Republic of Yemen
Ministry of High Education and Scientific Research
Emirates University Faculty of Medicine and Health Science Community Medicine Department

الجمهورية اليمنية
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الجامعة الإماراتية
كلية الطب والعلوم الصحية
قسم طب المجتمع

Awareness and Knowledge of Medical Students Toward Basic Life Support - Cardiopulmonary Resuscitation at Emirates University – Yemen

A research submitted to the department of community medicine, faculty of medicine and health sciences, Emirates university, in partial fulfillment for the degree of MBBH in general medicine and surgery.

RESEARCH TEAM

Ahmed Nasser Ahmed Zeyad
Gamil Abdullah Ali Alshabili
Sukaina Saqr Abdulaziz AL-Samawi
Tariq Mohammed Saleh AL-Ahmar
Wedad Abrahim Abdrabuh AL-masalemah
Enas Nasser Ahmed AL-Ansi
Morsal Nasr Rashed Sheef
Shaima Mahdi Ali AL-Zubairi
Nada Ebrahim Yahya AL-Khazzan
Yusra Ahmed Amer AL-Moradi

Supervisor:
Dr: Moamar Badi

Sana'a

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وعي ومعرفة طلاب الطب تجاه الدعم الأساسي للحياة (الإنعاش القلبي الرئوي) في الجامعة الإماراتية- اليمن

بحث مقدم لقسم طب المجتمع، كلية الطب والعلوم الصحية، جامعة الإماراتية، لتحقيق درجة بكالوريوس الطب والجراحة في الطب العام والجراحة.

فريق البحث

احمد ناصر احمد زياد	ايناس ناصر احمد العنسي
جميل عبد الله علي الشبيلي	مرسال نصر راشد شيف
سكينة صقر عبد العزيز السماوي	شيماء مهدي علي الزبيري
طارق محمد صالح الأحمر	ندى إبراهيم يحيى الخزان
وداد إبراهيم عبدربه المسالمة	يسرى احمد عامر المرادي

المشرف: د: معمر بادي

صنعاء

1442-2021

DEDICATION

To our parents for their great kindness, devotion, and continuous support. We commend their efforts and their toleration.

To our brothers, who have been our source of inspiration and gave us strength when we thought of giving up.

To our sisters, relatives, mentors, friends, and colleagues who have been always there for us every time we need.

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First and foremost, thanks to ALLAH, to whom we relate our success in achieving our research.

We would like to express our gratitude and appreciation for the role of our supervisor **Dr.Moamar Badi** for his insightful lectures, guidance, encouragement, patience, and valuable advice that had helped us to carry on the study successfully.

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Research Team

ABSTRACT

Background: BLS is defined as medical procedures and skills that can be utilized in case of an emergency to save lives. It is given to the victims of life-threatening illnesses or injuries until they can be given full medical care at a hospital. Sudden cardiac arrest is the main cause of death of millions of people worldwide every year. It is possible to save the lives of 50,000 people every year if (CPR) is properly done until help arrives.

Objectives: This study was designed to assess the awareness of the medical students at Emirates University toward Cardiopulmonary Resuscitation as a part of the Basic Life Support.

Methodology: Cross-sectional study was conducted among 384 of both clinical and preclinical phases of both genders' male and female medical students in Emirates University, Sana'a Yemen. Stander questionnaire was used to collect the data which include (personal data, knowledge, and attitudes data). The collected data was entered into a computer and analyzed using the SPSS program version 21.

Results: The total of the sample was 385 with a mean age of (22.25), of which more than two-thirds of 263 (68.3%) were males and 122 (31.7%) were females.

Regarding the training on the BLS among students, less than a third of the students 116 (30.1%) have received training on the BLS. There was a significant difference in the BLS training among students' levels (P-value < 0.001), on the other hand, there was no significant difference in the training on BLS between sex groups (P-value = 0.19).

Regarding the attitude of the students toward CPR, the result showed a good positive attitude among all the sample in general. The positive attitude was higher among females than males and this difference is significant (P-value < 0.001) also there was a significant difference in the positive attitude among students' levels (P-value = 0.021), but there was no significant difference in the attitude among those who have received training on BLS and those who didn't receive any training on BLS (P-value = 0.6).

Regarding the general knowledge of CPR, the result showed that more than half of the sample (52.2%) had poor knowledge. There was no significant difference in the general knowledge toward CPR among the sex groups (P-value = 0.6), on another side there was a significant difference in the general knowledge toward CPR among students' levels (P-value < 0.001) and among the training subgroups (P-value < 0.001).

Regarding the knowledge of the practical process of CPR, the result showed, more than half of the sample (59%) had poor knowledge. There was no significant difference in the general knowledge toward CPR among the sex groups (P-value = 0.1), on another side there was a significant difference in the general knowledge toward CPR among students' levels (P-value < 0.001) and among the training subgroups (P-value < 0.001).

Conclusion:

In a time where there was a good positive attitude toward CPR among the students, the knowledge of CPR was poor.

الخلاصة

المقدمة:-

دعم الحياة الاساسي: يعرف بأنه عبارة عن إجراءات ومهارات طبية يمكن استخدامها في حالة الطوارئ لإنقاذ الحياة، يتم تقديمه لضحايا الأمراض أو الإصابات التي تهدد الحياة حتى يتم تقديم الرعاية الطبية الكاملة لهم في المستشفى. السكتة القلبية المفاجئة هي السبب الرئيسي لوفاة ملايين الأشخاص في جميع أنحاء العالم كل عام.

من الممكن إنقاذ حياة 50000 شخص كل عام إذا تم إجراء الإنعاش القلبي الرئوي بشكل صحيح حتى وصول المساعدة.

الهدف:-

صممت هذه الدراسة لتقييم وعي ومعرفة طلاب الطب في الجامعة الإماراتية تجاه الإنعاش القلبي الرئوي كجزء من دعم الحياة الأساسي.

منهجية البحث:-

أجريت دراسة مقطعية وصفية على طلاب الطب لكل من المراحل السريرية وما قبل السريرية لطلبة من الجنسين الذكور والإناث في الجامعة الإماراتية _صنعاء _اليمن. في الفترة الواقعة بين يونيو وأغسطس 2021 ,من خلال استخدام استبيان لجمع البيانات التي تشمل (البيانات الشخصية، والمعرفة، وبيانات المعتقدات). وتم إدخال البيانات التي تم جمعها في الكمبيوتر وتحليلها باستخدام الإصدار 21 من برنامج SPSS.

النتائج:-

بلغ مجموع العينة 385 بمتوسط عمر (22.25)، أكثر من ثلثيهم 263 (68.3٪) ذكور و122 (31.7٪) إناث.

فيما يتعلق بالتدريب على BLS بين الطلاب، تلقى أقل من ثلث الطلاب 116 (30.1٪) تدريبًا على BLS. كان هناك اختلاف كبير في تدريب BLS بين مستويات الطلاب الدراسية (قيمة P <0.001)، من ناحية أخرى، لم يكن هناك فرق كبير في التدريب على BLS بين الذكور والإناث

(P-value = 0.19). فيما يتعلق بموقف الطلاب تجاه الإنعاش القلبي الرئوي، أظهرت النتيجة موقفًا إيجابيًا جيدًا لدى جميع أفراد العينة بشكل عام. كان الموقف الإيجابي أعلى بين الإناث منه عند الذكور وهذا الاختلاف ذو قيمة إحصائية كبيرة (قيمة P <0.001) كما كان هناك فرق ذو دلالة إحصائية في الموقف الإيجابي بين مستويات الطلاب الدراسية الأولى والأخيرة (قيمة P = 0.021) ولكن لم يكن هناك فرق ذو دلالة إحصائية في الموقف بين أولئك الذين تلقوا تدريبًا على BLS وأولئك الذين لم يتلقوا أي تدريب على BLS (قيمة P = 0.6). فيما يتعلق بالمعرفة العامة للإنعاش القلبي الرئوي، أظهرت النتيجة أن أكثر من نصف العينة (52.2٪) لديهم معرفة ضعيفة. لم يكن هناك فرق ذو دلالة إحصائية في المعرفة العامة تجاه الإنعاش القلبي الرئوي بين الذكور والإناث (قيمة P = 0.6)، وعلى جانب آخر، كان هناك اختلاف كبير في المعرفة العامة تجاه الإنعاش القلبي الرئوي بين مستويات الطلاب الدراسية (قيمة P <0.001) وبين أولئك الذين تلقوا تدريبًا على BLS وأولئك الذين لم يتلقوا أي تدريب على BLS (قيمة P <0.001). فيما يتعلق بالمعرفة العملية للإنعاش القلبي الرئوي، أظهرت النتيجة أن أكثر من نصف العينة (59٪) لديهم معرفة ضعيفة. لم يكن هناك فرق كبير في المعرفة العملية تجاه الإنعاش القلبي الرئوي بين الذكور والإناث (قيمة P = 0.1)، وعلى جانب آخر، كان هناك اختلاف كبير في المعرفة العملية تجاه الإنعاش القلبي الرئوي بين مستويات الطلاب الدراسية (قيمة P <0.001) وبين أولئك الذين تلقوا تدريبًا على BLS وأولئك الذين لم يتلقوا أي تدريب على BLS (قيمة P <0.001).

الاستنتاج:-

في الوقت الذي كان فيه الموقف إيجابي جيد تجاه الإنعاش القلبي الرئوي بين الطلاب، كانت المعرفة العامة والعملية بالإنعاش القلبي الرئوي ضعيفة.

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LIST OF ABBREVIATIONS

Abbreviations	Full name
BLS	Basic Life Support
CPR	Cardiopulmonary Resuscitation
COM	College of Medicine
AED	Automated External Defibrillator
AHA	American Heart Association
EMS	Emergency Medical Services
OHCA	Out of Hospital Cardiac Arrest
BPKIHS	B. P. Koirala Institute of Health Sciences
BEC	Basic Emergency Care
KAU	King Abdul-Aziz University
SPSS	Statically Package for Social Science
SD	Standard Deviation
Apr	Adjusted Prevalence Ratios
CI 95%	Confidence Intervals at 95%
AHP	Associated Health Plan

Chapter 1 introduction

INTRODUCTION

Background

Cardiopulmonary resuscitation as recognized today was developed in the late 1950s and 60s. In 1966 the American Heart Association developed the first CPR guidelines which have been followed by regular updates. the American Heart Association has updated the basic life support (BLS) course over the years with the last update in 2020 and the BLS guidelines have changed dramatically, and the elements of BLS continue to be some of the most important steps in the initial treatment.**[1]**

BLS is defined as medical procedures and skills that can be utilized in case of an emergency to save lives. It is given to the victims of life-threatening illnesses or injuries until they can be given full medical care at a hospital, if early BLS is initiated; the survival rate can be substantially improved, as approximately 70% of all cases of cardiac arrest occur out of hospital **[2]**. It is part of resuscitating care in emergency cases that aims to keep adequate ventilation and circulation until the cause of arrest is detected and resolved and it plays a vital role in the outcome of acute emergency situations. **[3]**

The term basic life support (BLS) refers to maintaining an airway and supporting breathing and circulation. It comprises the following elements: initial assessment, airway maintenance, expired air ventilation (rescue breathing; mouth-to-mouth ventilation or artificial ventilation), and chest compression. When all are combined the term cardiopulmonary resuscitation (CPR) is used, and it depends on the level of knowledge and skills held by those who carry out the CPR. **[4]**

AS Sudden cardiac arrest is the main cause of death of millions of people worldwide every year. It is possible to save the lives of 50,000 people every year if (CPR) is properly done until help arrives **[5]**. Following cardiac arrest time equal life, every minute's post-cardiac arrest with no resuscitation, there is a decrease in survival rate by 7-10%.
Moreover, cardiac arrest can also be seen in neonates and infants **[6]**, so medical students must learn (BLS) as a part of their curriculum, because

medical students today are tomorrows doctors and they must graduate as safe doctors, especially those in the clinical level as they are already studying clinical sciences, in contact with patients and about to graduate. **[7]**

Basic life support (CPR) Procedures: [8]

The sequence of actions for BLS (CPR) according to the guidelines of the American Heart Association (AHA):

- initial assessment:
  - Safety
    - move the victim out of the source of danger.
    - be sure you do not become a victim and do not enter an unsafe environment.
  - Assess the Person
    - Check for responsiveness by tapping and speaking loudly.
    - Check to see if the person is breathing. (Agonal breathing, which is occasional gasping and is ineffective, does not count as breathing).
  - Call for help
    - Send someone for help and to get an AED.
    - If alone Call for help without leaving the person.
- CPR:

CPR is a technique of basic life support for oxygenating the brain and heart until appropriate, definitive medical treatment can restore normal heart and ventilation action CPR is most successful when administered as quickly as possible. It should only be performed when a person shows no signs of life or when they are:

- whenever heart and/or breathing stop (cardiac and/or respiratory arrest).
  or not breathing normally (in cardiac arrest, some people will take occasional gasping breaths – they still need CPR at this point. Don't wait until they are not breathing at all).
- Unconscious.
- Unresponsive.

If the victim is unresponsive but has a pulse and is breathing adequately, neither cardiac nor respiratory arrest is present. Such a victim does not need chest compressions or rescue breathing. If there are no signs of injury, place the victim in a recovery position. A recovery position keeps the airway open.

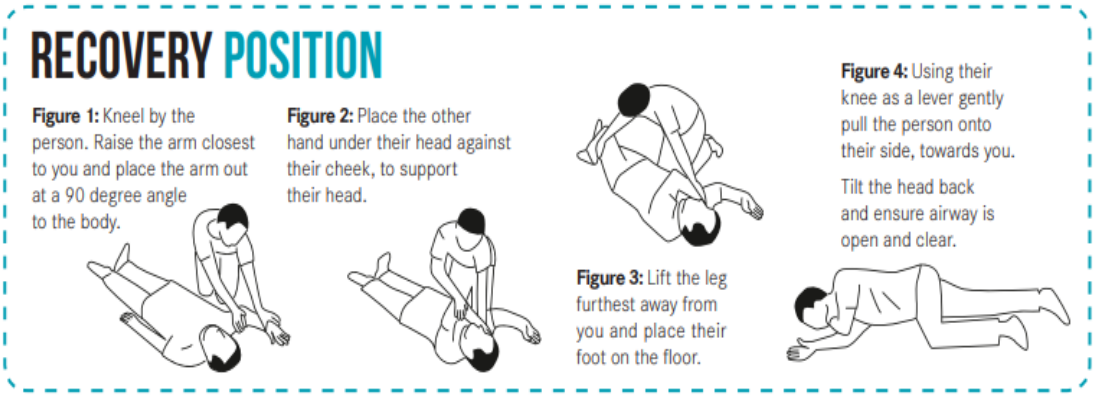

Figure 1 recovery position [11]

It is not essential to search for a pulse when a person is found with no signs of life. It can be difficult to find a person's pulse sometimes and time can be wasted searching. If CPR is necessary, it must be started without delay. **[9]**

- Check pulse (carotid pulse) and breathing for at least 5 seconds but not more than 10 seconds.
- Begin high-quality CPR:

In the past the CPR was done by following specific sequences in form of ABC (airway, breathing, chest compression) but, in 2011 the AHA recommend the new sequence for CPR as C-A-B (chest compressions, airway, breathing)

- Chest compressions:

  Preforms chest compressions immediately after recognition cardiac arrest.

  - Correct hand placement:

- ❖ In adult:
  - In the lower half of the sternum (between the nipples). 2-handed (second hand on top of the first or grasping the wrist of the first hand.
- ❖ In children 1–8 years:
  - In the lower half of the sternum (between the nipples). Use the heel of one hand only for compressions.
- ❖ In infant (up to 12 months of age):

- Just below the nipples. Do chest compressions, using two fingers of one hand.
- Compression rate:
  - 100 to 120 compressions deliver 30 compressions in 15 to 18 seconds then 2 rescue breaths (one cycle).

The compression rate for all persons is always at least 100 per minute.

Adult	30 compressions followed by two breaths
Child/Infant	30 compressions followed by two breaths

Table 1 Method OF CPR [10]

- Compression depth and recoil:
  - ❖ In adult:
    - At least 2 inches(5cm) and avoid compressing more than 2.4 inches(6cm).
    - Complete chest recoil after each compression.
  - ❖ In children 1–8 years:
    - compressing to one-third of chest depth. (about 2 inches).
  - ❖ In infant (up to 12 months of age):
    - about one-third of chest depth.) about 1 and ½ inches).
- Minimize interruptions:
  - Gives 2 breaths with a pocket mask in less than 10 seconds.

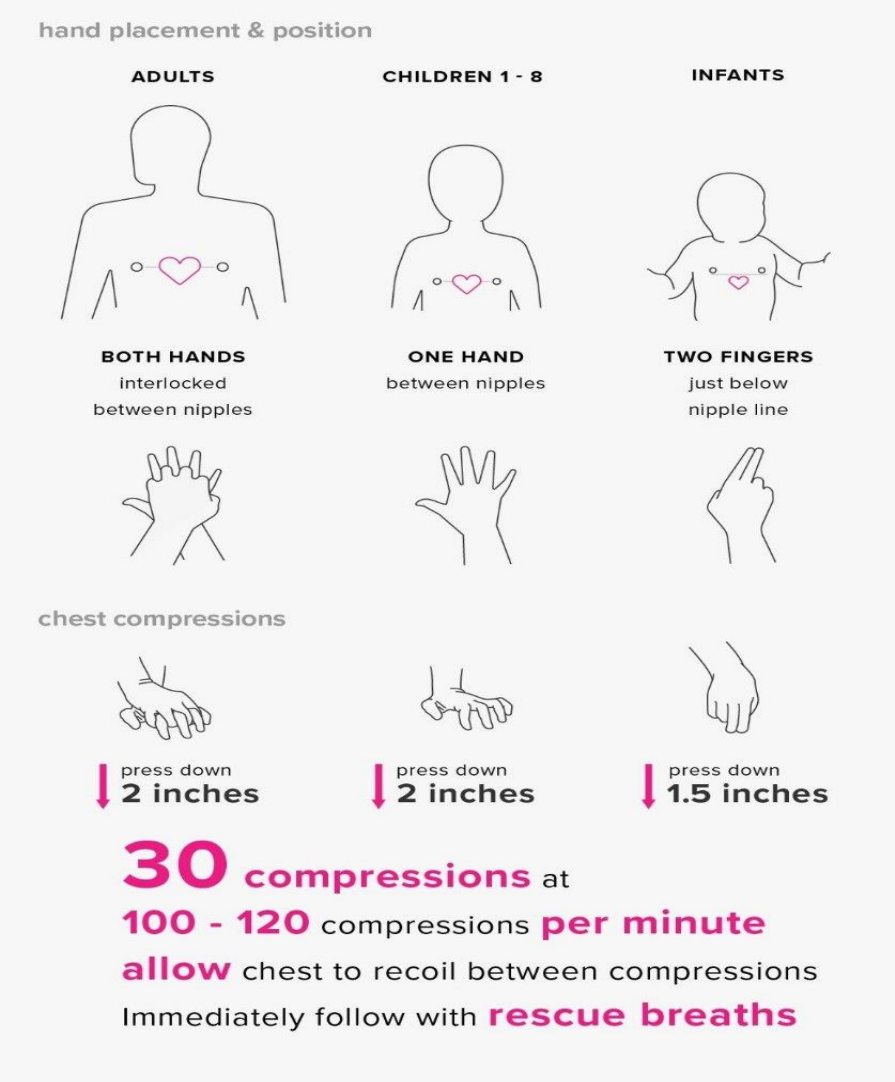

Figure 2 Chest Compression [12]

- Airway:
  - Opens airway adequately
    - use the head tilt–chin lift maneuver to open the airway of a patient when no cervical spine injury is suspected
    - For the trauma patient with suspected cervical spinal injury, use a jaw thrust without head tilt to open the airway.
    - For the trauma patient with suspected cervical spinal injury, if the jaw thrust does not open the airway, use a head tilt–chin lift maneuver.

