiration as well as checking pulse in between chest compressions.

**Table 4.5 Comparison of knowledge of signs and symptoms of heart attack and CPR by gender**

<b>Knowledge and Gender</b>					
	<b>Males (N= 243)</b>		<b>Females (N= 157)</b>		
	<b>Mean</b>	<b>Std. Dev</b>	<b>Mean</b>	<b>Std. Dev</b>	<b>P-Value</b>
Knowledge of signs and symptoms of heart attack	1.9	1.285	1.93	1.272	0.827
CPR Procedure	2.58	1.645	3.02	1.693	0.011
When to commence CPR	5.04	2.053	4.89	2.293	0.490

Table 4.5 shows the comparison of knowledge of signs and symptoms of heart attack, CPR procedure and when to commence CPR, between and within the male and female students, however the focus is on results on CPR procedure.

Based on the t-test in table 4.5 above indicates that there is significant difference in knowledge of CPR procedure between male and female students as indicated by p value 0.011. The indication is that the female students have more knowledge on CPR procedure than their male counterparts.

The 3<sup>rd</sup> year and postgraduate students responded correctly to the CPR procedure questions with the mean of 2.95 against the mean of 2.56 for 1<sup>st</sup> and 2<sup>nd</sup> year students with p-value 0.020 (table 4.4). This results shows that there is an association between the level of study and how much the students know about CPR procedure.

**Table 4.6 Comparison of knowledge of signs and symptoms of heart attack and CPR between and within different age groups**

Knowledge and age groups									
	17-20yrs (N=123)		21-22yrs (N=112)		23-25yrs (N=99)		26 & above yrs		
	Mean	Std.Dev	Mean	Std. Dev	Mean	Std.Dev	Mean	Std.Dev	P-Value
Knowledge of signs & symptoms of heart attack	1.93	1.288	1.83	1.2	1.96	1.261	1.95	1.44	0.878
CPR Procedure	2.74	1.572	3.08	1.6	2.76	1.836	2.23	1.634	0.012
When to commence CPR	5.03	1.992	5.21	2	5.13	2.253	4.26	2.282	0.024

Table 4.6 shows the comparison of knowledge of signs and symptoms of heart attack, CPR procedure and when to commence CPR, between and within the different age groups, however the focus is on results regarding CPR procedure.

ANOVA results in table 4.6 indicate that there is significant difference in knowledge of CPR procedure between and within different age groups (p-value 0.012). Bonferroni test revealed that not all groups are the same. There is significant difference (p-value 0.006) between the age group 21-22years and 26years and older, meaning the older the participants are the more likely that they would have better knowledge of CPR procedure.

**Table 4.7 Comparison of knowledge of signs and symptoms of heart attack and CPR, between and within different faculties**

Knowledge and Faculty							
	Humanities (N= 70)		Management Sciences & Law (N=183)		Sciences, Health & agriculture (N=147)		
	Mean	Std.Dev	Mean	Std. Dev	Mean	Std.Dev	P-Value
Knowledge of signs & symptoms of heart attack	1.71	1.144	2.03	1.315	1.86	1.286	0.186
CPR Procedure	2.27	1.76	2.68	1.548	3.08	1.73	0.003
When to commence CPR	4.61	2.215	4.73	2.041	5.47	2.172	0.002

Table 4.7 shows the comparison of knowledge of signs and symptoms of heart attack and CPR procedure as well timing for commencement of CPR between faculties.

The students from the faculty of Sciences, Health and Agriculture are better knowledgeable regarding the CPR procedure (mean score of 3.08), than their counterparts in faculty of Humanities (mean score of 2.27). This significant difference between and within different faculties is indicated by the p-value of 0.003 (table 4.7).

The above assertion that students from faculty of Sciences, Health and Agriculture know significantly better about CPR procedure compared to those from Faculty of Humanities is supported by p value of 0.002, which result from the Bonferroni test for multiple comparisons.

#### **4.2.3 Results on when to commence CPR**

Out of 400 participants only 25% (n=99) responded correctly to the question on the timing and indications of CPR. The other 75 % (n=301) did not know amongst others that CPR must commence when there is no pulse, within 6 minutes of heart attack, and that the patient needs to lie flat on his/her back on a firm surface to do chest compressions.

When asked when should CPR commence most female students 82% (n=128) of the female students who participated, did not know compared to the 71% (n=173) of the male students. This significantly higher percentage (75%) of students who do not know when to commence CPR could result in unwanted delays when CPR is required urgently to prevent death.

