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Poor knowledge and skill retention following AED and CPR training for nursing and other medical staff has been observed. Resulting of the increasing of the mortality rate CPR and AED training are important for nursing staff and is important as the nurses often are the first witness for the victim with cardiac arrest in hospital setting. The outcome of teaching approach is necessary to improve the knowledge and skill of the nurses and other medical team that increase the survival rate.

Aim

The aim of this literature review was to describe teaching approaches for cardiopulmonary resuscitation education in relation to acquired skills and knowledge in the use of an automated external defibrillation in a cardiac arrest situation in a clinical setting.

Method

The authors have selected a literature review for this study and key word that used are Cardiopulmonary resuscitation and education, nursing, continuing, cardiopulmonary resuscitation, nursing skill and education and cardiopulmonary resuscitation. Papers published two month ago since 04-2011 from many sources, such as books and Pubmed database including 10 years period. Those published paper in English language which covers strategies to improve the knowledge and skills of the nurses and other medical staff in cardiopulmonary resuscitation and automated external defibrillation using. In addition manual research has been used to get more information.

Result

There are many different teaching approaches can be used in cardiopulmonary resuscitation and automated external defibrillation training such as ; Digital Video Disc without manikin, DVD with manikin with scenario, peer tuition and instructor facilitated methods which the best method. The quality of education in cardiopulmonary resuscitation and automated external defibrillation training can be affected by the type of teaching approach which has been used. The education and refreshment of cardiopulmonary resuscitation and automated external defibrillation training can enhance skill and knowledge of nursing staff and give self confidence during resuscitation time and in using automated external defibrillation, which can lead to increase the survival rate and improve the quality of patient's life.

Conclusion

Nurses in hospital setting who seldom encounter cardiac arrest, should received automated external defibrillation and cardiopulmonary resuscitation training to avoid time delays in resuscitation. Staff should be evaluated by using manikin with feedback system and expert instructors to ensure the quality f chest compression are satisfied at the time of training. The availability of resuscitation training equipment in unit and ward can enhance the nursing staff for self education and refresh their skill and knowledge.

INTRODUCTION

Each year in United States of America there are 325, 000 victims of sudden cardiac arrest. The mortality rates due to cardiac arrest are frequently

observed in most of emergency situation, which is most often the result of ventricular tachycardia (VT) according to Mosesso, Shapiro, Stein, Burkett, Wang (2009). Moreover, cardiovascular attacks cause one third of all deaths in the world today (Lindstrand, Bergström, Rosling, Rubenson, Stenson & Tylleskär, 2010).

The nursing staffs are often the first witness for cardiac arrest in a hospital setting (Dwyer, Mosel, 2002; Gombotz, Weh, Mitterndorfer & Rehak, 2006). Moreover, the nurses are more efficient in training of automated external defibrillation (AED) as stated by Xanthos et al. 2009. Bardy et al (2008) point out that due to the effectiveness of automated external defibrillation, it becomes recommended in public places such as; public places are: airports, schools, restaurants, planes, and crowded places. Furthermore they recommend that the AED machine is red in color with instructions for use. In spite of the effectiveness of AED in cardiac patients, a better understanding and knowledge about the use of AEDs is required (Hancock, Roebuck, Farrer & Campbell, 2006; Martinez-Rubio, et al. 2003). Therefore, the authors` see a need to explore how Cardio-Pulmonary Resuscitation (CPR) education can enhance and improve nursing skills and knowledge in the use of AED in order to reduce mortality rate in cardiac patients.

BACKGROUND

Automated external defibrillation

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AED is an electronic devise which has two paddles; sternum and apex which can help to deliver the shock to the heart of the patient. This machine has

been created and upgraded to convert the VT and Ventricular fibrillation (VF) to sinus normal heart rhythms, which are the most emergency situation that needs immediate medical intervention (Anas, Lee, & Hasan, 2010). Moreover AED may be used in hospital setting or out of the hospital setting (Nettina, 2001). Winkle (2010) stated that around 250 000 victims are dying in United States of America every year caused by cardiac arrest 40% are resulting of VF. Therefore medical staff must be aware , trained in using AED to enhance the quality of life of cardiac arrest patient. However, using this machine needs medical education and knowledge as stated by (Ammirati et al. 2011). As mentioned above Brown, Rittenberger, Ammon, Harrington & Guyette (2010) stated AED can have affect only in shockable rhythms like VF.