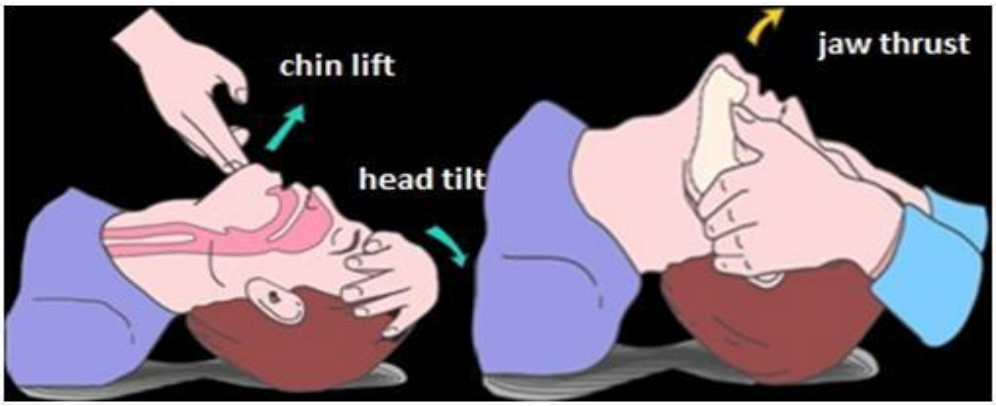

Figure 3 Management of Airway [13]

- Breathing:
  - Provides 2 breaths by using a barrier device.
  - Delivers each breath over 1 second.
  - Delivers breath that produces visible chest rise.
  - Avoids excessive ventilation.
  - Resumes chest compressions in less than 10 seconds.
    - ❖ In children 1–8 years:
      - The same as preformed in adult.
    - ❖ In infant (up to 12 months of age):
  - Perform mouth-to-mouth by covering the infant's nose and mouth with your mouth – remember to use only a small breath.

Perform the same steps for compressions and breath for each cycle After completing 5 cycles of compressions and breaths, the AED arrives with a bag-mask device. **[10] [1]**

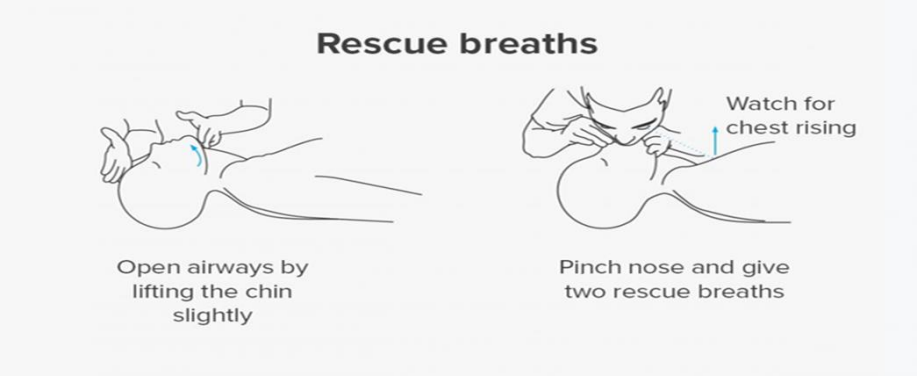

Figure 4 Rescue Breath in Adult [14]

- Automated External Defibrillator:
- Attach the AED when available.
- Delivers a shock and ensures that high-quality chest compression immediately after shock delivery.
- If the AED not available resume the CPR. [10]

Figure 5 AED Device

It is universally recognized that early defibrillation significantly improves survival rates. Survival can be significantly improved even 6-10 minutes after the arrest, as long as effective CPR has been started early in the arrest. It is thought that good CPR may even increase the likelihood of defibrillation success **[16]**

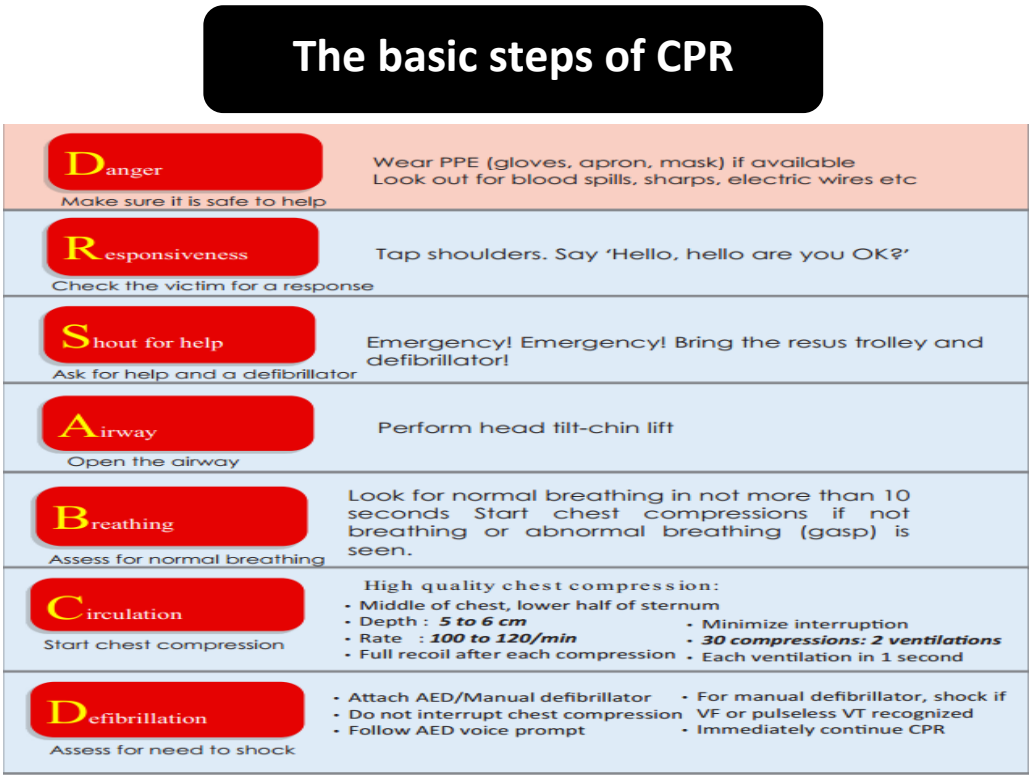

Figure 6 Basic Steps of CPR [17]

Chain of Survival: [1]

The AHA adult Chain of Survival symbol depicts the critical action required to treat life-threatening emergencies.

Early initiation of BLS has been shown to increase the probability of survival for an individual dealing with cardiac arrest. To increase the odds of surviving a cardiac event, the rescuer should follow the steps in the Adult Chain of Survival.

Chain of Survival in adult:

Figure 7 Adult Chain of Survival

- Recognize symptoms and rapid activation of EMS as soon as possible is to ensure that additional rescuers and those capable of providing advanced life support arrive as quickly as possible.
- Preform early high-quality CPR with an emphasis on chest compression to support circulation to the heart and brain until normal heart activity is restored. As the sooner we started it, the better the chance of survival.
- Rapid defibrillation with AED (as soon as it is available) can help terminate an abnormal rhythm and restore a regular heart rhythm.
- Effective advanced life support will be provided by EMS and hospital personnel with additional training and expertise.
- Integrated post-cardiac arrest care to improve survival for victims of cardiac arrest who are admitted to a hospital after resuscitation.

Chain of Survival in Pediatric:

The heart does not usually cause emergencies in children and infants. Children and infants most often have breathing problems that trigger cardiac arrest. The first and most important step of the Pediatric Chain of Survival is the prevention

Figure 8 Pediatric Chain of Survival

- Prevention of arrest is an important first step in the Pediatric Chain of Survival.
- Early high-quality CPR.
- Rapid activation of EMS.
- Advanced life support.
- Integrated post-cardiac arrest care.

Study justification:

Various studies have been carried out to access the level of knowledge and awareness towards BLS (CPR), which reflects its importance in emergency care of the patients they have been reported that BLS awareness was very poor among health professionals like doctors, dental, homeopathy and nursing colleges [18]. In other studies, [7] authors found a low prevalence of current training and lack of basic CPR knowledge and therefore recommended widespread CPR programs. **[19]**

According to a study given in the world journal of emergency medicine, when the participants are inquired about resuscitation training during graduation, 83(69%) of them had no training at all, and 27(22%) had received some training within the last 5 years. 28(23%) of participants had not been involved in patient resuscitation. **[20]**

Several recent studies have been conducted among medical students in different countries as Egypt **[21]**, Pakistan **[22]**, KSA **[23] [24] [25] [26]** and India **[27]** indicating the increasing global awareness toward the importance of the BLS and showing the poor knowledge of BLS among medical students.

Studies were conducted in Saudi Arabia in various universities among students to assess their knowledge and attitude toward BLS. In 2006 in a study conducted at King Saud University and included 15 colleges and 2250 students participated in it. The study revealed that the participant's attitude towards CPR was positive, but the knowledge was inadequate and more attention had to be focused on CPR improvement **[28]**. Another study took place in King Saud University in 2014 and this time it was conducted in the College of Applied Medical Sciences and College of Medicine. 245 students participated and the results showed that students lacked BLS awareness. From that study, it was recommended to add more BLS courses and integrated them as part of the main curriculum **[29]**

Unfortunately, at the time that several studies have been done in different countries to assess the medical students regarding BLS knowledge and awareness which indicates the increasing global awareness toward BLS

which is so important, we found only one study had been done in our country and the related data are lacking.

As The knowledge and awareness towards achieving excellent basic life support were not paid that much attention in medical schools (as in our University BLS and resuscitation skills training are not routinely practiced in our medical college and not a part of its curriculum), therefore it is expected to see some graduated physicians that cannot perform a proper CPR, so In the present study we aimed to assess the awareness and knowledge, about adult and children BLS(CPR) among The students of college of medicine(COM) in Emirates University as they are the future health care providers in the community, and It is important for them to have knowledge and training in submitting BLS maneuvers.

Study objectives:

General:

The current study aimed to study the knowledge and awareness toward basic life support – cardiopulmonary resuscitation among the medical students at Emirates University.

Specific:

1. To assess the knowledge and the attitude toward basic life support – cardiopulmonary resuscitation among the medical students from 1st level to the 6th level of Emirates University.
2. To determine the relationship between the academic level and the knowledge of CPR.
3. To determine the relationship between the previous training on the BLS and the knowledge of CPR

Chapter 2 review of literatures

REVIEW OF LITERATURES

A study was conducted in **India**, this study was done in 2013 to study (A cross-sectional study on awareness and perception about basic life support/cardio-pulmonary resuscitation among undergraduate medical students from coastal South India). The **result** of this study showed that a total of 377 students participated in the study. The proportion of males (53.3%) was slightly higher than females (46.7%). The breakup of the number of the students for each is as follows [n (%)]: First-year [95 (25.2%)], Second year [95 (25.2%)], Third year [94 (24.9%)], Final year [93 (24.7%)]. The majority (84.6%) had heard of BLS/CPR. Some of them (30.6%) could give the correct order of performing CPR as per the AHA guidelines (The year 2010). But there is a lack of knowledge about indications for BLS/CPR (37.8%). Few (18.9%) had undergone prior training in BLS, whereas, only 17.7% had been in a situation that needed BLS/CPR. Nearly half (50.2%) were not confident of performing BLS/CPR. Comparison of the students revealed that students who had training had higher mean scores for 'response to a situation needing BLS/CPR' and 'signs of successful resuscitation', though there was little difference in their knowledge of 'indications for BLS/CPR. Overall perception was not favorable and the students were not confident of performing BLS/CPR. This study **concluded that** the students need to be taught and trained in the CPR/BLS early in the curriculum to improve their knowledge. Repeated training would increase their confidence. **[30]**

Another study was conducted in **India**, this study was done in 2017 to study (Awareness, Attitude, and Knowledge of Basic Life Support among Medical, Dental, and Nursing Faculties and Students in the University Hospital). The **result** of this study showed that a total number of 659 participants were included in the study. The majority of the participants in all the groups gave the reason for the lack of BLS knowledge is due to lack of professional training The participants were aware of BLS, showed a positive attitude toward it, whereas the knowledge about BLS was lacking, with the

statistically significant P-value. This study **concluded that**, by introducing BLS regularly in the academic curriculum and by routine hands-on workshops, all the health-care providers should be well versed with the BLS skills for effectively managing life-threatening emergencies. **[31]**

A study was conducted in **Pakistan**, this study was done in 2009 to study (Awareness about BLS (CPR) among medical students: status and requirements). The **result** of this study showed that out of 61 students only 9 (14.7%) had taken a BLS (CPR) course while 52 (85.3%) students had not attended any such course. A significantly more number of students had theoretical knowledge about BLS (76.07% vs 49.18%, $p<0.00$). Practical knowledge about BLS was scored as having no, some, and complete knowledge of the course. Of all the students, 57.3% had no knowledge, among those 34% had heard BLS from somewhere, 22.9% had some knowledge out of which 50% had heard about it. Significantly less number of students had complete knowledge about BLS (4% $p<0.05$). Among the students who had taken the course, 22% had complete knowledge ($p<0.05$). Significantly less number of students knew about the skills for BLS (21% $p<0.05$). This study **concluded that** most of the medical students although had not attended the course, still had some knowledge about BLS. The inclusion of this course in the undergraduate curriculum will increase awareness and application of this valuable life-saving maneuver. **[32]**

A study was conducted in **Pakistan**, this study was done in 2019 to study (Dismal situation of cardiopulmonary resuscitation knowledge and skills among junior doctors in twin cities of Pakistan). The **result** of this study showed that a total 0f 371respondents, the response rate for this study was 87.08%. Abbreviations of BLS, AED were known by 94.3%, and 36.0% respectively. No doctor had complete knowledge of CPR. Less than half of the participants knew the proper compression depths. Overall knowledge regarding CPR steps was poor. Out of 31 CPR knowledge, attitude, and practice-related questions 21 correct answers were given by two doctors

which was the highest score. The mean score was 14.18 ± 0.15. This study **concluded that** awareness regarding CPR is essential for all doctors. Many authorities in developed countries are giving CPR training to the general population whereas, in Pakistan, many of the doctors never had CPR training. The current study showed the clear majority wants hands-on CPR training. Hospital authorities may find this as an opportunity to improve the knowledge and skills of health workers. **[33]**

A study was conducted in **Nepal** which is a country in **southern Asia**, this study was done in 2012 &2013 to study (Basic life support: knowledge and attitude of medical/paramedical professionals). The **result** of this study showed that the data from 121 responders (27 clinical faculty members, 21 dental and basic sciences faculty members, 29 house officers, and 44 nurses and health assistants) were analyzed. Only 9 (7.4%) of the 121 responders answered ≥11, 53 (43%) answered 7-10, and 58 (48%) answered <7 of 15 questions correctly. The clinical faculty members, house officers, and nurses/HA had a mean score of 7.4±3.15, 7.37±2.02, and 6.63±2.16 respectively, while dental/basic sciences faculty members attained a least mean score of 4.52 ±2.13 ($P<0.001$). Those who had received cardiopulmonary resuscitation (CPR) training within 5 years obtained the highest mean score of 8.62±2.49, whereas those who had the training more than 5 years back or no training obtained a mean score of 5.54±2.38 and 6.1±2.29 respectively ($P=0.001$). Those who were involved in resuscitation frequently had a higher median score of 8 in comparison to those who were seldom involved or not involved at all ($P<0.001$). This study **concluded that** the average health personnel in their hospital lack adequate knowledge in CPR/BLS. Training and experience can enhance the knowledge of CPR of this personnel. Thus standard of CPR/BLS training and assessment are recommended at their hospital. **[34]**

A study was conducted **in the United Kingdom**, 2019 to study (Do medical students studying in the United Kingdom have adequate factual knowledge

of basic life support?). The **result** of this study showed that a total of 3,732 complete responses were received from 21 medical schools. Eighty percent (n=2,999) of students completed a BLS course as part of their undergraduate medical studies. There was a significant difference (P<0.001) in the percentage of the fourth-year students selecting the correct answer in all the MCQs compared to the first-year students except in identifying the correct depth of compressions required during CPR (P=0.095). Overall 10.3% (95% CI 9.9% to 10.7%) of respondents correctly identified the answer to 5 MCQs on BLS 9% of the first-year students (n=194) and 12% of the fourth-year students (n=190). On an institutional level, the proportion of students answering all MCQ's correctly ranged from 2% to 54% at different universities. Eighty-one percent of students (n=3,031) wished for more BLS training in their curriculum. This study **concluded that** Factual knowledge of BLS is poor among medical students in the UK. There is a disparity in standards of knowledge across institutions and respondents indicating that they would like more training. **[35]**