Based on t-test male students are more likely to know when to perform CPR, than the female students, however the difference in knowledge on CPR timing and indications between male students and female students is not significant (p-value 0.490).

Level of study is not associated with how much the student knows about the timing and indications of CPR, as indicated by the p-value of 0.128 (table 4.4). ANOVA results indicated significant difference (p-value 0.024) in knowledge on timing and indications of CPR, between and amongst the different age groups.

**Table 4.8 Bonferroni – Multiple comparisons of age groups**

Dependent variable	(I) Age group	(J) Age group	Mean difference (I-J)	Std. Error	P-Value	95% confidence Level	
						Lower Bound	Upper Bound
CPR Procedure	21-22yrs	17-20yrs	0.341	0.217	0.701	-0.23	0.92
		23-25yrs	0.323	0.229	0.955	-0.28	0.93
		26+yrs	0.853	0.257	0.006	0.17	1.54
	26yrs	17-20yrs	-0.513	0.253	0.261	-1.18	0.16
		23-25yrs	-0.853	0.257	0.006	-1.54	-0.17
		26+yrs	-0.53	0.264	0.270	-1.23	0.17
When to commence CPR	21-22yrs	17-20yrs	0.182	0.278	1.000	-0.56	0.92
		23-25yrs	0.083	0.294	1.000	-0.7	0.86
		26+yrs	0.957	0.331	0.024	0.08	1.83
	26yrs	17-20yrs	-0.775	0.325	0.106	-1.64	0.09
		23-25yrs	-0.957	0.331	0.024	-1.83	-0.08
		26+yrs	-0.874	0.339	0.061	-1.77	0.02

Table 4.8 shows the results of Bonferroni data analysis test. Bonferroni test revealed that not all groups are the same. There is significant difference (p-value 0.024, table 4.8) between the age group 21-22years and 26years and older, meaning the older the participants are the more likely that they would have better

knowledge of when and under which circumstances to commence or initiate CPR.

**Table 4.9 Bonferroni – Multiple comparisons of faculties**

Dependent variable	(I) Faculty	(J) Faculty	Mean difference (I-J)	Std. Error	P-Value	95% confidence Level	
						Lower Bound	Upper Bound
CPR Procedure	Humanities	Management Sciences and Law	-0.406	0.233	0.244	-0.97	0.15
		Sciences, Health & Agriculture	-0.81	0.24	0.002	-1.39	-0.23
	Sciences, Health & Agriculture	Humanities	0.81	0.24	0.002	0.23	1.39
		Management Sciences and Law	0.404	0.183	0.084	-0.04	0.84
When to commence CPR	Humanities	Management Sciences and Law	-0.112	0.298	1.000	-0.83	0.6
		Sciences, Health & Agriculture	-0.855	0.308	0.017	-1.6	-0.11
	Management Sciences and Law	Humanities	0.112	0.298	1.000	-0.6	0.83
		Sciences, Health & Agriculture	-0.743	0.235	0.005	-1.31	-0.18
	Sciences, Health & Agriculture	Humanities	0.855	0.308	0.017	0.11	1.6
		Management Sciences and Law	0.743	0.235	0.005	0.18	1.31

Table 4.9 shows the results of Bonferroni data analysis test. Based on this test the students from the faculty of Sciences, Health and Agriculture are more likely to know when to do CPR as compared to students from other faculties. The

difference between and within these different faculties is reflected by the p-value of 0.017 (table 4.9).

#### **4.2.4 Results on general questions on CPR**

About 70% (n=281) of the 400 students did not know that there is a difference in the way CPR is done on children and adults. These students further did not know that any person could do CPR even if such a person is not a health professional. Female students performed worse on this question with 78% (n=122) having responded incorrectly compared to the 65% (n=159) male students.

#### **4.3 Summary of all responses to all questions**

The study asked four main categories of questions to determine the level of knowledge of signs and symptoms of heart attack as well the out of hospital management thereof, with special reference to CPR. On average only a disappointing 26% (n=104) of 400 students responded correctly to all the questions while 74% (n=296) did not know much about the signs and symptoms of an impending heart attack and performance of CPR as an out of hospital intervention for patients who experience out of hospital heart attack.