Types of automated external defibrillation

There are two types of AED: Monophasic which gives (360 joules) and the second type is Biphasic which gives 150-200 joules (Sraj, 2005).

The different between the two types: according to (Sraj, 2005):

Feature

Monophasic

Biphasic

Direction of the current

Moves in one direction only from paddle

Moves in both direction (first positive direction then in milliseconds in a negative direction)

Joules

Form 360

150 (Some machines can go up 200)

Potential myocardial damage

More damaging

less damaging

Efficacy

93% in laboratory trails

99% in laboratory trails

Ventricular tachycardia (VT)

Ventricular tachycardia is a heart rhythm described as “ a run of three or more premature ventricular contractions (PVCs)” (Lewis, Heitkemper, Dirksen, O’Brien & Bucher, 2007, p. 854).

VT clinical association

VT occurs with Coronary Artery Disease (CAD), cardiomyopathy, significant electrolyte imbalance, mitral valve prolapse, long QT syndrome, some medicine toxicity like digitalis and central nervous system disease.

Furthermore, this type of dysrhythmia can be notice in non cardiac patients (Lewis et al, 2007).

VT clinical significance

Patient with VT may be found with pulse or pulseless and VT if persistent can lead to decrease in Carbon monoxide (CO) due to decreasing of ventricular filling times and loss of atrial contraction. All this finding can lead to several complications which include; hypotension, pulmonary edema, cerebral blood flow will decrease and cardiopulmonary arrest (Lewis et al, 2007).

VT treatment

This type of dysrhythmia can be treated simply if the causes identified like; electrolyte imbalance and ischemia. If the VT is monomorphic (patient has appearance of all the beats match each other in each lead of a surface electrocardiogram) and patient with pulse, Procainamide, Sotalol, Amiodarone or Lidocaine Intravenous injection (IV) can be used. If the patient in polymorphic (has beat-to-beat variations in morphology) VT with prolonged baseline QT interval Magnesium, Isoprterenol, Lidocaine Intravenous injection can be administer. If the patient has no pulse it must be taken in high priority level emergency case, in this condition CPR and defibrillation are the first line if treatment (Lewis et al, 2007).

Ventricular fibrillation (VF)

Ventricular fibrillation is described as a heart rhythm with” a severe derangement of the rhythm characterized on electrocardiogram (ECG) by

irregular undulation of varying shapes and amplitude” (Lewis et al., 2007, p. 855).

VF clinical association

VF can occur in acute myocardial infarction (MI), myocardial ischemic disease like Coronary Artery Disease and cardiomyopathy. Furthermore this type of abnormal heart rhythm can be associated with coronary reperfusion after fibrinolytic therapy. Other VF clinical associations are like electric shock, hypokalemia, drug toxicity and acidosis (Lewis et al, 2007).

VF clinical significance

Patient with VF can be found unconscious, pulseless and apneic condition and if this type of dysrhythmia not treated immediately and rapidly patient will die (Lewis et al, 2007).

VF treatment

VF is life-threatening condition and the best treatment for this dysrhythmia is the CPR and Advance Cardiovascular Life Support (ACLS) with using defibrillation immediately if available (Lewis et al, 2007).

Cardiac arrest

It is the sudden loss heart function either the victim is diagnosed as a heart disease or not, which occur within minutes after symptoms appear.

(American Heart. org. 2011).

Cardiopulmonary resuscitation (CPR)

Cardiopulmonary resuscitation is a “ combination of oral resuscitation (mouth-to-mouth breathing), which supplies oxygen to the lungs, and external cardiac massage (chest compression), which is intended to normalize cardiac function and blood circulation”(Kozier, Erb, Snyder & Berman, 2008, P. 1419). American Heart Association (2011) has emphasized the updated CPR guidelines for the chest compression rate is rate is 100 compressions per-minute.

Defibrillation

It is a process of administering the electrical shock to an individual' heart for stop any abnormality heart impulse such For VT and restore the normal heart rhythm (Kozier, Erb, Snyder & Berman, 2008).