A study was conducted in **Italy**, this study was done in 2019 to study (Final-year medical students' knowledge of cardiac arrest and CPR). The **result** of this study showed that 1012 medical students from 99 different universities and 14 different countries completed the questionnaire. A total of 82.2% attended a BLS or BLS/AED course, provided by the University in only 69.7% of cases. In 84.3% it was a mandatory part of their degree. A total of 78.6% felt able to rescue a person in OHCA. Only 49.3% knew that 'unresponsiveness' and 'absence of normal breathing' are sufficient for lay people to identify an OHCA, and less than half of those interviewed knew the incidence of OHCA in Europe and the decrease the chance of survival if CPR is not performed. The correct compression: ventilation ratio was known by 90.2%, the correct compression depth by 69.7%, whilst only 57.8% knew the right compression rate. In total, 69.7% knew that an AED must be used immediately when available, and only 57.2% recognized the AED symbol. This study **concluded that** medical students' knowledge of cardiac arrest

and CPR needs to be improved throughout Europe and we believe that BLS/AED training should be mandatory in all European Universities. **[36]**

A study was conducted in **Iran**, this study was done in 2021 to study (Awareness of Iranian Medical Sciences Students Towards Basic Life Support; a cross-sectional study). The **result** of this study showed that 1210 students with the main age of 21.2 ± 2.3 years completed the survey (79% female). 133 (10.9%) students had CPR experience and none had received any formal training. None of the responders could answer all questions correctly. The mean awareness score of participants was 11.93 ± 2.87 (range: 10.13 -17.25). The awareness score of participants was high in 49 (4.04 %) participants, moderate in 218 (18.01%) and low in 943 (77.93%) of studied cases. This study **concluded that** more than 70% of the studied medical sciences students obtained a low score on BLS awareness. **[37]**

A study was conducted in **Saudi Arabia**, this study was done in 2018 to study (Knowledge and Attitude of Basic Life Support among Medical Students at King Abdul-Aziz University). The **result** of this study showed that 370 medical students at King Abdul-Aziz University (KAU) were participated to evaluate their knowledge and attitude toward Basic Life Support (BLS). The distribution among academic years was represented as 97, 111, 106, and 56 students from the 3rd, 4th, 5th, and 6th respectively, 190 of the students were male and 180 were female students. The overall mean percentage of total correct answers was 38.5% for males and 43% for females. 6th year medical students scored the highest mean of total correct answers in general 47.5% in comparison with the 3rd,4th, and 5th which scored 38.5%, 39.5%, and 38% respectively. Both the total mean of correct answers of knowledge and attitude toward BLS were 40% for both variables. In adult CPR questions the overall participants scored 43% mean of correct answers which was higher than children CPR 33% with a ten percent difference. Students who had BLS courses other than the mandatory ones scored 41.5% of the correct answers, while the students who had only

mandatory BLS courses scored 39% of the correct answers. This study **concluded that** among KAU medical students, the data showed poor essential knowledge toward BLS. The overall attitude towards BLS was negative. However, the data also showed slight improvement when students had BLS courses other than the mandatory ones. Therefore, more focus may be placed on strengthening BLS skills. In addition, it is recommended to have an annual BLS simulation for all medical students to consolidate their skills and knowledge. We also recommend adding active learning to all medical students. **[38]**

A study was conducted in **Saudi Arabia**, this study was done in 2018 to study (Awareness and Knowledge of Health-College Students of Cardiopulmonary Resuscitation at Taif University, Saudi Arabia). The **result** of this study showed that only 7.3% of participants got more than 80% correct answers, most participants scored less than 50%. On the other hand, about 16% of students got less than 10% correct answers and no one got the full mark. There were significant ($p<0.05$) differences in CPR knowledge among health colleges, program and year of study program. Nursing students got the highest score among all participants. In addition, students of the bridging program had a higher score than regular students. All questions were answered correctly by at least one-third of the participants. A low rate of correct answers was found in infant CPR, steps of doing CPR, and update the information of CPR. This study **Concluded that** lack of awareness of CPR in most health colleges' students. This is agreed with most previous studies. Despite significant differences among medical professionals in their CPR scores, they didn't reach an acceptable level of awareness. This study recommended giving adequate BLS knowledge and training for all health professionals and included a BLS course in the curricula of health colleges. **[39]**

A study was conducted in **Egypt**, this study was done in 2018 to study the (Awareness of Basic Life Support among Egyptian Medical Students; a Cross-Sectional Study). The **result** of this study showed that a total of 823 medical students, including 727 males (88.3%) and 96 females (11.7%) with the mean age of 20.3 ± 2.7 years, from Al-Azhar medical schools, completed the questionnaire (463 and 360 in academic and clinical years, respectively). Only 222 students (27%) reported previous attendance of BLS courses, while 282 (34.3%) stated that they had attended an external medical/paramedical course before. There was a statistically significant association between sex and the overall score ($p < 0.001$), with females achieving significantly higher scores than males. The correct meaning of the abbreviation "BLS" was only identified by 364 (44.8%) students. Only 254 responders (30.9%) could select 'look for safety' when asked about the first thing to do when you find an unresponsive person in the middle of the road. Moreover, only 78 students (9.5%) could identify "Activate EMS" as the immediate response after confirming the unresponsiveness of that person. About 72% and 84% of students failed to recognize the proper point of chest compression in adults and infants, respectively. Moreover, the majority (80%) did not know how to give rescue breathing in infants. Only 18% of students correctly identified early signs of shock and only 22% knew how to help patients with myocardial infarction. Being in clinical years, previous BLS training or practical experience were significantly associated with higher BLS knowledge scores ($p < 0.001$). This study **concluded that** the level of BLS awareness among Egyptian medical students is generally poor. The introduction of regular BLS courses into the undergraduate curriculum is a must to increase the level of BLS knowledge among Egyptian future physicians. **[40]**

Another study was conducted in **Egypt**, this study was done in 2018 to study (Basic Life Support Knowledge of Medical Students: A Single Faculty Study in Egypt). The **result** of this study showed that with a response rate of 85%, only 5% of the participants scored 50% or more in the questionnaire, they encountered some significant gender differences, with a significantly

higher percentage of male students achieving good knowledge scores. Clinical students were 2.2 times (95% CI: 1.5 -3.1) more likely to achieve good BLS knowledge scores than preclinical students. Attending BLS courses, self-perceived ability to manage emergency situations, and being male were all independent predictors of good BLS knowledge scores, with adjusted Odd's ratios of 1.7 (95% CI: 1.2-2.4), 2 (95% CI: 1.2-3.3), and 1.8 (95% CI: 1.3-2.6) respectively. Ninety-six percent of the study participants wanted to learn more about BLS as a part of their curriculum. This study **concluded that** ninety-five percent of the students achieved poor BLS knowledge scores. Revisiting the BLS teaching strategies in the subject based system is strongly encouraged. We advise medical students to take BLS courses to raise their knowledge levels. **[41]**

A study was conducted in **Jordan**, this study was done in 2019 to study (Cardiopulmonary resuscitation level of knowledge among allied health university students in Jordan: a cross-sectional study). The **result** of this study showed that a total of 883 students completed the surveys and were included in the study. The mean age was 21 years (±1.6) and the majority were females (73.1%). A total of 693 (78.5%) students did not receive previous CPR training and the top barriers to receiving CPR training were unawareness of training opportunities and a lack of time. Participants had a mean CPR knowledge score of 3.9 (±1.7) out of 10 maximum potential points. Trained participants had a higher mean score compared with the untrained (4.6 (±1.6) vs 3.8 (±1.6), $p<0.001$). Previous training (adjusted $\beta=0.6$; 95% CI 0.2 to 0.9; $p<0.001$) and being in the physical therapy program (adjusted $\beta=0.5$; 95% CI 0.1 to 0.8; $p=0.01$) were associated with higher knowledge. This study **concluded that** there is poor knowledge of CPR among AHP students including trained individuals. Efforts to increase the awareness of CPR should target students and professionals who are highly likely to encounter patients requiring CPR. Compulsory training courses, shorter training periods as well as recurrent and regular refreshing courses, and use of various media devices are recommended. **[42]**

A study was conducted in **Syria**, **Iraq,** and **Jordan**, this study was done in 2020 to study (Awareness of basic life support among undergraduate medical students in Syria, Iraq, and Jordan). The **result** of this study showed that 1659 of the participant (78.3%) stated that they did not attend a basic life support course. BLS knowledge there was a significant difference between the participants from different countries where the mean score in Syria, Iraq, and Jordan to total score; low (0-12), moderate (13-24), and high (25-37). In total, 18.3%, 27.8%, and 8.9% of participants had high, intermediate, and low level respectively. In CPR skills 36.2% of the participant were not confident of performing CPR and about 70.3% were uncomfortable to be in a situation that needed CPR performing. They compared the knowledge and Perception of the participants who attended previously BLS training and who did not attend a course especially in some domains of CPR (massage rate, massage location, and massage depth, massage/ventilation ratio). They found a significant difference between the two groups in all domains with a higher score to those who have been attended previously BLS training. This study **concluded that** attendance at a basic life support course previously effected on knowledge level. Hence, there is an urgent need to apply basic life support courses into the pre-clinical stage at universities. **[43]**

A study was conducted in **Yemen**, this study was done in 2019 to study (Knowledge and Awareness of BLS among Medical Students in Sana'a University- 2019). The **result** of this study showed that a total of 550 medical students with the mean age of 24.4 ± 1.6 years, of both genders in which 245(44.5%) were male and 305(55.5%) were female, completed the questionnaire. The academic level of the respondents was 161(29.3%), 192(34.9%), 197(35.8%) from the 4^{th}, 5^{th}, and 6^{th} year, respectively. 92(16.7%) respondents had attended previous BLS training IV courses. The mean score was (34.1%) showing the overall poor knowledge of the responding students about BLS. Most of the respondents 479(87.1%) scored

(less than 50%), with a statistically significant association has been found between the higher academic level and the better knowledge of BLS ($p<0.05$). This study **concluded that**, poor knowledge and awareness toward BLS among medical students in Sana'a University. they recommend doing BLS training courses and introducing it in the curriculum of early academic years with regular reassessment and refreshing courses later on. **[44]**

In The End, almost all the conducted studies show the significant association between the higher knowledge of BLS and the previous attendance of BLS training courses. And also being in later clinical years is significantly associated with higher scores, as many studies show that there was a significant association between the practical experience and the better knowledge of BLS.

Chapter 3 Methodology

METHODOLOGY

Study Design:

This study is a cross-sectional study

Study Area:

The study was conducted in the Faculty of Medicine and Health Sciences, Emirates international University, Sana'a, Yemen.

Study Population:

The study was applied for a total of 384 of both clinical and preclinical phases medical students of both genders male and female including 108 students of the 1st year, 92 students of the 2nd year, 70 students of the 3rd year, 51 students of the 4th year, 35 students of 5th year and 28 students of the 6th academic year.

Sample size estimation:

The selected key indicator for sampling was the '(percentage of students who are aware of BLS) the result of a previous study conducted at Sanaa university- Yemen showed that the prevalence of those who have good knowledge of BLS was around 50%. (45)

The sample size was calculated using the formula for estimating a single proportion;

$$N = (Z2 \times P \times Q) / D2$$

Where;

- ✓ **N** sample size required,
- ✓ **Z** is the critical value for a given confidence interval (1.96),
- ✓ **P** is the expected proportion of the event to be studied (estimated based on findings of previous studies). 50% or (0.50)
- ✓ **Q** =1−P (proportion of the population represented with the sample),
- ✓ **D** is the margin of error or degree of accuracy desired (0.05).
- ✓ 95% CI and 5% of margin of error = 1.96.

$$N = ((1.96)2 \times 0.50 \times 0.50)/ (0.05)2 = 384,$$

From the above formula, the minimum sample size needed is 384 students.

Sampling technique:

- Total of students in the medical college 582 distributed on 6 levels (level 1-level 6)
- To select 384 students, we divided the students into clusters depending on their levels (6 clusters).
- We use the proportion of clusters to calculate the sample size in each cluster as it`s clear in the following table.
- Within each cluster, we calculate the sample size by gender depending on the size of the gender in the cluster.
- Then we use systematic random sampling to select the names of the sample under study.

level	**No. OF students**			**sample selected for study**		
	M	F	Total	M	F	Total
level 1	124	40	164	82	26	108
level 2	103	36	139	68	24	92
level 3	67	39	106	44	26	70
level 4	51	27	78	34	18	51
level 5	33	20	53	22	13	35
level 6	19	23	42	13	15	28
total	397	185	582	262	122	384

Table 2 Sample Selection Process

Data collection method:

For data collection, we used a printed questionnaire. The data collection has continued for three days from June 5th, 2021 to June 7th, 2021 to ensure that the questionnaire has reached most of the study population and to reach an acceptable response rate.

The survey questionnaire was divided into three sections contains 29 items;

- **Part1:** included four questions about the personal information (age, gender, academic year, and previous training).

- **Part 2:** included five questions that pertained to know the attitudes of CPR among the students.
- **Part 3:** included 20 multiple questions regarding the awareness, knowledge about the adult and child BLS maneuvers (assessment of airway, breathing, and circulation in victims, CPR technique, and AED use).

Knowledge domain had more specific questions regarding the ideal site and duration of pulse check, correct BLS sequence, ideal site of hand placement while giving compressions, the correct rate and depth of compressions and the compression: ventilation ratio to be maintained, characteristics of high-quality CPR, correct maneuver of airway opening. The responses to all these questions were based on the guidelines for Basic Life Support given by American Heart Association.

The questionnaire was prepared using the advanced cardiac life support manual posted in the Indian Journal of anesthesia 2010**[45]**. It was previously used and validated in several studies conducted in different countries and reviewed by an Emergency Specialist.

Data analysis:

The collected data were entered to Microsoft Excel and then statistical analysis was made by statistical package for social science (SPSS). For categorical data, the number and percentage were used in the data summarized for the quantitative variables we used (the mean and SD-and median to describe them. Data is presented in tables and graphs. Appropriate tests of significance were applied to determine the significance of association by Chi-square test. For the assessment of students based on the score, the parameters were: more than 85% score as high, (65-84%)as good, between (50-64%)as average, and less than 50 as poor. A p-value equal to or less than 0.05 was considered as a significant level

Ethical considerations:

The study's purpose, procedures, potential risks, and benefits were explained to medical students; participants were informed of the details and aims of the

study before consenting to participation, and all of the information was collected and kept strictly confidential.

Variables:

Age, Gender, Academic year, previous attendance of BLS course.

Inclusion and Exclusion criteria:

Inclusion criteria:

All undergraduate medical students of Emirates International University, “medical college” from the first year MBBS to the final year MBBS, were included in the selection process.

Exclusion criteria: Other colleges of medical science (interns, nursing, dentistry), and students of other departments were excluded.

Chapter 4 result

RESULT

Description of the sample

The Sample by sex:

The total of the sample was 385, of which more than two-third 263 (68.3%) were males and only 122 (31.7%) were females.

Figure (12) shows that males are more than females in all levels except in level 6 which females were more than males.

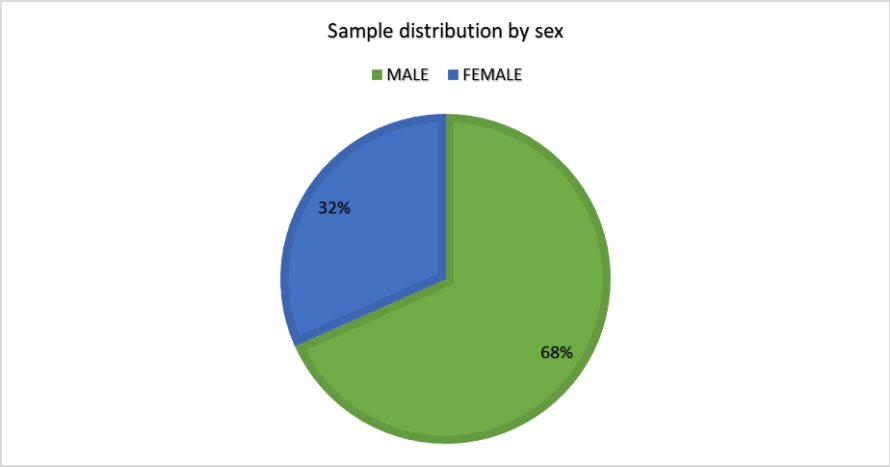

Figure 9 Distribution of The Sample by Sex

The Sample by age:

The age of students is not normally distributed in all the sample in general figure (10) and even in the sex groups figure (11). The minimum age was 17 and the maximum age was 30 the median age 22 and the Interquartile range was 4. The median age was 22 in both sex groups (males and females). There was a small difference in the mean of age between the two groups (22.4, 21.9 respectively) and this difference was small and not statistically significant (P-value = 0.09)

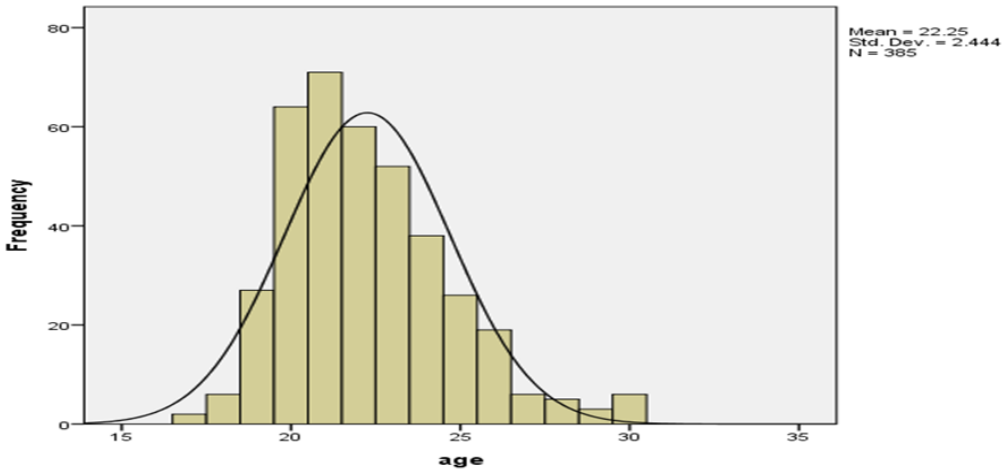

Figure 10 Distribution of The Age in The Sample in General

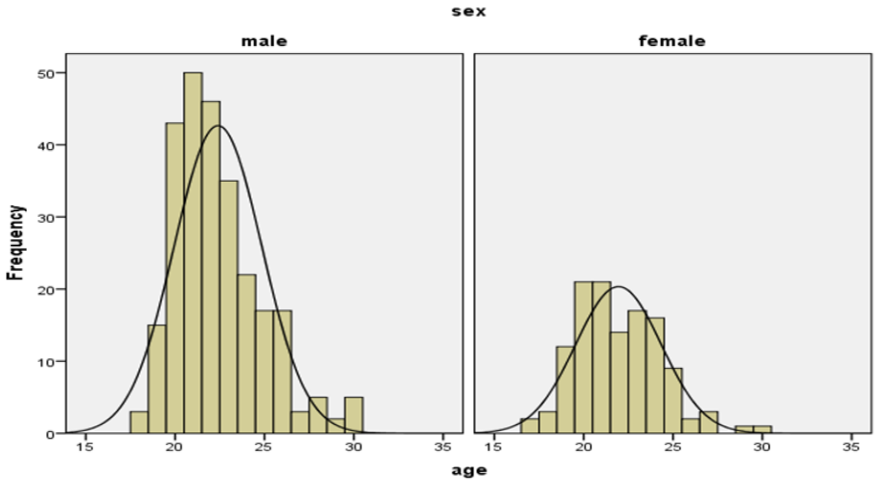

Figure 11 Distribution of The Age in The Sex Group

The sample by student's level

The sample was selected depending on the proportion size of the students in each level, figure (12) shows the number and percentage of students in each level by sex. More than half of sample 200 (52%) were from level one and two (108 (28.1%), 92 (23.9%) respectively), while the remaining students were distributed as the following, 70 (18.2%) were from level three, 52 (13.5%) from level four, 35 (9.1%) from level five and 28 (7.3%) from level 6.