Based on the Bonferroni test the students from the Faculty of Sciences, Health and Agriculture are more likely (p-value 0.017) to know when to do CPR as compared to students from other faculties. ANOVA results indicated that there is significant difference in knowledge of CPR procedure between and within different age groups (p-value 0.012).

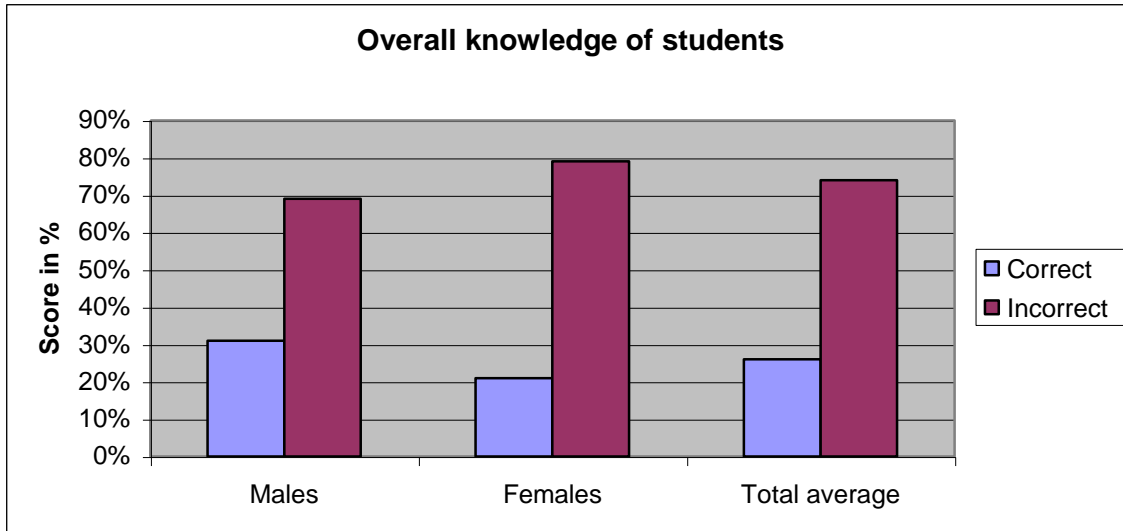


Figure 4.3: Overall knowledge of students

Figure 4.3 indicate that generally female students performed worse with 79% (n=123) responding incorrectly to the questions compared to 69% (n=168) when compared to male students. Important to note is that 74% (n=296), which include both male and female students, performed poorly as they did not know the signs and symptoms of impending heart attack and CPR as life saving out of hospital procedure.



## **CHAPTER 5**

### **5. DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

In this chapter the focus is on discussion of main findings of the study. The findings as reflected in Chapter 4 are discussed critically against the literature review. Included in this chapter, are the conclusion and recommendations.

#### **5.2 Discussions and conclusion**

It is well documented in literature that survival from out of hospital cardiac arrest is dependent on the rapid institution of bystander CPR, however bystander knowledge of CPR may be a major determinant of such survival. In evaluating the level of knowledge about first aid among Polish society the study by Sosada et al (2002) found that knowledge of secondary school students and teachers was insufficient. Despite the importance of knowledge of CPR to save lives, like in many other studies Cheung 's (2003) study of knowledge of cardiopulmonary resuscitation among the public in Hong Kong revealed that the knowledge was poor, thus necessitating a need for a review of basic life support education.

In the current study at the University of Limpopo the focus was on the knowledge of university students regarding signs and symptoms of an impending heart attack and CPR on out of hospital patients. As expected this study found that only a disappointing 26% (n=104) knew the signs and symptoms of heart attack and CPR procedure as demonstrated by correct responses provided on questions. It is a documented fact that communities with low rate of CPR also have low survival rates of cardiac arrest patients (Superior North EMS, 2003). The terribly low level of knowledge of signs and symptoms of heart attack and CPR procedure among university students is call for a concern.

The current study at University of Limpopo found that gender is to a particular extent associated with how much the students knew about CPR procedure and signs and symptoms of impending heart attack. There were differences in knowledge of signs and symptoms of heart attack, by gender that was highlighted by this study at the University of Limpopo. Overall female students performed worse with 79% (n=123) responding incorrectly to the questions compared to 69% (n=169) males, indicating that male students have a better general knowledge of how to recognize a potential heart attack patient through signs and symptoms and will be in a better position to know how to perform CPR. The difference between male and female may be due to the fact that there were more males (n=87) from the faculty of health sciences from which they could have as part of some of their courses studied human physiology, which cover the cardiac function and pathology.

