

Awareness and Attitude Towards Basic Life Support Among Undergraduate Medical Students of Private Medical Colleges in Malaysia

Lim Shin Tyan, Shashinka Nelson*, Sim Jiun Chen, Siti Nurazera Binti Kamaludin, Ammar Bin Amran

Faculty of Medicine, Melaka Manipal Medical College (Manipal Academy of Higher Education), Muar, Malaysia

Email address

joeythetyan@gmail.com (L. S. Tyan), shashinka_n@hotmail.com (S. Nelson), desmond97sim@gmail.com (S. J. Chen), zerakamaludin@yahoo.com (S. N. B. Kamaludin), namasyaamar@hotmail.com (A. B. Amran)

*Corresponding author

To cite this article

Lim Shin Tyan, Shashinka Nelson, Sim Jiun Chen, Siti Nurazera Binti Kamaludin, Ammar Bin Amran. Awareness and Attitude Towards Basic Life Support Among Undergraduate Medical Students of Private Medical Colleges in Malaysia. *Open Science Journal of Clinical Medicine*. Vol. 7, No. 3, 2019, pp. 93-102.

Received: May 31, 2019; Accepted: August 5, 2019; Published: September 17, 2019

Abstract

A solid knowledge regarding BLS and CPR should be cultivated within individuals especially healthcare professionals so that they can engage in life saving measures in case of an emergency. Our study aims to determine the awareness as well the attitude towards basic life support among undergraduate medical students of private medical colleges in Malaysia. A cross sectional analytical study was conducted among 138 undergraduate medical students in a private medical college in Malaysia from May 2019 to June 2019. A self-administered, structured questionnaire which was obtained from previous studies was used to collect data. The awareness questionnaire consisted of 20 multiple choice questions while the questionnaire which assessed attitude consisted of 15 Likert type scale based questions. In the assessment of awareness, 1.45% of medical students seemed to have a good awareness while 27.54% had a somewhat fair awareness towards BLS and 71.04% of them seemed to have a poor awareness on BLS. In the assessment of attitude, 7.25% of medical students seemed to have a good attitude while 63.77% of students had a somewhat fair attitude towards BLS and 28.99% of them seemed to have a poor attitude towards BLS. There is no significant association between gender (p value=0.604), ethnicity (p value=0.365), parents' occupation (related or not related to medical field) (p value=0.469), semester (p value=0.061) in both cases of awareness and attitude (P value <0.05). However, there is significant difference of awareness and attitude towards BLS between those who had experience in giving CPR and those who did not have experience in giving CPR. (P value>0.05). In conclusion, it was revealed that undergraduate medical students had suboptimal awareness on Basic Life Support. However, they seemed to cultivate a rather positive attitude towards the same. We recommend that early introduction of BLS training and regular reinforcement training to medical students is needed to improve students' awareness towards BLS.

Keywords

BLS/CPR, Awareness and Attitude, Experience, Questionnaire, Undergraduate Medical Students, Malaysia

1. Introduction

The American Red Cross society defines Basic Life Support (BLS) as a type of care that health care providers as well as public safety professionals provide to anyone experiencing cardiac arrest, respiratory distress or obstructed airway breathing. [1] The key elements of BLS consist of

initial assessment, airway maintenance, chest compression and expired air ventilation. This includes detection of sudden cardiac arrest (SCA), activation of the emergency response system, early CPR and rapid defibrillation with an Automated External Defibrillator (AED). [2] Basic Life Support is important to provide relief to someone undergoing a cardiac arrest or respiratory distress. Since cardiac arrest is one of the major causes of death around the world, acquiring

knowledge and skill regarding BLS which is an important component of cardiopulmonary resuscitation (CPR) will help to improve survival rate as well as quality of life and ultimately reduce morbidity and mortality. [3]

CPR helps to maintain the oxygenated blood circulation in the body and it is continuously done until the heart can be restarted. Although people seem to be aware of the concept of BLS, most of the time it has been observed that the attitude and skill level is not up to the mark. A solid knowledge regarding BLS and CPR should be cultivated within individuals especially healthcare professionals so that

they can engage in life saving measures in case of an emergency. [4, 5] There have been references to artificial respiration in Egyptian mythology. Also the Bible mentions that mouth-mouth as well as mouth-nose respiratory methods were some of the emergency methods practiced. [6] One of the first cases of mouth-mouth resuscitation method was the survival of a suffocated miner by Tossach in 1744. [7] With the course of time, the techniques involved in resuscitation have been modified into an organized procedure consisting of cardiopulmonary resuscitation (CPR) also termed as Basic Life Support (BLS). [8]