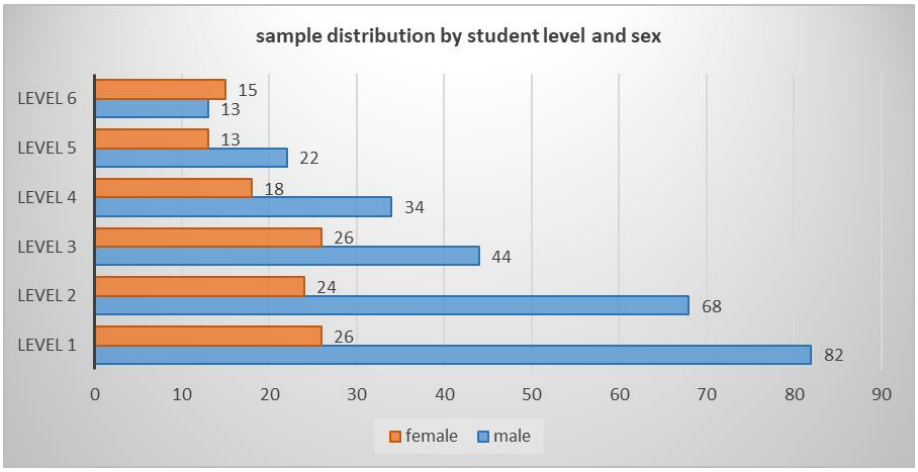

Figure 12 Distribution of The Sample by Student Level

Training on BLS

Figure (13) shows the training on the BLS among students, among 385 students under study only 116 (30.1%) were students have received training on the BLS while those who didn't receive any type of training on BLS were 269 (69.9%).

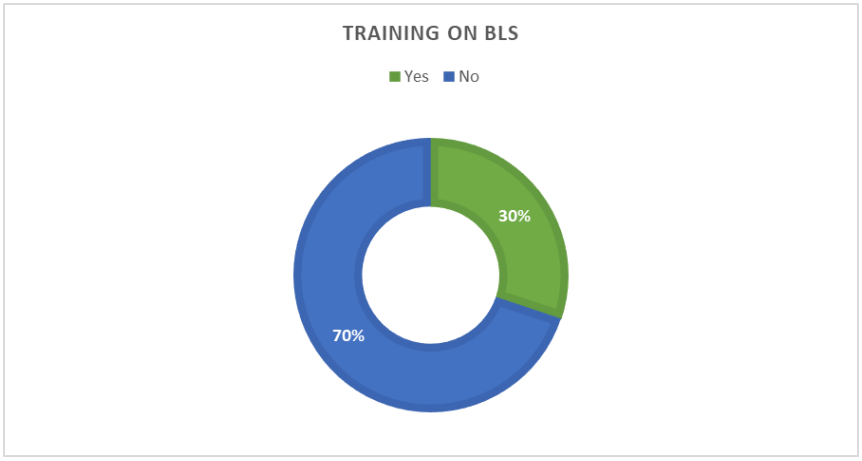

Figure 13 Training On BLS

Training on BLS among sex groups and study levels

Table (3) shows the status of the training on BLS among the sex groups and the study levels.

Depending on the sex of the students the table below shows that among 263 males under study 85 (32.3%) have received training on BLS. on the other side, among 122 females only 31 (25.4%) have received training on BLS. There was a slight difference in the training on BLS between males and females and this difference is not statistically significant (P-value = 0.19)

Depending on the study level of the students the results showed that training on BLS was low among students of the three first levels L1, L2, L3 (24.1%, 20.7%, and 24.3% respectively), while the training increased among students of the last three level L4, L5 and L6 (48.1%, 48.6%, and 42.9%). There were clear differences in the training between students in the basic levels and clinical levels and this difference is statistically significant (P-value < 0.001)

Variables	**Subgroups**	**Training on BLS**		**Chi-square**	**P value**
Sex		Yes	No		
	Male	85 (32.3%)	178 (67.7%)	1.89	0.19
	Female	31 (25.4%)	91 (74.6%)		
	Total	116 (30.1%)	269 (69.9%)		
Study level	Level 1	26 (24.1%)	82 (75.9%)	22.7	< 0.001
	Level 2	19 (20.7%)	73 (79.3%)		
	Level 3	17 (24.3%)	53 (75.7%)		
	Level 4	25 (48.1%)	27 (51.9%)		
	Level 5	17 (48.6%)	18 (51.4%)		
	Level 6	12 (42.9%)	16 (57.1%)		
	Total	116 (30.1%)	269 (69.9%)		

Table 3 BLS Training Among Sex Groups and Study Level Groups

The attitude of the students toward CPR as a part of BLS:

To measure the attitude of students toward CPR, we asked about five points and the respondents had the freedom to select one of three choices (agree, disagree and I don't know)

1. I am aware of the importance of CPR in clinical practice.
2. According to me, knowledge of the correct CPR procedure is mandatory to all health care professionals and it should be made compulsory.

3. I believe CPR is a basic emergency need for the betterment of mankind and Health status.
4. I would like to participate in CPR awareness programs and have a lifesaving Experience.
5. Rather than being beneficial, CPR is more harmful to the patients.

To measure the scores of positive attitudes in each item, we used the proportion of those who have selected the correct choice in each item and calculated the scores after dividing the scores into four levels

- High positive attitude (if the proportion of those who have selected the correct choice is equal or more than 85% of the sample).
- Good positive attitude (if the proportion of those who have selected the correct choice is between 65 - 84% of the sample).
- Average positive attitude (if the proportion of those who have selected the correct choice is between 50- 64% of the sample).
- Poor positive attitude (if the proportion of those who have selected the correct choice is less than 50% of the sample).

Table (4) shows the attitude of students toward CPR, and the results showed that:

1. Depending on the importance of CPR in clinical practice, the result showed that those who agree with the importance of CPR in the clinical practice were 317 (82.3%) of the total sample. This means there is a good positive attitude toward the importance of CPR in clinical practice.
2. Depending on the attitude of the respondents about if the CPR procedure is mandatory for all health staff, the result showed that those who agree with the CPR procedure is mandatory for all health staff were 331(86%) of the total sample. This means there is a high positive attitude toward the CPR procedure is mandatory for all health staff.
3. Depending on the attitude of the respondents about CPR as a basic emergency need for the betterment of mankind and health status, the result showed that those who agree with the CPR as a basic

emergency need for the betterment of mankind and health status were 341(88.6%) of the total sample. This means there is a high positive attitude toward the CPR as a basic emergency need for the betterment of mankind and health status.

4. Depending on the attitude of the respondents about the importance of including the medical students in specific training on CPR the results showed that most of the sample (82.9%) agree with this idea while only 9.1% disagree with this idea. This means there is a good positive attitude toward the CPR procedure is mandatory for all health staff.
5. Depending on the idea of (CPR is harmful to the patient) the result showed that nearly two-thirds of the sample (62.3%) disagree with this idea while only 28.8% agree with this idea. This means there is an average positive attitude toward the CPR procedure is mandatory for all health staff.

Item	Agree	Disagree	No Idea	Score of the positive attitude on the item
Importance of CRP in clinical practice	317(82.3%)	45 (11.7%)	23 (6%)	Good
Knowledge about CPR procedure is mandatory for all health staff	331 (86%)	28 (7.3%)	26 (6.8%)	High
I believe CPR is a basic emergency need for the betterment of mankind and health status	341 (88.6%)	17 (4.4%)	27 (7%)	High
I would like to participate in CPR awareness programs	319(82.9%)	35 (9.1%)	31 (8.1%)	Good
Rather than being beneficial, CPR is more harmful to the patients	111(28.8%)	240 (62.3%)	34 (8.8%)	Average

Table 4 Attitudes of Students Toward CPR

To Measure the score of the positive attitude for all the five items, we give each correct attitude one point then we calculate the total points for each student., then we divided the sample into four groups

- High positive attitude, for those who got more than 85% of the total points (5 points)
- Good positive attitude, for those who got between (65- 84%) of the total points (4 points).
- Average positive attitude, for those who got between (50-64%) of the total points (3 points).
- Poor positive attitude, for those who got less than 50% of the total points (2 points or less)

Table (5) shows the scores of the student's attitudes in general, from the table it is clear that positive attitude among the students was good general. Those who have a high positive attitude toward CPR were (45.2%), while those have a poor positive attitude were only (10.6%)

Score of the positive attitude	No. and %
High	174 (45.2%)
Good	133 (34.5%)
Average	37 (9.6%)
Poor	41 (10.6%)

Table 5 The Score of the Positive Attitude

The positive attitude toward CPR among students' subgroups

Table (6) represents the positive attitude toward CPR among subgroups and the result shows that,

Depending on the sex of the students, there was some difference in those who got a high positive attitude among the two sex groups, it was higher within the female students (54.9%) than the male students (40.7%). There was a clear difference in those who got high positive attitude between meals and females and this difference is statistically significant (P-value = 0.001)

Depending on the students' study levels, those who got high positive attitudes among the different study levels were as the following: level 1 (48.1%), level 2 (32.6%), level 3 (54.3%), level 4 (51.9%), level 5 (45.7%) and level 6 (39.3%). The highest positive attitude was within students of level three and the lowest positive attitude was within students of level two. There were some differences in those who got high positive attitude among

the different levels and this difference is statistically significant (P-value = 0,012)

Depending on the BLS training, those who got high positive attitudes among the training subgroups were as the following: within those who have received training on BLS (49.1%) while among those who didn't receive any training on BLS (43.5%). There is some difference in those who got high positive attitude among those who have received training on BLS and those who didn't receive any training on BLS, but this difference was small and not statistically significant (P-value = 0.69)

Variables	**Subgroups**	**High**	**Good**	**Average**	**poor**	**Chi-square**	**P value**
Sex	Male	40.7%	34.2%	11.0%	14.1%	14.2	0.001
	Female	54.9%	35.2%	6.6%	3.3%		
Study level	Level 1	48.1%	32.4%	5.6%	13.9%	27.7	0.012
	Level 2	32.6%	33.7%	15.2%	18.5%		
	Level 3	54.3%	38.6%	5.7%	1.4%		
	Level 4	51.9%	32.7%	11.5%	3.8%		
	Level 5	45.7%	37.1%	8.6%	8.6%		
	Level 6	39.3%	35.7%	14.3%	10.7%		
BLS training	Yes	49.1%	33.6%	8.6%	8.6%	1.4	0.69
	No	45.2%	34.5%	9.6%	10.6%		

Table 6 Positive Attitudes Toward CPR Among Students' Subgroups

Students' Knowledge about BLS and CPR in general

To measure the knowledge of the students in the general knowledge about we determined 10 questions (questions b1 to qb4, question b8, and questions qb16 to qb20). In each question, we used the proportion to measure the correct answer as the following.

Knowledge about the abbreviation of BLS:

Figure (14) represents the knowledge of the students toward abbreviation of BLS and the results showed that,

Among all students, 259 (67.3%) mentioned BLS abbreviation stand for basic life support, 62 (16.1%) linked the BLS to best life support, 33 (8.6%) refer to BLS to basic lung support, 22 (5.7%) Said BLS is an abbreviation for basic life services and only 9 (2.3%) who said that they don't know.

Among all students, two-thirds of them (67.3%) selected the correct answer (BLS abbreviation stand for basic life support), and this means the knowledge of the students toward abbreviation of BLS was a good knowledge

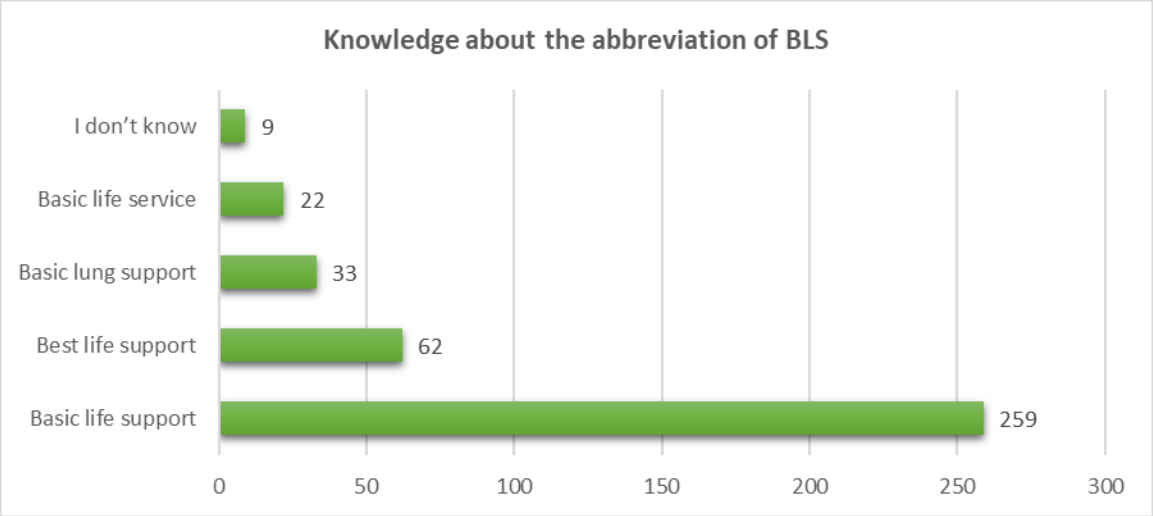

Figure 14 Knowledge About BLS

Knowledge about the actions that can be taken to save an unresponsive adult person on the road:

Figure (15) represents the Knowledge about the actions that can be taken to save an unresponsive adult person

The results showed that among all students under study 138 (35.8%) of the respondents mentioned that maintain the airway is the best action to save an unresponsive adult person, while 125 (32.5%) prefer to ask for help as the best action to save an unresponsive adult person. About 72 (18.7%) of the respondents prefer to start chest compression, while 39 (10.1%) prefer to start giving breathing. Only 11 (2.9%) of those said (I don't know). Those

who selected the correct answer (ask for help) were only (32.5%) of all students, so the Knowledge about the correct actions that were needed to save an unresponsive adult person was low (32.5%).

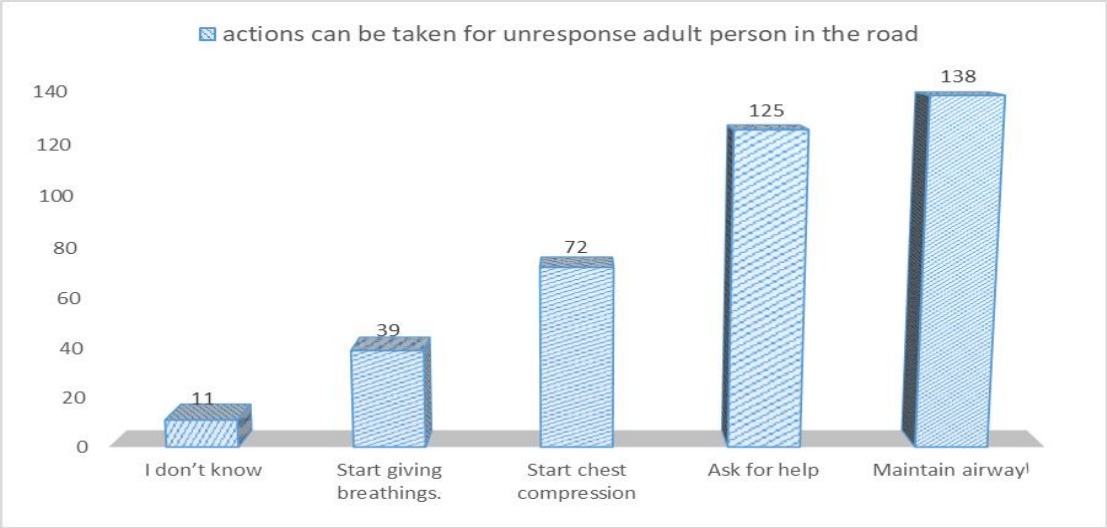

Figure 15 Knowledge About the Actions That Can Be Taken to Save an Unresponsive Adult Person

Knowledge about Immediate action plan to save an unresponsive adult person after an accident

Figure (16) represents the knowledge of the students about the immediate action plan to save an unresponsive adult person after an accident.

The result showed that among all students 174 (45.2%) mentioned that Immediate recognition of cardiac arrest and activation of emergency response system is the immediate action plan to save an unresponsive adult person after an accident, while 92 (23.9%) prefer rabid defibrillation as an immediate action plan. Seventy-nine (19.7%) of the sample mentioned that, put the person in a recovery position is the immediate action plan to save him, while 28 (7.3%) select observation as the immediate action plan to save the person. Those who said I don't know were only 15 (3.9%).