Public Access Defibrillation (PAD)

It is a program that improves the automated external defibrillator in public facilities (Federal occupational health, 2010).

Cardiopulmonary resuscitation / automated external defibrillation provider

An employee, who has finished or completed training in CPR, in addition has knowledge and understands an AED operation (Sraj, 2005).

Chain of survival

It is that access which concentrates on the increasing of the survival chance . according to these components:

Early access to care (local emergency medical system number)

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Early CPR.

Early defibrillation.

Early advance of care.

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Sequence of actions when nursehealth provider is using an automated external defibrillator

These procedures should be following when the patientvictim is unconscious or not breathing Start with calling for help then start with CPR if the AED not available immediately.

1-When the AED arrives:

Continue CPR until the AED is switched on in case of more than one rescuer.

If you are alone stop CPR and switch on the AED.

Follow the voice instruction.

Pads attaching to the patientvictim chest (the positive pad is placed on the patient'svictim's left chest below the nipple, whereas the negative pads is placed on the victim'spatient's right upper chest above the nipple to the right from patient' s perspective of the sternum).

Be sure that no body touches the patientvictim during the AEDis analyzing the rhythm.

2-When the shock is needed:

-

Be sure that nobody is touching the patient/victim.

Push the shock button as instructed

Follow the voice instruction.

3-When no shock is needed:

Continue CPR using a ratio of 30 compressions to 2 rescue breaths

Follow the voice instruction.

Doing these procedures till the patient starts to regain consciousness signs such as coughing, movement and breathing or you become tired (Nettina, 2001; Sraj, 2005).

Precautions in the use of automated external defibrillation

Sraj (2005) has emphasized several precautions which must be taken into consideration by the AED's operator before using it. Furthermore, these precautions are very important in keeping the operator and the patient in a safe and secure environment.

These precautions are;

Unresponsiveness

The rescuer should check the patient's level of consciousness, pulse and any signs of life like moving or coughing. This step is a very important step to avoid any problems or misusing of AED.

Wet chest

Due to water and sweat AED might not be very effective. So In order to get defibrillation's effectiveness use the piece of cloth which is kept in the AED kit to dry the chest

Moving vehicle

Using AED device needs special care especially during the transportation of the patient. In case of using moving vehicle it may affect AED's analyzing the heart rhythm which can lead to wrong analysis.

Flammable materials

Try to avoid using any flammable materials like alcohol and stop any flammable gases like oxygen . using these flammable materials can make fire due to the expected spark from the shock.

Chest patches

Be close to the patient and scan for any nitroglycerine patches and remove it right away before attaching the AED's paddles. These patches can make burn to the patient's chest.

Metal surface

Avoid using the metal or any electric conductive surface because the ability of transmitting the shock to the rescuers or any persons nearby.

Pacemaker

The rescuer should look to the patient's chest closely and identify if this patient using pacemaker especially if it's implanted one. Try to attach the paddles one to one and have inches distance from the pacemaker to avoid destroying the pacemaker's batteries.

Age consideration

AED is not recommended to be used in children under age of 8 especially in unadjusted energy AEDs.

Hands off

The users during analyzing the heart rhythm must be hands off to avoid analyzing disturbance. Furthermore the users and any person nearby must be clear before delivering the shock avoiding the transmission of the shock to them.

Wireless devices

The nearby people they must not use their wireless devices like cell phone and especially during the analyzing heart rhythm and delivering shock process. These devices can cause trouble made by wave's interference which may influence the analysis.

Education in a clinical setting

Education can be defined as a learning opportunity which is planned by an individual or a committee to reach a related objective (Rogers, 2002). One of the main differences between nurse education and education of children in school is, that nurse education is based upon the theory and practice of adult

learning. Furthermore, there are different teaching strategies, some of these teaching strategies like; lectures method, (lecturers) are the main instrument in this method. Experiential learning depends on learning result from experience. Last method is pairs exercise in this method the group members are asked to form pairs then work together (Quinn & Hughes, 2007).

The coordinators and teachers must choose the best teaching strategy accordingly and provide good learning environment to achieve teaching program goals (Quinn & Hughes, 2007).

McEwen & Wills's, (2007) have referred to one of the grand theory which is Henderson theory.