Signs and symptoms of heart attack are not known by about 76% (n=304) of the students as they responded incorrectly to this question. This significantly poor knowledge of signs and symptoms among students could be due the fact that some of the symptoms are not exclusively for heart attack, but could be related to some other ailments. With this incredibly high lack of knowledge of signs and symptoms of heart attack, the students are more likely to miss the person presenting with signs and symptoms of heart attack, thus failing to prevent a potentially preventable death. A study conducted in Canada has revealed that the lack of awareness of symptoms of MI (heart attack) and limited ability to perform CPR skills in emergency situations by community residents may contribute to the high mortality rates due to heart disease (Kirk-Gardener et al., 1992). Similarly a study by Khan et al., (2007) in Pakistan revealed that many patients present late to hospitals for treatment of potential heart attack signs and symptoms because of lack of knowledge of these signs and symptoms, consequently increased chances mortality due heart attack.

About 28% (n=112) of participants responded correctly to CPR procedure questions, which means that they are more likely to know what to do should they be confronted with a heart attack patient. Notwithstanding the fact that 28% (n=112) of students responded correctly, it is of great concern and worrying that the other 72% (n=288) did not have an idea about the CPR procedure.

As if the poor knowledge on CPR procedure was not enough, the study further revealed that 76% (n=304) of the students do not know the actual timing and indication for performance of CPR. This significantly poor knowledge of when to commence CPR could result in delays and complications in heart attack patients leading to increased morbidity and mortality. A study by Dracup et al (1989) has revealed that the immediate delivery of bystander-administered cardiopulmonary resuscitation (CPR), coupled with the rapid delivery of advanced cardiac life support, can significantly reduce mortality from out-of-hospital cardiac arrest. The lack of knowledge of when to commence CPR, as identified above is not good in a country like South Africa where every 8 minutes a heart attack occurs (Heart Foundation South Africa, 2003).

Difference in knowledge of CPR procedure between male and female students was noted. Notwithstanding the general poor knowledge of signs and symptoms as well as CPR, t-test results indicated that female students have better knowledge of CPR procedure (p-value 0.011, table 4.5), which indicates, that females are in a better position to perform CPR in a procedurally correct manner.

The level of study was shown to be strongly associated (p-value 0.020) with how much students know about signs and symptoms of impending heart attack and CPR, as reflected by the 3<sup>rd</sup> year and post graduate students who responded correctly and better to the questions than those in lower levels of study (table 4.4).

There were no significant differences between and within the different faculties when it came to the knowledge of signs and symptoms of heart attack as indicated by p-value 0.186 (table 4.7). It is surprising that students from health faculty did not perform better than others considering that they are exposed to anatomy and physiology in the lectures. A study conducted among students of non-medical specialisation in the Czech Republic found that their knowledge of CPR was low, despite efforts to increase the laymen's knowledge of CPR (Malek et al., 2007).

The study has found that the older the students are, the better their knowledge of signs and symptoms of impending heart attack and CPR with the p-value 0.006 (table 4.6). It is not surprising that older students knew more than younger ones because older students tend to naturally be in higher levels of study where they may have been exposed to various social circumstances and academic teaching.

The most important, but worrying finding of this study is that 74% (n=296) of the students lack knowledge of signs and symptoms of heart attack and CPR procedure. In a similar study in Victoria, Smith et al., (2003) found that Victorian public appeared to lack the knowledge of heart attack symptoms. The fact that about 74% (n=296) of students lack knowledge of signs and symptoms of heart attack, as well CPR procedure, is worrying in the context of a country like South Africa where it has been established that there is a heart attack occurring every 8 minutes (Heart Foundation South Africa, 2003). It can therefore be safely concluded that the students' general knowledge of signs and symptoms of heart and attack and CPR procedure is poor. A similar study conducted on Beijing's residents indicated that only 7.4% knew all the correct signs and symptoms (Zhang et al., 2007). The question that comes to mind is if the 74% (n=296) literate university students lack knowledge of this crucial subject that has proved to reduce morbidity and mortality in heart attack patients, what about the entire public of South Africa?