Among all students, more than one third of them (45.2%) selected the correct answer (Immediate recognition of cardiac arrest and activation of emergency response system), and this means the knowledge of the students toward immediate action plan to save an unresponsive adult person after an accident was a poor knowledge

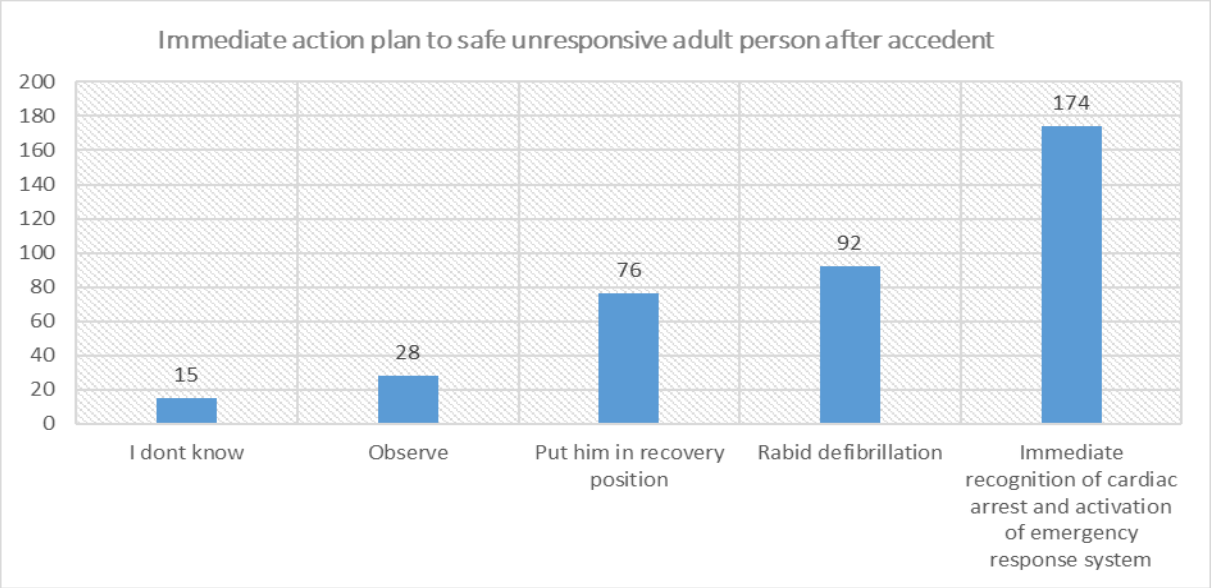

Figure 16 Knowledge About the Immediate Action Plan to Save Unresponsive Adult Person After Accident

Knowledge about for how much time you need to feel pulse before moving to start chest compressions to save an unresponsive adult person after an accident:

Figure (17) represents the Knowledge about how much time you will try to feel for a pulse before moving to start chest compressions.

The results showed that among all students 187 (48.6%) mentioned that Minimum of 5 sec and Maximum of 10 seconds is the needed time before starting chest compression, while 86 (22.3 %) mentioned Minimum of 10 sec and Maximum of 15 seconds is the needed time before starting chest compression. Fifty-six (14.5%) of the sample mentioned that the needed time before starting chest compression is between 15 to 20 seconds, while

51(13.2%) mentioned there is no limited time. Those who said I don't know were only 5 (1.3%).

Those who mentioned the correct answer (Minimum of 5 sec and Maximum of 10 seconds) were only 187 (48.6%), which means there was low knowledge about the correct time needed to feel the pulse before starting chest compression.

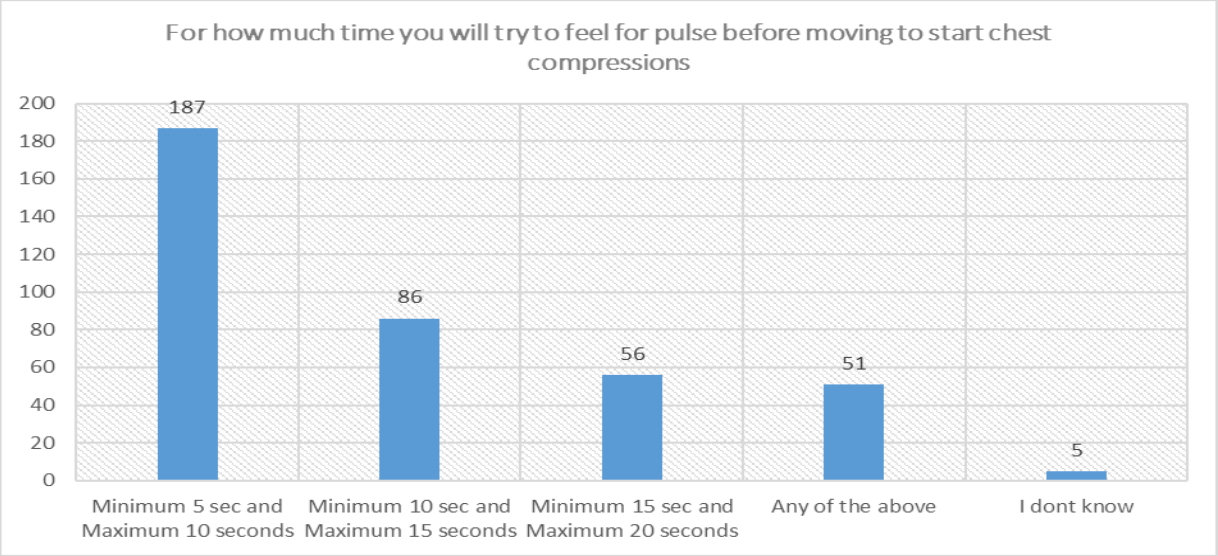

Figure 17 Knowledge About for How Much Time You Will Try to Feel for Pulse Before Moving to Start Chest Compressions

Knowledge about mouth to mouth breathing in CPR

Figure (18) represents the knowledge of the students about the mouth to mouth breathing in CPR. To measure the knowledge of the students about what is the exception not to be done in the situation there is no desire to give mouth to mouth breathing in CPR and the result showed five different choices.

Around half of the respondents, 192 (49.9%) said no CPR if there are any barriers to do mouth-to-mouth breathing, while 74 (19.2%) prefer to do bag-mask ventilation with chest compression. Fifty-nine (15.3%) selected mouth-mask ventilation and chest compression, while 55 (14.3%) selected chest compression only, while those who said I don't know were only 1.6%.

Those who selected the correct answer were 192 (49.9%), and this means the knowledge of the students toward mouth to mouth breathing in CPR was a average knowledge.

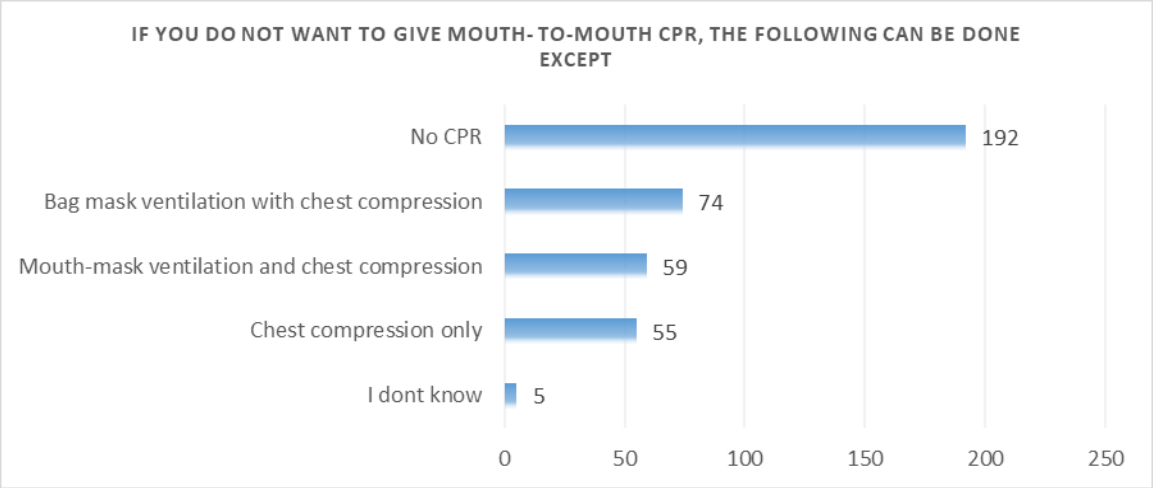

Figure 18 Knowledge About Mouth-to-Mouth Breathing in CPR

Knowledge about the abbreviation of AED

Figure (19) represents the knowledge about the abbreviation of AED

Among all students, only 126 (32.7%) selected the correct answer about the abbreviation of AED and mentioned that it stands for Automated External Defibrillator, and this means the knowledge of the students toward the abbreviation of AED was a poor knowledge. Those who said that they don't know were only 9 (2.3%).

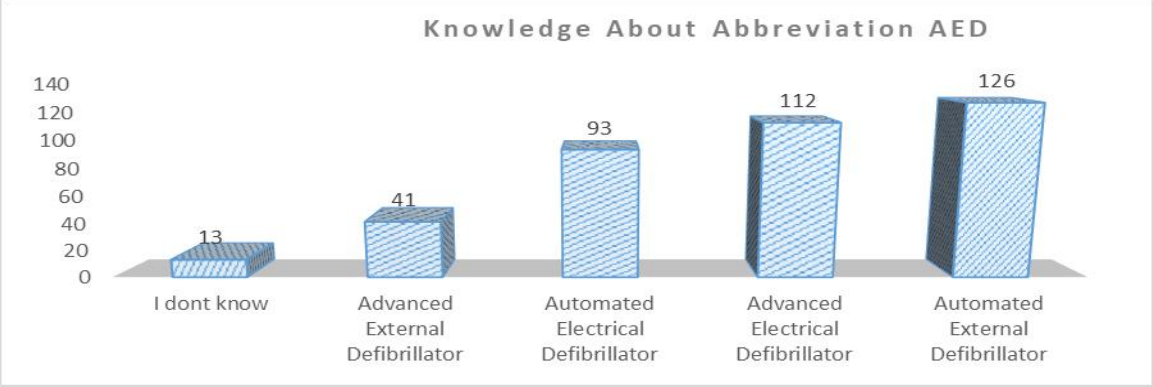

Figure 19 Knowledge About the Abbreviation of AED

Knowledge about the abbreviation of EMS

Figure (20) represents the knowledge about the abbreviation of EMS

Among all students, only 161 (41.8%) selected the correct answer about the abbreviation of EMS and mentioned that EMS stands for Emergency Medical Services, and this means the knowledge of the students toward the abbreviation of EMS was a poor knowledge. Those who said that they don't know were only 11 (2.9%).

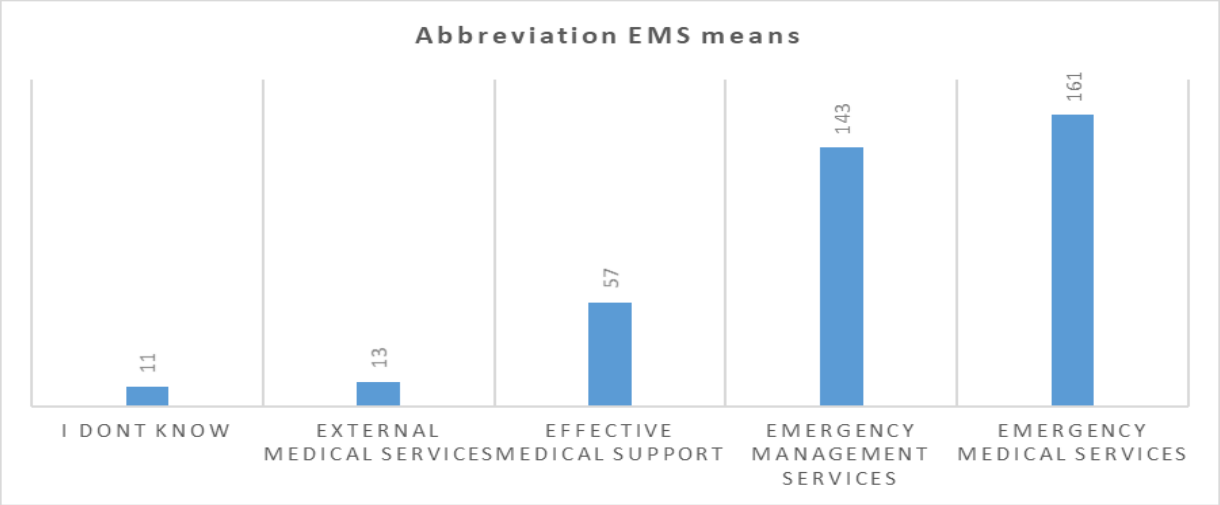

Figure 20 Knowledge About the Abbreviation of EMS

Knowledge about the correct action taken for an old man with retrosternal chest discomfort, profuse sweating, and vomiting.

Figure (21) represents the knowledge of the students about the correct action taken for an old man with retrosternal chest discomfort, profuse sweating, and vomiting.

The result showed that, among all the students more than half 223 (57.9%) of the sample selected the correct answer (Probably myocardial infarction, hence activates EMS, give an aspirin tablet, and allow him to rest) and this means the knowledge of the students toward this situation was an average knowledge. Those who said that they don't know were only 12 (3.1%).

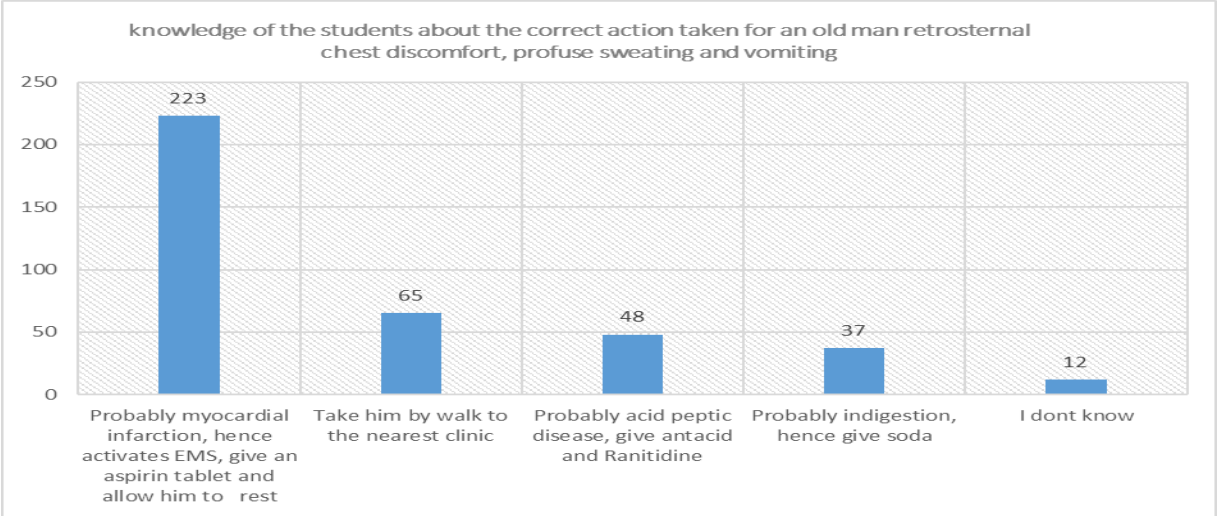

Figure 21 Knowledge About the Correct Action Taken for an Old Man with Retrosternal Chest Discomfort, Profuse Sweating, and Vomiting

Knowledge about the correct first step taken for an unconscious person lying in a safe place.

Figure (22) represents the knowledge of the students about the correct first step taken for an unconscious person lying in a safe place.

The result showed that among all the students only152 (39.5%) of the sample selected the correct answer (Call for help) and this means the knowledge of the students toward this situation was a poor knowledge. Those who said that they don't know were only 5 (1.3%).

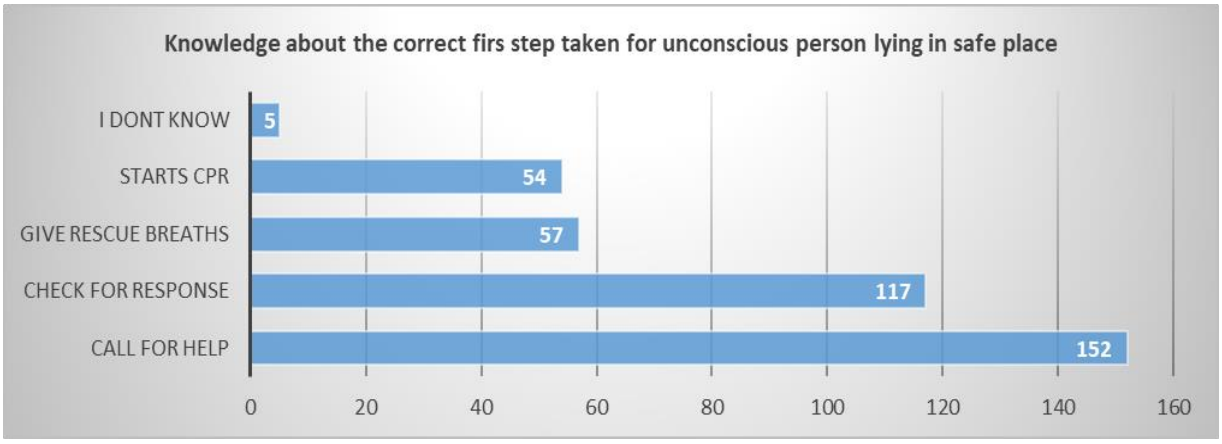

Figure 22 Knowledge About the Correct First Step Taken for an Unconscious Person Lying in a Safe Place

The most dangerous method used to open the airway in an unresponsive patient

Figure (23) represents the knowledge of the students about the dangerous method that can cause death used to open the airway in an unresponsive patient

The result showed that 199 (52%) selected neck flexion, while 63 (16%) selected Jaw thrust. Sixty-two (16%) selected head lift, while 52 (14%) selected Chin lift, while those who said I don't know were 2%. Those who selected the correct answer (neck flexion) were only 199 (52%), and this means the knowledge of the students toward The most dangerous method used to open the airway in an unresponsive patient was an average knowledge.