The Henderson theory is focusing on the important of education for medical team, patient and families that translate to practice and experience to improve the quality of care. If this research has been done in a clinical setting it can enhance the education.

Categorization of learning theories

McEwen & Wills's, (2007) have mentioned, that sometime it will come to the nurses' mind a question why is it very important to be aware of about the process of learning and to understand learning theories. The importance of understanding learning theories is to describe the process used to get about changes in the way individuals understand information and skills or tasks. Moreover, Bigge & Shermis (1999) categorized the learning theories to two categories which are;

Behavioral learning theories

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Behavioral learning theories which depend on behavior response and ignore the feeling, thoughts and cognitive processes of the student. In addition, behavioral learning theories were the first widely used in education and these types of learning theories includes the work of Pavlov, Skinner and others. Furthermore, these types of learning theories persistent in the American educational system in 1959s and 1960s, as well as behavioral learning theories enhance the American educational system in 20th century (McEwen & Wills's, 2007).

Cognitive learning theories

Cognitive learning theories which based on the mental processes and activities which go within the student. These type of theories start to get wide thrust in 1960s. Moreover, Jean Piaget is the most important theorists in cognitive science which developed main components of his theory in 1920s (McEwen & Wills's, 2007).

Teaching approach

Teaching can be defined most of the time as the facilitation of learning and is passing on to intentional act of communicating information (Bastable, 2003). To achieve this, the teachers must know the learning methods and the individual needs and connect them to instruction (Forrest, 2004).

Skill and knowledge

Skill is defined as " a goal-directed, well organized behavior that is acquired through practice and performed with economy of effort" (Proctor & Dutta, 1995, p. 18). Knowledge can be defined, as " set of organized statements of

facts or ideas, presenting a reasoned judgment or an experimental result, which is transmitted to others through some communication medium in some systematic form” (Bell, 1976, p. 175).

Up to date, there are a lot of research articles regarding cardiopulmonary resuscitation education and use of an automated external defibrillation. Therefore it is important to identify teaching approaches and critically evaluate the effect of the education on skills and knowledge.

The effect of Cardiopulmonary resuscitation education on nurse’s skill and knowledge

Kardong , Oermann, Odom, Ha (2010) conclude in their article if the nurses used manikin with voice advisory they will be more competent than the nurses how used normal manikin without voice advisory. Furthermore the median number of chest compression before Basic Life Support course was three and so fast, but after BLS training increased to 13 as stated by (Mellor & Woollard, 2010). In addition, Madden (2010) found in his study that, the nurses are more confident and competent in case of cardiac emergency situation after CPR training.

AIM

The aim of this literature review was to describe teaching approaches for cardiopulmonary resuscitation education in relation to acquired skills and knowledge in the use of an automated external defibrillation in a cardiac arrest situation in a clinical setting.

Research questions

Which teaching approaches are used for cardiopulmonary resuscitation education when nurses use an automated external defibrillation in a cardiac arrest situation in a clinical setting?

What effect has the cardiopulmonary resuscitation education on nurses` skills in their use of an automated external defibrillation in a cardiac arrest situation in a clinical setting?

What effect has the cardiopulmonary resuscitation education on nurses` knowledge when an automated external defibrillation is used in a cardiac arrest situation in a clinical setting?

METHOD

The method chosen for this study is a literature review with a systematic approach. A literature review “ is a critical summary of research on a topic of interest, often prepared to put a research problem in context” (Polit & Beck, 2008, p. 757).

Literature search

The literature search was carried out in PubMed which “ is a data base that anyone, anywhere in the world with internet access can search for journal articles and permanent resource regardless of your institutional affiliation” (Polit & Beck, 2008, p. 757). MeSH terms are created by the National Center for Biotechnology Information (NCBI). PubMed, works through searching in National Library of Medicine (NLM's) Web site, it helps the researchers to get full text of the articles from biomedical literature and helps to access further

links to selected life sciences journals not in MEDLINE (National Center for Biotechnology Information, 2010). The search strategies were made by combining MeSH terms in PubMed and the result of this database search are shown in Table 1.

In order to get relevant original articles to this literature review the authors have used Mesh term and limited the research which published in the last 10 years between 2001-2011, English human and any age.

Table 1. Database search in Pubmed.