Based on the results of this study there is obviously a need for increased public education including students at various institutions of teaching and learning, in both recognition of heart attack symptoms and appropriate steps to take in a cardiac emergency. Lester et al., (1994) recommended that by teaching CPR in institutions of learning and teaching all social classes and ethnic groups could be reached, and retention of resuscitation skills could be improved by regular revision. It is true that by reaching all social classes and ethnic groups through the introduction of CPR in learning and teaching centers, the public is likely to learn from the students as they apply the learnt knowledge and skills. The findings of this study at University of Limpopo highlight the fact that there is a need for further study of this nature in which the focus will be on the broader public of South Africa to determine how ready and capable the public is to recognize a potential heart attack through signs and symptoms and act accordingly by performing CPR.

### **5.3 Limitations**

- 5.3.1 There could be a potential of information bias because of the close-ended questions used in obtaining the data leading to some participants guessing even though they were instructed not to.
- 5.3.2 Due to university policies on protection of privacy and confidentiality of student data, it was difficult to obtain student population data from which the researcher could have derived an ideal simple random sample which would have been representative of the student population. This inability to access the student population data has potential to result in a sample that is not proportionally representative.
- 5.3.3 Students' practical ability to perform CPR was not tested, however it could be assumed that students' low level of knowledge would equate to poor

CPR performance. Such a practical test could have verified some of the responses given and eliminate possibility of coincidence from guessing.

#### **5.4 Recommendation**

The results of this study indicate that about 74% (n=296) of the students lack knowledge of signs and symptoms of impending heart attack and CPR procedure. Based on these results, it is recommended that the university provide as part of the curriculum the basics of emergency management of out of hospital heart attack cases with special focus on recognition of signs and symptoms as well as performance of CPR.

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## APPENDIX

## Appendix A

### Research Questionnaire

#### Personal data

Age: \_\_\_\_\_

Sex: \_\_\_\_\_

Degree: \_\_\_\_\_

Level of study: \_\_\_\_\_

Faculty: \_\_\_\_\_

#### CPR Questions

Instructions: Answer the following questions by choosing the correct answer

Choose one of the following: -Yes or no and don't know

Please don't guess

Example (a) CPR is not an emergency procedure

Answer: NO

#### **(A). Questions on signs and symptoms of pending heart attack**

The following are signs and symptoms of impending heart attack

(A1) 1.1.1 Chest pain that brings tremendous pressure in the chest

Answer: \_\_\_\_\_

(A2) 1.1.2 Lameness or pain in the left arm (without trauma)

Answer: \_\_\_\_\_

(A3) 1.1.3 Shortness of breath, nausea and sweating

Answer: \_\_\_\_\_

(A4) 1.1.4 Pain in the jaw or shoulder (without trauma)

Answer: \_\_\_\_\_

## **(B) 2. Questions on the procedure**

Cardiopulmonary Resuscitation is an emergency procedure that involves the following: -

(B1) 2.1.1 Checking for response

Answer: \_\_\_\_\_

(B2) 2.1.2 Clearing the airway

Answer: \_\_\_\_\_

(B3) 2.1.3 Mouth to mouth ventilation

Answer: \_\_\_\_\_

(B4) 2.1.4 Chest compressions

Answer: \_\_\_\_\_

(B5) 2.1.5 Checking pulse in between ventilations and compressions

Answer: \_\_\_\_\_

**(C) CPR should be commenced when the following occurs: -**

(C1) 2.2.1 The person stops breathing and has no pulse

Answer: \_\_\_\_\_

(C4) 2.2.4 The person's breathing is shallow

Answer: \_\_\_\_\_

(C5) 2.2.5 The person is not responding to verbal commands but breathing

Answer: \_\_\_\_\_

**(D) 2.3 CPR should commence: -**

(D1) 2.3.1 At least within 6 minutes of cardiac arrest

Answer: \_\_\_\_\_

(D2) 2.3.4 Exactly 45 minutes after cardiac arrest

Answer: \_\_\_\_\_

(D3) 2.3.5 Even after 1hour of cardiac arrest

Answer: \_\_\_\_\_

(E) 2.4 Chest compressions can be done on patient with pulse

Answer: \_\_\_\_\_

(F) 2.5 Patient should lie on his/her back and on a firm surface during CPR

Answer: \_\_\_\_\_

**(G) General questions**

(G1) 3.1 CPR for infants, children and adults is done the same way

Answer: \_\_\_\_\_

(G2) 3.2 CPR can only be done by professionals in hospital

Answer: \_\_\_\_\_

***Thank you for participating in this study***