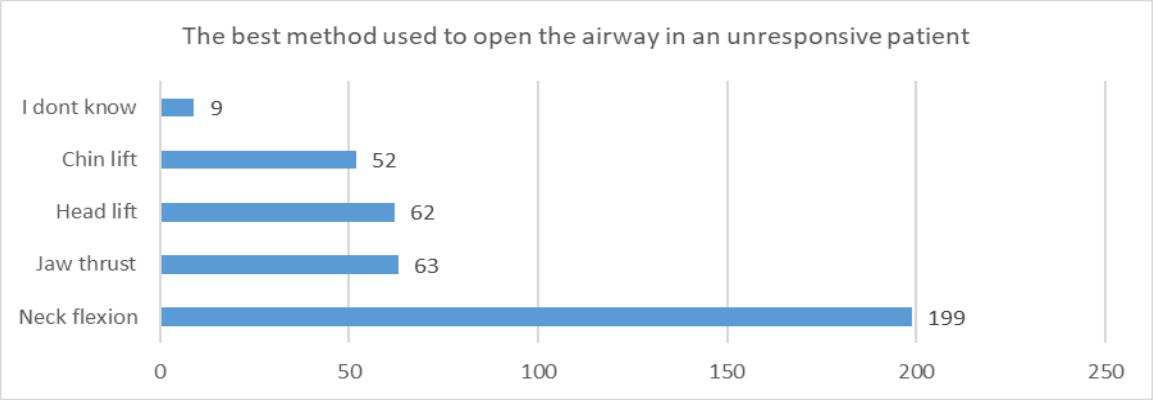

Figure 23 Most Dangerous Method Used to Open the Airway in an Unresponsive Patient

The proportion of the correct answer for the general knowledge about CPR

The Knowledge items	Proportion of the correct answer	Score
Knowledge about the abbreviation of BLS	67.3%	Good
Knowledge about the actions can be taken to save an unresponsive adult person in the road	32.5%	Poor
Knowledge about Immediate action plan to save an unresponsive adult person after accident	45.2%	Poor
Knowledge about for how much time you need to feel for a pulse before moving to start chest compressions to save an unresponsive adult person after accident	48.6%	Poor
Knowledge about mouth to mouth breathing in CPR	49.9%	Average
Knowledge about the abbreviation of AED	32.7%	Poor
Knowledge about the abbreviation of EMS	41.8	Poor
Knowledge about the correct action taken for an old man with retrosternal chest discomfort, profuse sweating, and vomiting.	57.9%	Average
Knowledge about the correct first step taken for an unconscious person lying in a safe place	39.5%	Poor
The dangerous method used to open the airway in an unresponsive patient	52%	Average

Table 7 The proportion of the correct answer for the general knowledge toward CPR

The score of the correct answers of the general knowledge about BLS and CPR

To measure the score of the correct answers, we give each correct answer one point each point weighted by 10% then we measured the mean and SD of the numbers of the correct answers after that we divided the sample into four groups as the following:

1. Those who had 9-10 correct answers and got more than 85% took (high knowledge level)
2. Those who had 7-8 correct answers and got between 65- 84% took (good knowledge level)

3. Those who had 5-6 correct answers and got between 50- 64% took (average knowledge level)
4. Those who had less than 5 correct answers and got between less than 50% took (poor knowledge level)

The mean of the correct answers was (4.6) and SD was 2.1.

Table (8) below represents the scores of the knowledge about BLS and CPR. The result showed that more than half of the sample 201 (52.2%) had poor knowledge about the general knowledge about BLS and CPR, while those who had high or good knowledge were only 86 (22.3%)

The knowledge level	Frequency	Percent
high knowledge	12	3.1%
good knowledge	74	19.2%
average knowledge	98	25.5%
poor knowledge	201	52.2%
Total	385	100.0%

Table 8 The score of The Correct Answers of the General Knowledge About BLS and CPR

The general knowledge about BLS and CPR among the sample subgroups

Table (9) represents the general knowledge about BLS and CPR among the sample subgroups and the result shows that,

Depending on the sex of the students, there was no important difference in the general knowledge about BLS and CPR among the two groups, those who have high knowledge among males and females were (2.7% and 4.1% respectively), while those who have poor knowledge among males and females were (51.7% and 53.3% respectively). The difference between males and females was very small and was not statistically significant (P-value =0.7)

Depending on students' study levels, the general knowledge about BLS and CPR among the different study levels was as the following: those who had

high knowledge were higher in the last three levels (4,5 and 6) than the first three levels (1,2, and 3), in the other hand those who had poor knowledge were lower in the last three levels (4,5 and 6) than the first three levels (1,2, and 3). There was a clear difference in the general knowledge about BLS and CPR among the different study levels and this difference was highly significant (P-value = < 0.001)

Depending on the BLS training, the general knowledge about BLS and CPR among the training subgroups was as the following: those who had high knowledge were higher within those who have received training than those who didn't receive training (6% and 1.9% respectively), in the other hand those who had poor knowledge were lower within those who have received training than those who didn't receive training (36.2% and 59.1% respectively). There was a clear difference in the general knowledge about BLS and CPR among those who have received training on BLS and those who didn't receive any training on BLS, and the difference was highly significant (P-value = < 0.001)

Variable	**Variable Subgroups**	**high knowledge**	**good knowledge**	**average knowledge**	**poor knowledge**	**Chi – square**	**P. value**
sex	Male	7 (2.7%)	49 (18.6%)	71 (27%)	136 (51.7%)	1.5	0.7
	Female	5 (4.1%)	25 (20.5%)	27 (22.1%)	65 (53.3%)		
	Total	12 (3.1%)	74 (19.2%)	98 (25.5%)	201 (52.2%)		
Study level	Level 1	0	15 (13.9%)	27 (25%)	66 (61.1%)	66.4	< 0.001
	Level 2	2 (2.2%)	4 (4.3%)	27 (29.3%)	59 (64.1%)		
	Level 3	4 (5.7%)	10 (14.3%)	15 (21.4%)	41 (58.6%)		
	Level 4	1 (1.9%)	18 (34.6%)	14 (26.9%)	19 (36.5%)		
	Level 5	2 (5.7%)	16 (45.7%)	8 (22.9%)	9 (25.7%)		
	Level 6	3 (10.7%)	11 (39.3%)	7 (25%)	7 (25%)		
	Total	12 (3.1%)	74 (19.2%)	98 (25.5%)	201 (52.2%)		
Training on BLS	Yes	7 (6%)	34 (29.3%)	33 (28.4%)	42 (36.2%)	22	< 0.001
	No	5 (1.9%)	40 (14.9%)	65 (24.2%)	159 (59.1%)		
	Total	12 (3.1%)	74 (19.2%)	98 (25.5%)	201 (52.2%)		

Table 9 General Knowledge About BLS and CPR Among the Sample Subgroups

The knowledge about the practical process of the CPR

The knowledge about the proper place to palpate the pulse during CPR

Figure (24) represents the knowledge about the proper place to palpate the pulse during CPR.

The result showed that major of the sample 266 (69.1) selected carotid pulse, while those who selected brachial pulse were the lowest group 16 (4.2%).

Those who selected the correct answer were 266 (69.1%), while those who said they don't know were only 10 (2.6%)

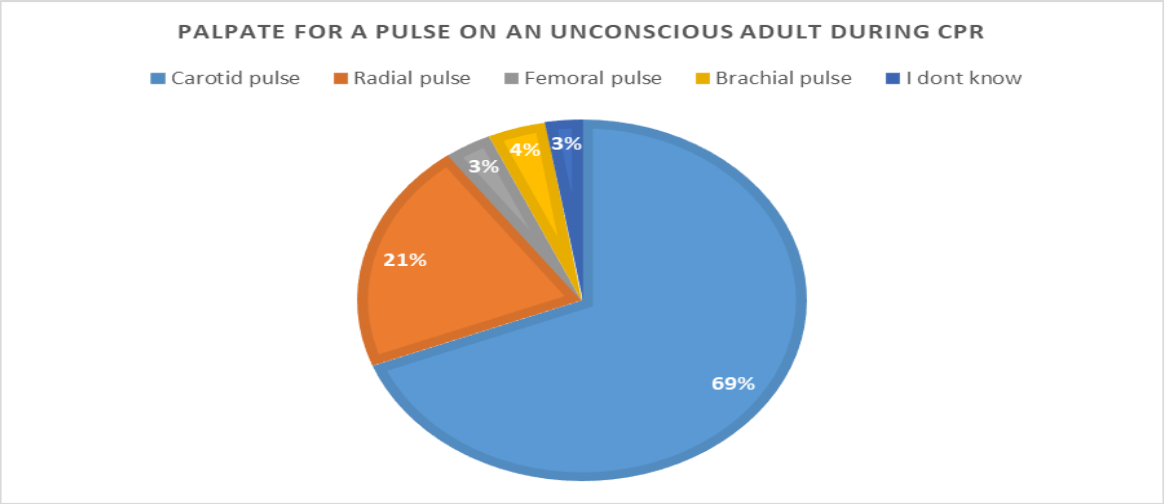

Figure 24 Knowledge About the Proper Place to Palpate the Pulse During CPR

The location for chest compression in adult

Figure (25) represents the knowledge of the students about the location for chest compression in adult. The result showed that there are five choices and most of the sample 268 (69.6%) selected the center of the chest on the breastbone, while 85 (22.1%) selected the left side of the chest as the correct location for the chest compression in CPR for adult. Eighteen (4.7%) of the sample selected the right side of the chest, while 10 (2.6%) selected anywhere of the chest region as the correct location for the chest compression in CPR for adult. Those who selected the correct answer were 268 (69.6%) while those who said I don't know were only 1%.

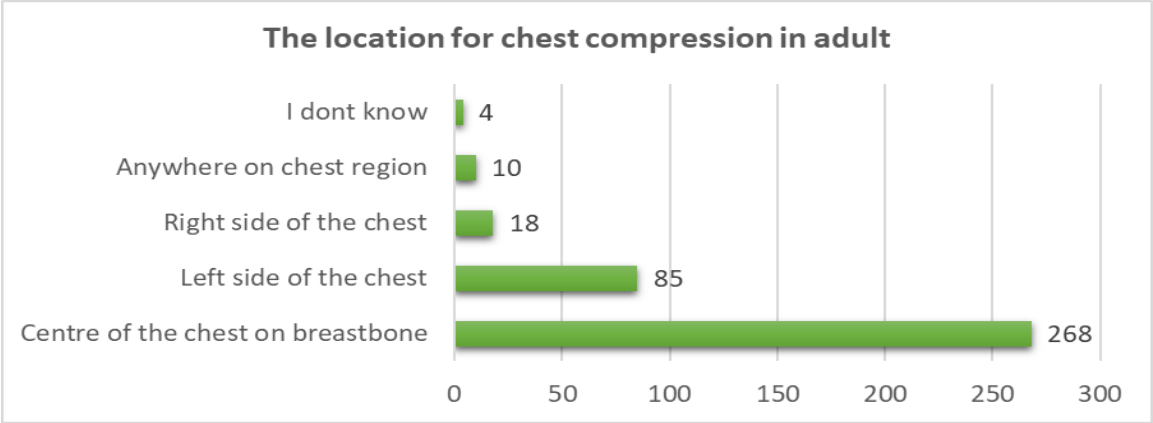

Figure 25 Location for Chest Compression in Adult

The location for chest compression in infants following the 2-finger technique

Figure (26) represents the knowledge of the students about the location for chest compression in infants following the 2-finger technique. The result showed that there are five choices and more than half of the sample 215 (55.8%) selected the center of the chest on the breastbone, while 73 (19%) selected above the nipple line as the correct location for the chest compression in CPR for the infant. Forty-eight (12.5%) of the sample selected at xiphisternum, while 43 (11.2%) selected at the intermammary line as the correct location for the chest compression in CPR for the infant. Those who selected the correct answer were 215 (55.8%), while those who said I don't know were only 1.6%.

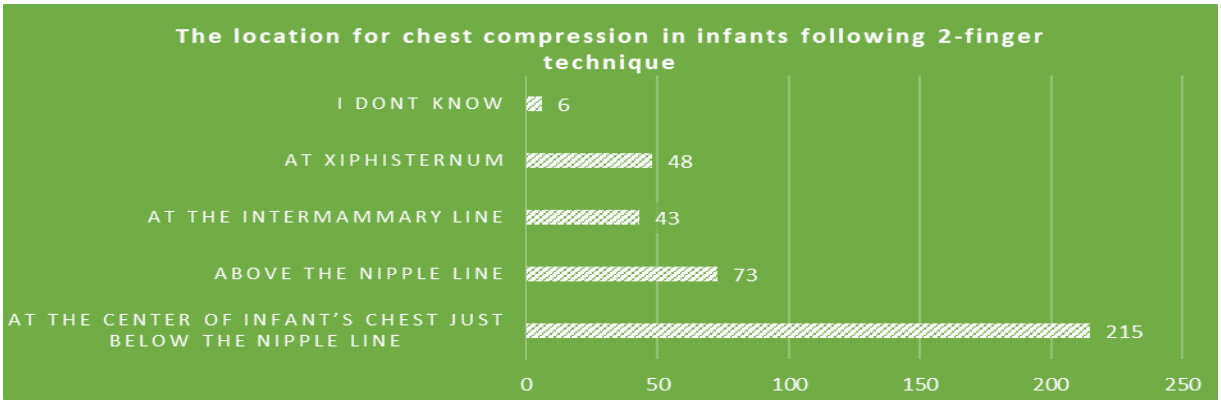

Figure 26 Location for Chest Compression in Infants Following 2-Finger Technique

Giving rescue breathing in the infant.

Figure (27) represents the knowledge of the students about: How do you give rescue breathing in infant?

Around third of the sample 129 (33.5%) said Mouth-to-mouth and nose, while 127 (33%) prefer to do Mouth-to-mouth with nose pinched. Sixty-four (16.6%) selected Mouth-to-mouth without nose pinched, while 58 (15.1%) selected mouth-to-nose only. Those who selected the correct answer were only 129 (33.5%), while those who said I don't know were 1.8%.

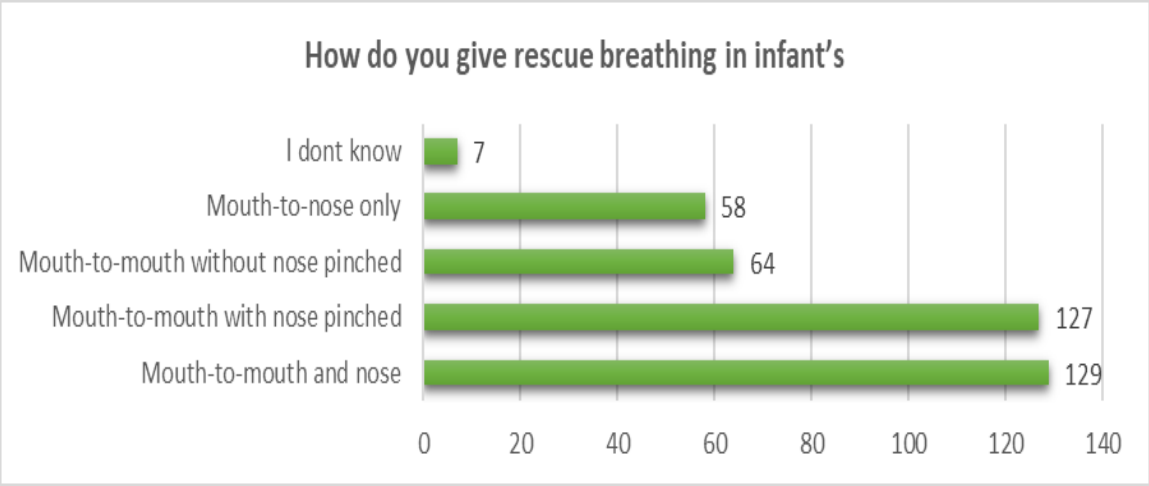

Figure 27 Giving Rescue Breathing in Infant.

Knowledge about the depth of compression in adults during CPR

Figure (28) represents the knowledge of the students about: the depth of compression in adult during CPR

The result showed that 171 (44.4%) selected At least 2 inches, while 98 (25.5%) selected the comfortable level. Fifty-seven (14.8%) selected less than 2 inches, while 50 (13%) selected 2½ inches. Those who selected the correct answer (At least 2 inches) were only 171 (44.4%), while those who said I don't know were 2.3%.

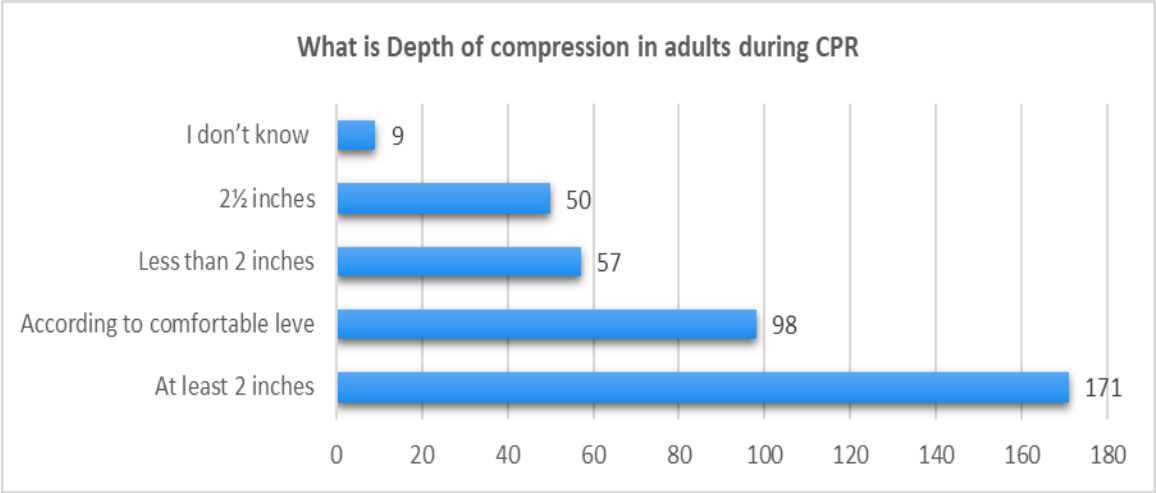

Figure 28 Knowledge About the Depth of Compression in Adults During CPR

Knowledge about the depth of compression in children during CPR

Figure (29) represents the knowledge of the students about the depth of compression in children during CPR

The result showed that 132 (34.3%) selected about 1inche, while 122 (31.7%) selected about 2 inches. Ninety-two (23.9%) selected one-fourth to one-half depth of chest, while 23 (5.9%) selected 2½ - 3 inches. Those who selected the correct answer (about 2 inches) were only 122 (31.7%), while those who said I don't know were 4.2%.