Database

Key word

Identified articles (hits)

Abstracts reviewed

Articles examined

Articles

Included

Date for search

Pubmed

22032011

(" Cardiopulmonary Resuscitation"[Mesh]) AND " Education, Nursing, Continuing"[Mesh]

41

41

23

4

Pubmed

22032011

" Cardiopulmonary Resuscitation"[Mesh] nursing skill

22

21

21

4

Pubmed

22032011

(" education" [Subheading]) AND " Cardiopulmonary Resuscitation"[Mesh]

725

500

30

11

Key words

In this literature review the authors completed this research with the following key words;

(“ Cardiopulmonary Resuscitation AND “ Education, Nursing, Continuing”[Mesh],

“ Cardiopulmonary Resuscitation”[Mesh] nursing skill and (“ Education” [Subheading]) AND “ Cardiopulmonary Resuscitation”[Mesh].

Identified original articles had to be published in peer-reviewed journals with an available abstract and had to focus on cardiopulmonary resuscitation education in relation to the use of an automated external defibrillation in a cardiac arrest situation in a clinical setting. Furthermore studies on adult, children eight years and older, SVT-VT patients and nurses were included. Non medical people and younger children (less than eight years), patients with pacemaker and refusal of informed consent were excluded, as were studies that did not involve health-care professionals in clinical settings.

The primary search yielded 19 original articles of interest. In addition bibliographic searches revealed X articles. The articles are presented in the matrix (Appendix 1). The selected articles were assessed independently by the authors using

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Appendix 1Sophiahemmet University College classification guide of academic articles and studies regarding quality in both quantitative and qualitative research (Appendix 2). The studies were classified as Randomised controlled trial (RCT), Clinical controlled trial (CCT), Non- controlled study (P), Retrospective study (R) or Qualitative study (Q). Scientific quality of the studies was assessed on a three-grade scale: high- (I), moderate- (II) or low- (III) quality. The authors` intended to work systematically by highlighting the similar words in the articles e. g., AED, clinical setting, skills and knowledge and discuss on regular basis to compare and discuss responses to the research questions.

This literature review content the cardiopulmonary resuscitation education in relation to acquired skills and knowledge in the use of an automated external defibrillation in resuscitation situation in hospitals for most of the medical professionals like; doctors, technicians and nursing staff, but the authors will focus on nursing staff avoiding the vagueness of this literature review.

Manual search can be defined as finding an original article which has been used in literature review (Polit & Beck, 2008).

ETHICAL CONSIDERATIONS

The ethical consideration which are so important in this literature review, include the authors must check who is the sponsor of the study because it includes the use of technology Furthermore the authors must assess if the participants in the reviewed studies were informed and consented before they participated, especially in case of patients are involved. Finally, the

authors must clarify if these studies have got approval from the ethical committees (Spouse, 2003).

RESULTS

19 primary published articles have been reviewed by the authors` in this study which have focused on Teaching approaches used for cardiopulmonary resuscitation education when nurses use an automated external defibrillation in a cardiac arrest situation in a clinical setting and the Effect of cardiopulmonary resuscitation education on nurses` skills knowledge in their use of an automated external defibrillation in a cardiac arrest situation in a clinical setting. Results from the studies are chosen which are relevant to this study`s aim and research questions The selected results from the primary published articles have been categorized under the following headings;

Teaching approaches used for cardiopulmonary resuscitation education when nurses use an automated external defibrillation in a cardiac arrest situation in a clinical setting

Perkins, Hulme, & Bion, (2002) stated in their article that , peer tuition is the one type of teaching approach which depends on peer of tutors with exceptional teaching background and experience by lecture-led CPR training. However, it pointed out that, in spite of cardiopulmonary resuscitation and AED skills performance enhance with peer tuition, knowledge remained the same over the participants.

The quality of performance can be improved with audible feedback system

(Noordergraaf, et al. 2006). Furthermore, if audible feedback system has <https://assignbuster.com/impact-of-cardiopulmonary-resuscitation-education-use-of-difibrillator-nursing-essay/>

been used there is significant improvement in skill acquisition and skill retention has been reported that is available in automated external defibrillation (Handley & Handley, 2003)

Szögedi , Zrínyi , Betlehem, Ujváriné & Tóth(2010) defined problem-based learning as one of learning methods which organize the knowledge in clinical setting , strengthens to motivate the students to learn, enhances clinical reasoning skills, and improve self-directed and continues education. Furthermore they concluded this method is better and more efficient method form the traditional method which is class room during cardiopulmonary education. Moreover this method can enhance and improve the outcome of cardiopulmonary education which can lead to better understanding and skill demonstrating during resuscitation in clinical setting.

The other teaching approach which has been emphasized by Bjørshol, Lindner, Søreide , Moen & Sunde(2009) is manikin and 24-min video instruction during cardiopulmonary resuscitation training. They made a study on hospital employees by distributing 5118 personal manikins. 3466 responded to the first questionnaire the result can be seen in table 2

Table 2. Questionnaire administered to all hospital employees before receiving their personal resuscitation manikin.

Question

Answer

Number of replies

What is your age?

43 (± 11) years

3445

What is your gender?

Female: 87%

3298

Male: 13%

How long ago did you have training in basic life support (BLS)?

15 (8-60) months

3295

Never: 296

How well do you feel that you are trained in BLS (1-5, 1 = very bad and 5 = very good)?

3.1 (± 1.0)

3412

Have you been in a situation where you needed skills in BLS, whether at work or not?

Yes, at work: 1121 (33%)

3425

Yes, outside work: 363 (11%)

No: 2071 (60%)

Altogether 908 replied to second questionnaire which they attended the classroom training the result can be seen in table 2

Table 2. Questionnaire to all hospital employees nine months after receiving their personal resuscitation manikin.

Question

Answer

Number of replies

Where did you perform the BLS training with your MiniAnne manikin?

Hospital meeting room: 908 (65%)

1397

Own dept.: 366 (26%)

At home: 73 (5%)

Did not participate: 120 (9%)

How long ago did you train with your MiniAnne manikin?

39 (26-48) weeks

1184

How well do you feel that you are trained in BLS (1-5, 1 = very bad and 5 = very good)?

3.8 (± 0.8)

1333

How many persons, in addition to yourself, have trained on BLS with your MiniAnne manikin/self-instruction movie?

1 (0-3)

1165

Have you experienced any discomfort using the manikin?

Yes: 49 (4%)

1272

No: 1223 (96%)

After receiving the participants their personal manikin by six months the result is displayed in table 3

Table 3. Number of study subjects performing different BLS tasks before and six months after BLS training with a personal resuscitation manikin and video instruction (percentages in brackets). The number of correct chest compressions and mouth-to-mouth ventilations are measured for 2 min after initiation of BLS (interquartile range in brackets).

Before BLS training, n = 59

Six months after BLS training, n = 39

P value

Assessed responsiveness

42 (71)

34 (87)

0. 02

Opened airways before assessing respiration

10 (17)

17 (44)

0. 01

Assessed respiration

42 (71)

28 (72)

0. 73

Pulse check

34 (58)

13 (33)

0. 02

Called for help before starting BLS

45 (76)

32 (82)

0. 61

Correct telephone number for EMS activation

56 (98)

39 (100)

Ns

Correct compression : ventilation (C: V) ratio

32 (54)

36 (98)

<0. 001

Number of correct chest compressions

60 (5-102)

119 (75-150)

<0. 001

Number of correct mouth-to-mouth ventilations

3 (0-8)

4 (0-7)

0. 23

After finalizing the result by Bjørshol , Lindner , Søreide , Moen & Sunde(2009) they came to that cardiopulmonary resuscitation training with manikin and video instruction benefit and improve the staff self-confidence and clinical basic life support skill. In other hands using assessment of cardiopulmonary resuscitation defibrillation (CPR-D) nursing skills and informing the leaders is necessary to give information for kind of education they need seems to improve resuscitation performance (Mäkinen, et al. 2007).

Spearpoint, Gruber & Brett (2009) mentioned in their article that permanent cardiopulmonary education as one of the teaching approaches. Moreover they stated that , The simplicity, continuous and quality of the education on basic life support program are affected on CPR performance and hospitals cardiac arrest through increasing patient discharge and decrease the cardiac arrest. There was study done by Moule , Albarran , Bessant , Brownfield & Pollock (2008) in united kingdom comparing two teaching met