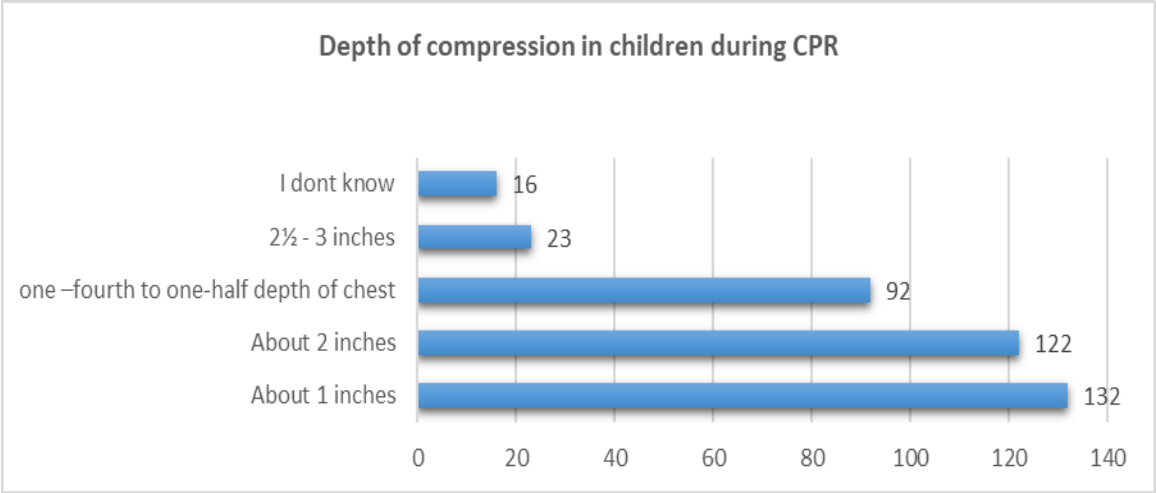

Figure 29 Knowledge About the Depth of Compression in Children During CPR

Knowledge about the depth of compression in infants during CPR

Figure (30) represents the knowledge of the students about the depth of compression in infants during CPR

The result showed that 145 (37.7%) selected between ½ - 1 cm, while 130 (33.8%) selected about 1 and ½ inches. Fifty-eight (15.1%) selected One–half to one- third depth of chest, while 36 (9.4%) selected 2½ - 3 inches. Those who selected the correct answer (about 1 and ½ inches) were only 130 (33%), while those who said I don't know were 4.2%.

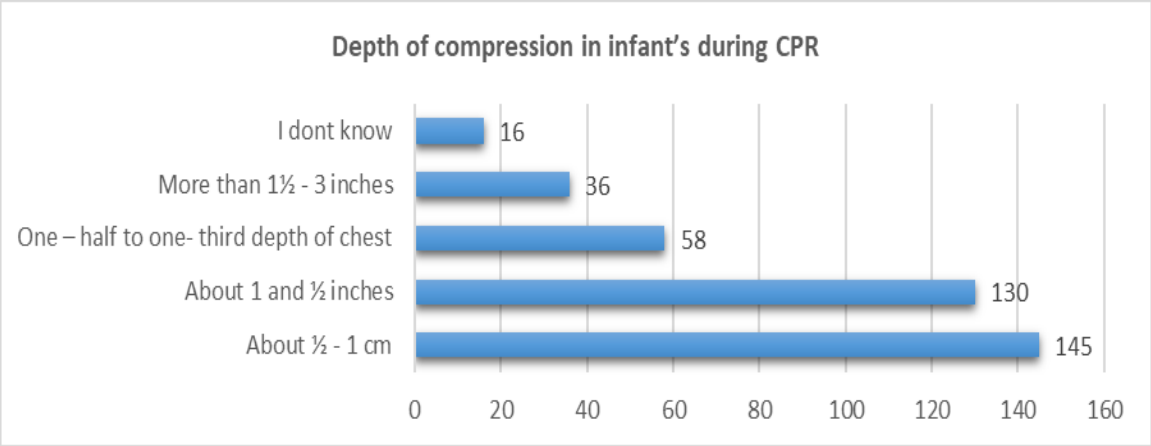

Figure 30 Knowledge About the Depth of Compression in Infants During CPR

Knowledge about the rate of chest compression in adult and children during CPR

Figure (31) represents the knowledge of the students about Rate of chest compression in adult and children during CPR

The result showed that 117 (31%) selected At least 100/min, while 116 (30%) selected At least 70/min. Seventy-eight (20%) selected At least 80/min, while 61 (16%) selected At least 90/ min. Those who selected the correct answer (At least 100/min) were only 117 (31%), while those who said I don't know were 3%.

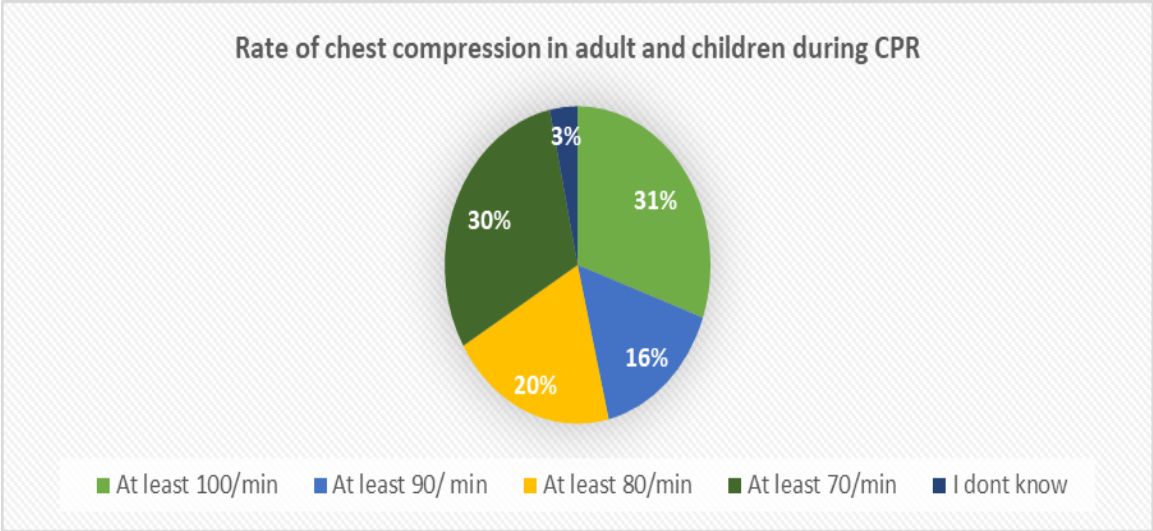

Figure 31 Knowledge About Rate of Chest Compression in Adult and Children During CPR

Knowledge about the Ratio of CPR, single rescuer in adult

Figure (32) represents the knowledge of the students about the ratio of CPR, single rescuer in adult

The result showed that 131 (34%) selected 30 to 2, while 130 (34%) selected 15 to 2. Fifty-four (14%) selected 30 to 1, while 52 (14%) selected 15 to 1. Those who selected the correct answer (30 to 2) were only 131 (34%), while those who said I don't know were 5%.

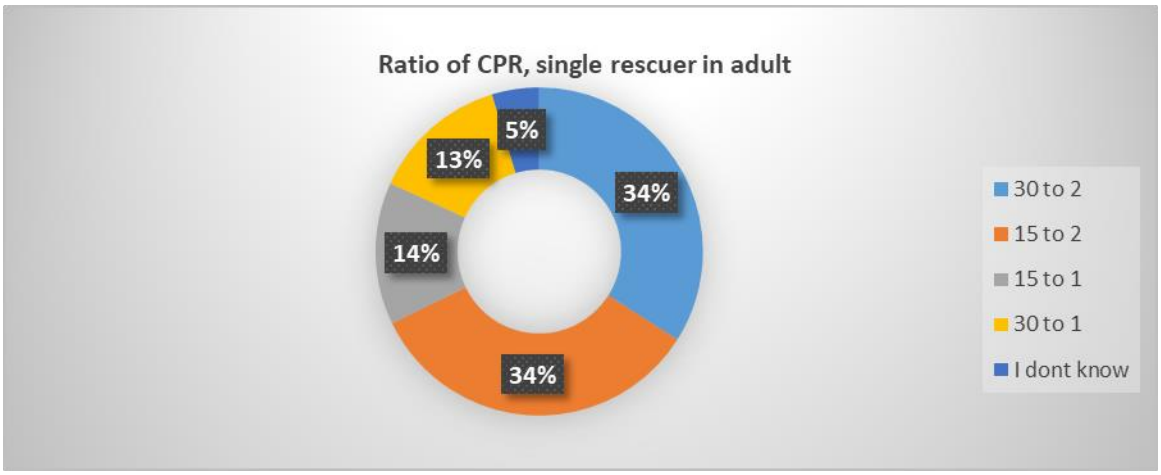

Figure 32 Knowledge About the Ratio of CPR, Single Rescuer in Adult

Knowledge about the chest compression and ventilation ratio in a newborn

Figure (33) represents the knowledge of the students about the chest compression and ventilation ratio in a newborn.

The result showed that 114 (30%) selected 30 to 2, while 97 (25%) selected 15 to 2. Eighty-five (22%) selected 30 to 1, while 72 (18.7%) selected 15 to 1. Those who selected the correct answer (30 to 2) were only 114 (30%), while those who said I don't know were 4%.

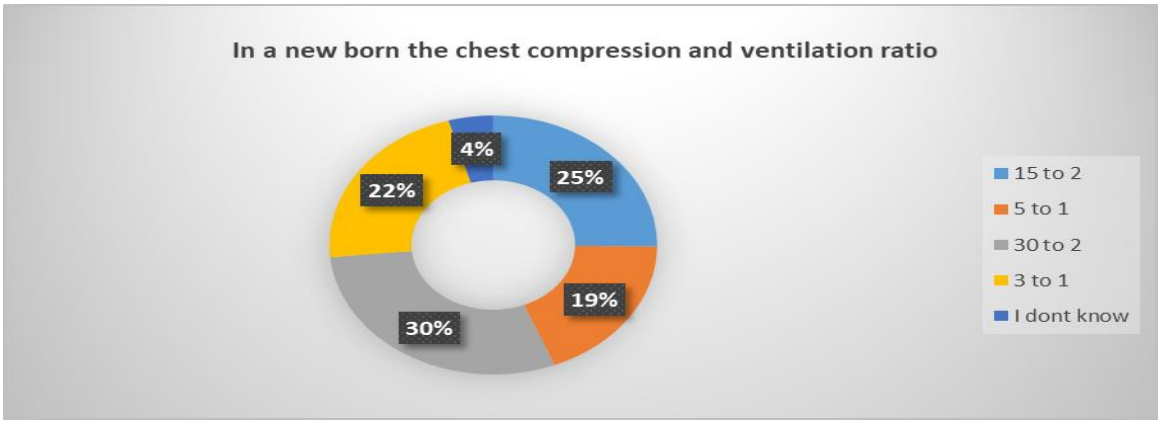

Figure 33 Knowledge About the Chest Compression and Ventilation Ratio in A Newborn

The proportion of the correct answer for the knowledge of the practical process in CPR

The Knowledge items	Proportion of the correct answer	Score
The knowledge about the proper place to palpate the pulse during CPR	69.1%	Good
The location for chest compression in adult	69.6%	Good
The location for chest compression in infants following 2-finger technique	55.8%	Average
Giving rescue breathing in the infant.	33.5%	Poor
Knowledge about the depth of compression in adults during CPR	44.4%	Poor
Knowledge about the depth of compression in children during CPR	31.7%	Poor
Knowledge about the depth of compression in	33%	Poor

infants during CPR		
Knowledge about Rate of chest compression in adult and children during CPR	31%	Poor
Knowledge about Ratio of CPR, single rescuer in adult	34%	Poor
Knowledge about the chest compression and ventilation ratio in a newborn	30%	Poor

Table 10 The proportion of the correct answer for the knowledge of the practical process in CPR

Score knowledge about the practical process of the CPR

To measure the score of the correct answers, we give each correct answer one point each point weighted by 10% then we measured the mean and SD of the numbers of the correct answers after that we divided the sample into four groups as the following

1. Those who had 9-10 correct answers and got more than 85% took (high knowledge level)
2. Those who had 7-8 correct answers and got between 65- 84% took (good knowledge level)
3. Those who had 5-6 correct answers and got between 50- 64% took (average knowledge level)
4. Those who had less than 5 correct answers and got between less than 50% took (poor knowledge level)

The mean of the correct answers was (4.3) and SD was 2.3.

Table (11) below represents the scores of the knowledge about the practical process of CPR. The result showed that more than half of the sample 277 (59%) had poor knowledge about the knowledge about the practical process of CPR, while those who had high or good knowledge were only 66 (17.1%)

The knowledge level	Frequency	Percent
high knowledge	32	8.3%
good knowledge	34	8.8%
average knowledge	92	23.9%
poor knowledge	227	59%
Total	385	100.0%

Table 11 The score Knowledge About the Practical Process of The CPR

The knowledge about the practical process of the CPR among the sample subgroups

Table (12) represents the knowledge about the practical process of the CPR among the sample subgroups and the result shows that,

Depending on the sex of the students, there was no important difference in the knowledge about the practical process of the CPR among the two groups, those who have high knowledge among males and females were (9.5% and 5.7% respectively), while those who have poor knowledge among males and females were (56.7% and 63.9% respectively). The difference between males and females was very small and was not statistically significant (P-value =0.1)

Depending on students' study levels, the knowledge about the practical process of the CPR among the different study levels was as the following: those who had high knowledge were higher in the last three levels (4,5 and 6) than the first three levels (1,2, and 3), in the other hand those who had poor knowledge were lower in the last three levels (4,5 and 6) than the first three levels (1,2, and 3). There was a clear difference in the general knowledge about BLS and CPR among the different study levels and this difference was highly significant (P-value = < 0.001)

Depending on the knowledge about the practical process of the CPR among the training subgroups was as the following: those who had high knowledge were higher within those who have received training than those who didn't receive training (19.8% and 3.3% respectively), in the other hand those who had poor knowledge were lower within those who have received training than those who didn't receive training (43.1% and 65.8% respectively). There was a clear difference in the knowledge about the practical process of CPR among those who have received training on BLS and those who didn't receive any training on BLS, and the difference was highly significant (P-value = < 0.001)

Variable	Variable Subgroups	high knowledge	good knowledge	average knowledge	poor knowledge	Chi – square	P. value
Sex	Male	25 (9.5%)	25 (9.5%)	64 (24.3%)	149 (56.7%)	2.6	0.1
	Female	7 (5.7%)	9 (7.4%)	28 (23%)	78 (63.9%)		
	Total	32 (8.3%)	34 (8.8%)	92 (23.9%)	227 (59%)		
Study level	Level 1	4 (3.7%)	5 (4.6%)	30 (27.8%)	69 (63.9%)	69.6	< 0.001
	Level 2	3 (3.3%)	5 (5.4%)	19 (20.7%)	65 (70.7%)		
	Level 3	2 (2.9%)	6 (8.6%)	22 (31.4%)	40 (57.1%)		
	Level 4	14 (26.9%)	5 (9.6%)	5 (9.6%)	28 (53.8%)		
	Level 5	8 (22.9%)	8 (22.9%)	6 (17.1%)	13 (37.1%)		
	Level 6	1 (3.6%)	5 (17.9%)	10 (35.7%)	12 (42.9%)		
	Total	32 (8.3%)	34 (8.8%)	92 (23.9%)	227 (59%)		
Training on BLS	Yes	23 (19.8%)	13 (11.2%)	30 (25.9%)	50 (43.1%)	34.9	< 0.001
	No	9 (3.3%)	21 (7.8%)	62 (23%)	177 (65.8%)		
	Total	32 (8.3%)	34 (8.8%)	92 (23.9%)	227 (59%)		

Table 12 Knowledge About the Practical Process of The CPR Among the Sample Subgroups

Chapter 5 discussion

DISCUSSION

This chapter discusses in detail the major findings and the implications of them. The results are put in the context of the previous and recent research in form of comparing our findings with other researchers` findings (where applicable) and comparing our findings based on the background variables. The main topics are knowledge about BLS, and CPR, students' attitude about BLS and the practical knowledge of the students about CPR.

Characteristics of the sample under study

In the present study males were more than females, among all the sample under study (385) males represent more than two-thirds of the sample 263 (68.3%), while females represent less than a third of the sample 122 (31.7%). This result coherent with other researcher results which showed males more than females in the sample [30, 38], but on the other side the current study results not agreed with other researchers` result [37,43,44].

Training on BLS

In the current study training on the BLS was very low, among 385 students under study only 116 (30.1%) where students have received training on the BLS, this result is agreement with other researchers` results that showed low training on the BLS [30,32,37,38,41,43,44].

In the current study, there was a slight difference in the training on BLS between males and females and this difference was not statistically significant (P-value = 0.19), and this result in agreement with other researchers [44].

Depending on the study level of the students the current study showed that training on BLS was low among students of the three first levels L1, L2 (24.1%, 20.7%, and 24.3% respectively), competing with the training on BLS among students of the last three level L4, L5, and L6 (48.1%, 48.6%, and 42.9%).

In the current study, there was a clear difference in the training between students in the basic levels and clinical levels and this difference was statistically significant (P-value > 0.001). This result relatively similar to many other studies [43].

Students' attitude about BLS

The current study showed a high positive attitude toward BLS, those who have a high positive attitude toward BLS were (45.2%), while those who have a poor positive attitude were only (6.5%). This result relatively similar to many other studies [30].

Depending on the sex of the students the current study showed that there was a clear difference in the positive attitude among the two sex groups, it was higher within the female students (54.9%) than the male students (40.7%). The difference in the positive attitude between males and females and this difference is statistically significant (P-value = 0.001). This result relatively similar to many other studies [38].

Depending on the students' study levels the current study showed that the positive attitude was low among students of level 1, level 2, and high among the other levels (level 3, level 4, level 5, and level 6. There were some differences in the positive attitude among the different levels and this difference was statistically significant (P-value = 0,012).

The current study showed that the positive attitudes among the training subgroups were higher among those who have received training on BLS (49.1%) than those who didn't receive any training on BLS (43.5%). The difference on the positive attitude among those who have received training on BLS and those who didn't receive any training on BLS was small and not statistically significant (P-value = 0.6). This result relatively similar to many other studies (44,30), but in the other side the current study results not in agreement with another researcher [43]

General Knowledge about BLS and CPR

The result of the current study showed that knowledge about BLS was low, and more than half of the sample 201 (52.2%) had poor knowledge about BLS and CPR in general, while those who had high or good knowledge were only 86 (22.3%). This result relatively similar to many other studies [30,37,38,43,44].

Depending on the sex of the students, there was no important difference in the general knowledge about BLS and CPR among the two groups, those who have high knowledge among males and females were (2.7% and 4.1% respectively), while those who have poor knowledge among males and females were (51.7% and 53.3% respectively). The difference between males and females was very small and was not statistically significant (P-value = 0.7) This result relatively similar to many other studies [38,43,44].

Depending on the students' study levels, the general knowledge about BLS and CPR among the different study levels was as the following: those who had high knowledge were higher in the last three levels (4,5 and 6) than the first three levels (1,2, and 3), on the other hand those who had poor knowledge were lower in the last three levels (4,5 and 6) than the first three levels (1,2, and 3). There was a clear difference in the general knowledge about BLS and CPR among the different study levels and this difference was highly significant (P-value = < 0.001). This result relatively similar to many other studies [43].

Depending on the BLS training, the general knowledge about BLS and CPR among the training subgroups was as the following: those who had high knowledge were higher within those who have received training than those who didn't receive training (6% and 1.9% respectively), in the other hand those who had poor knowledge were lower within those who have received training than those who didn't receive training (36.2% and 59.1% respectively). There was a clear difference in the general knowledge about BLS and CPR among those who have received training on BLS and those who didn't receive any training on BLS, and the difference was highly significant (P-value = < 0.001). This result relatively similar to many other studies [43], but on the other side the current study results not in agreement with other researchers who showed no significant difference between the two groups [30,38,44]

knowledge about the practical process of the CPR

The current study showed that more than half of the sample 277 (59%) had poor knowledge about the practical process of CPR, while those who had

high or good knowledge were only 66 (17.1%). This result relatively similar to many other studies [30,37,43,44]

Depending on the sex of the students the current study found that there was no important difference in the knowledge about the practical process of the CPR among the two groups, those who have high knowledge among males and females were (9.5% and 5.7% respectively), while those who have poor knowledge among males and females were (56.7% and 63.9% respectively). The difference between males and females was very small and was not statistically significant (P-value = 0.1). This result relatively similar to many other studies [38,43,44].

Depending on the students' study levels the current study showed that the knowledge about the practical process of the CPR among the different study levels was higher in the last three levels (4,5 and 6) than the first three levels (1,2, and 3), in the other hand those who had poor knowledge were lower in the last three levels (4,5 and 6) than the first three levels (1,2, and 3). There was a clear difference in the general knowledge about BLS and CPR among the different study levels and this difference was highly significant (P-value = < 0.001). This result relatively similar to many other studies [43].

Depending on the knowledge about the practical process of the CPR among the training subgroups the current showed that those who had high knowledge were higher within those who have received training than those who didn't receive training (19.8% and 3.3% respectively), in the other hand those who had poor knowledge were lower within those who have received training compering with those who didn't receive training (43.1% and 65.8% respectively). There was a clear difference in the knowledge about the practical process of CPR among those who have received training on BLS and those who didn't receive any training on BLS, and the difference was highly significant (P-value = < 0.001) This result relatively similar to many other studies [43] but in the other side the current study result not in agreement with other researchers who showed no significant difference within the two groups [30,44]

Chapter 6 Conclusion and Recommendation

CONCLUSION AND RECOMMENDATION

CONCLUSIONS:

- Training on the BLS was low among the total sample with no significant difference among the two sex groups.
- The training on BLS was higher among students of the clinical levels than students of preclinical levels and this difference was statistically significant.
- There was a good positive attitude among all the sample in general with a significant difference among the two sex groups and study levels.
- There was no significant difference in the attitude between those who have received training on BLS and those who didn't receive any training on BLS
- The general knowledge about CPR was poor in general with a significant difference in the general knowledge toward CPR among students' levels and the training subgroups.
- There was no significant difference in the general knowledge toward CPR among the sex groups.
- The knowledge about the practical process of CPR was poor in general with significant difference among students' levels and among the training subgroups.
- There was no significant difference in the knowledge about the practical process of CPR among the sex groups.

RECOMMENDATION:

1. BLS training courses need to be introduced in the curriculum of early medical years to improve their knowledge and skills.
2. Regular reassessment, repeated training, and refreshing courses in later medical years and for those who already got involved in previous BLS training courses to update and enhance their skills and to increase their confidence.
3. Training courses and Workshops based on first-aid and BLS/CPR training for all the university students irrespective of their stream of study or specialization.

LIMITATIONS

- This study has focused on medical students only without the other paramedical colleges and also the study included only one university and didn`t included all universities due to the lack of time.
- Not all the students were available at the time of collection of data so it takes a lot of time and efforts from us to collect the data. Some students were uncooperative and didn't take our study seriously,
- Observation of skills in real life scenario and skill demonstration was not assessed as part of the research due to technical difficulties.

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APPENDIX

I. Identification Initials:

•Age ( ).

•Sex

- Male- ( ). Female-( ).

•Level . . .

- 1st ( ) 2nd ( ) 3rd ( ) 4th ( ) 5th ( ) 6th ( )

•Previous training ((BLS course)):

- Yes ( ) NO ( )

II. Basic life support

A) General questions to know the importance of CPR in clinical practice.

I am aware of the importance of CPR in clinical practice.	**Agree**	**Disagree**	**I don`t know**
According to me, knowledge about correct CPR procedure is mandatory to all health care professionals and it should be made compulsory	Agree	Disagree	I don`t know
I believe CPR is a basic emergency need for the betterment of mankind and Health status	Agree	Disagree	I don`t know
I would like to participate in CPR awareness programs and have a lifesaving experience	Agree	Disagree	I don`t know
Rather than being beneficial, it is more harmful to the patients.	Agree	Disagree	I don`t know

B) The main goal and accuracy of cardiopulmonary resuscitation (CPR) intervention (This section also contain multiple-choice questions)

1. What is the abbreviation of "BLS''?

   a. Best life support b. Basic life support.

   c. Basic lung support d. Basic life services.

   e. I don`t know

2. What will be your first step? when you find an adult person unresponsive on the road? (Note: If you are alone there)

    a. Maintain airway
    b. Start chest compression.
    c. Ask for help
    d. Start giving breathings.
    e. I don`t know

3. If an adult person after an accident is not responding to you even after shaking and shouting at him, what will be your immediate action plan?
   (Note – If multiple rescuers are present)

    a. Rabid defibrillation
    b. Immediate recognition of cardiac arrest and activation of emergency response system
    c. Put him in recovery position
    d. Observe
    e. I don`t know

4. If an adult person after an accident is not responding to you even after shaking and shouting at him, how much time you will try to feel for a pulse before moving to start chest compressions?

    a. Minimum of 5 sec and Maximum of 10 seconds
    b. Minimum of 10 sec and Maximum of 15 seconds
    c. Minimum of 15 sec and Maximum of 20 seconds
    d. I don`t know

5. Where should you palpate for a pulse on an unconscious adult during CPR?
    a. Carotid pulse
    b. Radial pulse
    c. Femoral pulse
    d. Brachial pulse
    e. I don`t know
6. What is the location for chest compression in adults?
    a. Right side of the chest
    b. Left side of the chest

c. Centre of the chest on breastbone d. Anywhere on chest region
e. I don`t know

7. What is the location for chest compression in infants following the 2-finger technique?
   a. Two finger in the center of infant's chest just below the nipple line
   b. Two finger breadth above the nipple line
   c. Two fingers at the intermammary line
   d. Two fingers at xiphisternum
   e. I don`t know

8. If you do not want to give mouth-to-mouth CPR, the following can be done EXCEPT?
   a. Mouth-mask ventilation and chest compression
   b. Chest compression only
   c. Bag mask ventilation with chest compression
   d. No CPR
   e. I don`t know

9. How do you give rescue breathing in infant?
   a. Mouth-to-mouth with nose pinched
   b. Mouth-to-mouth and nose
   c. Mouth-to-nose only
   d. Mouth-to-mouth without nose pinched
   e. I don`t know

10. What is the Depth of compression in adults during CPR?
    a. At least 2 inches b. 2½ inches
    c. Less than 2 inches d. According to comfortable level
    e. I don`t know

11. What is the Depth of compression in children during CPR?

a. About 2 inches b. 2½ - 3 inches
c. one–fourth to one-half depth of chest d. About 1 inches
e. I don`t know

12. Depth of compression in infant during CPR?
a. More than 1½ - 3 inches
b. About 1 and ½ inches
c. About ½ - 1 cm
d. One-half to one-third depth of chest
e. I don`t know

13. Rate of chest compression in adult and children during CPR?
a. At least 100/min b. At least 90/ min
c. At least 80/min d. At least 70/min
e. I don`t know

14. Ratio of CPR, single rescuer in adult is?
a. 30:2 b. 15:2 c. 30:1 d. 15:1 e. I don`t know

15. In a newborn the chest compression and ventilation ratio is?
a. 15:2 b. 5:1 c. 30:2 d. 3:1 e. I don`t know

16. Abbreviation AED stands for?
a. Automated External Defibrillator
b. Automated Electrical Defibrillator
c. Advanced Electrical Defibrillator
d. Advanced External Defibrillator
e. I don`t know

17. What does Abbreviation EMS stand for?
    a. Effective Medical Support
    b. Emergency Management Services
    c. Emergency Medical Services
    d. External Medical Services
    e. I don`t know

18. A 50 -year –old gentle man with retrosternal chest discomfort, profuse sweating, and vomiting. What is next?
    a. Probably myocardial infarction, hence activates EMS, give an aspirin tablet and allow him to rest
    b. Probably acid peptic disease, give antacid and Ranitidine
    c. Probably indigestion, hence give soda
    d. Take him by walk to the nearest clinic
    e. I don`t know

19. What is the first step to do when you see a person lying unconscious in a safe place?
    a. Call for help
    b. check for response
    c. Give rescue breaths
    d. Starts CPR
    e. I don`t know

20. All of the following are maneuvers to open the airway in an unresponsive patient except?
    a. Head lift
    b. Chin lift
    c. Neck flexion
    d. Jaw thrust.
    e. I don`t know

1) تحديد الهوية:

- العمر ( )
- الجنس
  - ذكر ( ) انثى ( )
- المستوى:
  - المستوى الأول ( ) الثاني ( ) الثالث ( ) الرابع ( ) الخامس ( ) السادس ( )
- التدريب السابق:
  - نعم ( ) لا ( )

2) دعم الحياة الاساسي

I. أسئلة عامة لمعرفة أهمية الإنعاش القلبي الرئوي في الممارسة السريرية.

أنا مدرك لأهمية الإنعاش القلبي الرئوي في الممارسة السريرية	اتفق	اختلف	أنا لا أعلم
وفقًا لي ، المعرفة حول الإجراء الصحيح للإنعاش القلبي الرئوي إلزامية لجميع المهنيين في مجال الرعاية الصحية وينبغي أن تكون إلزامية	اتفق	اختلف	أنا لا أعلم
أعتقد أن الإنعاش القلبي الرئوي هي حاجة طارئة أساسية لتحسين حالة البشرية والصحة	اتفق	اختلف	أنا لا أعلم
أود أن أشارك في برامج التوعية بخصوص الإنعاش القلبي الرئوي وان احظى بتجربة إنقاذ الحياة	اتفق	اختلف	أنا لا أعلم
وبدلا من جلب الفائدة ، فإنه أكثر ضررا للمرضى	اتفق	اختلف	أنا لا أعلم

II. الهدف الرئيسي ودقة تدخل الإنعاش القلبي الرئوي (يحتوي هذا القسم أيضاً على أسئلة متعددة لخيارات

1. ما هو اختصار "BLS"؟

أ. أفضل دعم للحياة
ب. دعم الحياة الأساسي
ج. دعم الرئة الأساسي
د. خدمات الحياة الأساسية
هـ. لا أعلم

2. ماذا ستكون خطوتك الأولى؟ عندما تجد شخص بالغ لا يستجيب ملقى على الطريق؟ (ملاحظة: إذا كنت بمفردك هناك)؟

أ. الحفاظ على مجرى الهواء مفتوح
ب. بدء ضغط الصدر
ج. طلب المساعدة
د. بدء إعطاء التنفس.
هـ. لا أعلم

3. إذا كان شخص بالغ بعد حادث لا يستجيب لكم حتى بعد هز ومناداته بصوت عالي، ما هي خطة العمل الفورية؟ (ملاحظة - إذا كان هناك العديد من المنقذين)

أ. الرجفان السريع
ب. وضعه في وضع الاسترداد
ج. الأدراك الفوري بالسكتة القلبية وتفعيل نظام الاستجابة للطوارئ
د. مراقبة المريض
هـ. لا أعلم

4. إذا كان شخص بالغ بعد حادث لا يستجيب لكم حتى بعد هز ومناداته بصوت عالي، لكم من الوقت سوف تحاول أن تشعر بالنبض قبل التحرك لبدء ضغط الصدر؟

أ. الحد الأدنى 5 ثوان والحد الأقصى 10 ثوان
ب. الحد الأدنى 10 ثانية والحد الأقصى 15 ثانية
ج. الحد الأدنى 15 ثانية والحد الأقصى 20 ثانية
د. أي من أعلاه
هـ. لا أعلم

5. أين يجب أن تستشعر نبض شخص بالغ فاقد الوعي أثناء الإنعاش القلبي؟

أ. النبض السباتي
ب. النبض الإشعاعي
ج. نبض الفخذ
د. نبض عضدي
هـ. لا أعلم

6. ما هو موقع ضغط الصدر عند البالغين أثناء الإنعاش القلبي؟

أ. الجانب الأيمن من الصدر
ب. الجانب الأيسر من الصدر
ج. مركز الصدر على عمود الثدي
د. أي مكان على منطقة الصدر
هـ. لا أعلم

7. ما هو موقع ضغط الصدر لدى الأطفال الذين بتقنية إصبعين؟

أ. إصبعين في مركز صدر الرضيع أسفل خط الحلمة
ب. اثنين من اتساع الإصبع فوق خط الحلمة
ج. اثنين من الأصابع في الخط المتداخل
د. اصبعين في الذيل الخنجري لعظم القص
هـ. لا أعلم

8. إذا كنت لا تريد إعطاء إنعاش قلبي رئوي من الفم إلى الفم، يمكن القيام بما يلي ماعدا؟

أ. التهوية بقناع الفم وضغط الصدر
ب. ضغط الصدر فقط
ج. تهوية قناع الحقيبة مع ضغط الصدر
د. لا إنعاش قلبي رئوي
هـ. لا أعلم

9. كيف إعطاء تنفس لرضيع اثناء الإنعاش القلبي الرئوي؟

أ. من الفم إلى الفم مع قرص الأنف
ب. الفم إلى الفم والأنف
ج. بالفم إلى الأنف فقط
د. من الفم إلى الفم بدون قرص أنف
هـ. لا أعلم

10. ما هو عمق الضغط على الصدر في البالغين أثناء الإنعاش القلبي؟

أ. على الأقل 2 بوصات
ب. 2 بوصة ونصف
ج. أقل من 2 بوصه
د. وفقا لمستوى مريح
هـ. لا أعلم

11. ما هو عمق الضغط على الصدر في الأطفال أثناء الإنعاش القلبي؟

أ. حوالي 2 بوصة
ب. 2 نصف - 3 بوصة
ج. عمق الصدر من ربع إلى نصف
د. حوالي بوصه
هـ. لا أعلم

12. عمق ضغط على الصدر في الرضيع أثناء الإنعاش القلبي الرئوي؟

أ. أكثر من 1 ونصف – 3 بوصه
ب. حوالي 1 بوصة ونصف
ج. حوالي نصف- 1 سم
د. نصف إلى ثلث عمق الصدر
هـ. لا أعلم

13. معدل ضغط الصدر في البالغين والأطفال أثناء الإنعاش القلبي؟

أ - ما لا يقل عن 100/دقيقة
ب. ما لا يقل عن 90 في الدقيقة
ج. على الأقل 80 في الدقيقة
د. 70/دقيقه على الأقل
هـ. لا أعلم

14. نسبة الإنعاش القلبي، المنقذ الوحيد في البالغين هو؟

أ.30:2
ب. 15:2
ج. 30:1
ج. 15:1
هـ. لا أعلم

15. في مولود جديد نسبة ضغط الصدر وإعطاء تنفس هي؟

أ.15:2
ب. 5:1
ج. 30:2
د. 3:1
هـ. لا أعلم

16. ما الذي يرمز اليه المختصر AED؟

أ. مزيل الرجفان الخارجي التلقائي
ب. مزيل الرجفان الكهربائي الآلي
ج. مزيل الرجفان الكهربائي المتقدم
د. مزيل الرجفان الخارجي المتقدم
هـ. لا أعلم

17. ما الذي يرمز إليه المختصر EMS؟

أ. الدعم الطبي الفعال
ب. خدمات إدارة الطوارئ
ج. راجع الخدمات الطبية الطارئة
د. الخدمات الطبية الخارجية
هـ. لا أعلم

18. رجل يبلغ من العمر 50 عاما يشتكي من عدم راحة في الصدر، مع التعرق والتقيؤ. ما التالي؟

أ. ربما اعتلال عضلة القلب، وبالتالي ينشط، ويعطي لوح الأسبرين ويسمح له بالراحة
ب. من المحتمل مرض الارتجاع المريء، يَعطي مضادات الحموضة
ج. من المحتمل عسر الهضم، لذا يَعطي صودا
د. خذه مشيا إلى أقرب عيادة
هـ. لا أعلم

19. ماهي الخطوة الأولى للقيام بها عندما ترى شخص فاقد الوعي في مكان آمن؟

أ. دعوة للمساعدة
ب. تحقق من الاستجابة
ج. اعطاء التنفس
د. يبدأ الإنعاش المركزي
هـ. لا أعلم

20. كل ما يلي محاولات لفتح مجرى الهواء في مريض لا يستجيب ماعدا؟

أ. رفع الرأس
ب. رفع الذقن
ج. ثني العنق
ج. دفع الفك
هـ. لا أعلم