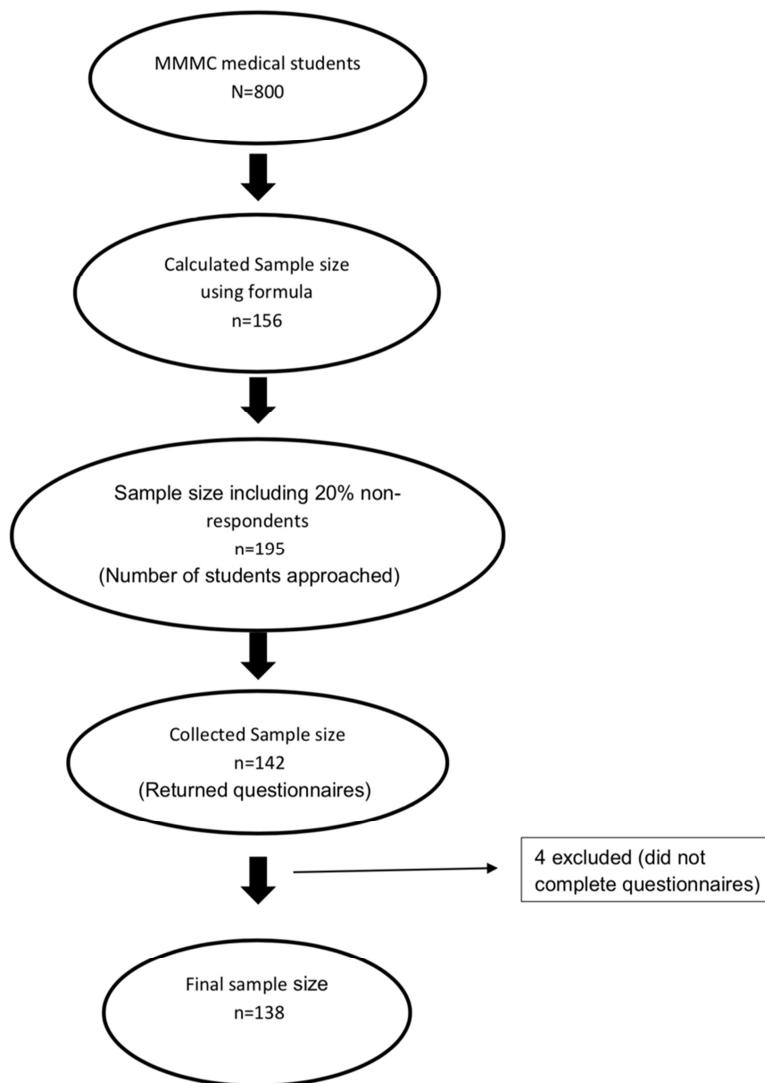


Figure 1. Progression in formulating sample size.

Since 1966 the healthcare providers in the United States of America were made to undergo a training course on Basic Life Support. [9] This was mainly aimed at those working on resuscitation. [10] Henceforth it is important to cultivate a healthy attitude which should lead to willingness to come forward and execute it well to save a life. Therefore, it is important to provide the proper training to health care professionals to be competent enough to take up such a challenge as and when required.

Remarkably unsatisfactory results regarding knowledge and skill towards BLS was revealed in studies conducted in Tamil Nadu, Nepal, India, Saudi Arabia, Iran and China. [15–20] It was noted that the confidence level of medical students to perform BLS well and efficiently was quite low in European countries [11], while poor training among the medical students of UK and Poland was recognized. [12, 13] Lack of a sound BLS knowledge among undergraduate medical students of Switzerland and Pakistan has also been

reported thus far. [14, 8]

Since as of now there is limited information regarding the awareness and attitude towards BLS among undergraduate medical students of Malaysia, we have taken up the task of carrying out a cross sectional study to do so. Our study aims to determine the awareness as well as the attitude towards basic life support among undergraduate medical students of private medical colleges in Malaysia. Furthermore, we aim to determine the association between age, gender, having either one or both parents in the field of medicine, current academic year, previous exposure to BLS training, having experience in giving CPR to a patient in the past as well as one's ethnic group with the awareness and attitude on BLS.

2. Method

Study design, study time, study setting, study population

A cross sectional analytical study was conducted among undergraduate medical students in a private medical college in Malaysia from May 2019 to June 2019. This private medical college offers Bachelor of Dental Surgery (BDS), MBBS and Foundation In Science (FIS) program. It has 2 different campuses, one campus based in Muar, Johor and another campus based in Malacca. The Muar campus offers MBBS Semester 6 & 7, while the campus in Malacca offers Bachelor of Dental Surgery (BDS), Foundation in Science (FIS) and MBBS Semester 8, 9 & 10. This study aims to

Calculation:

Alpha (α)	=0.05
Estimated proportion (p)	=0.44 (44% of students acquired fair result) [22]
Estimation error (d)	=0.07
Population size (N)	=800

2.2. Data Collection

The independent variables for our study were age, gender, ethnicity, parents' occupation (related to medical field or not related to medical field), exposure to BLS course, academic year and experience of doing CPR on patient. Our dependent variable was the awareness and attitude towards Basic Life Support among undergraduate medical students. A self-administered, structured questionnaire which was obtained from previous studies was used to collect data. [15, 21] Each participant was asked to complete the questionnaire on the spot. The questionnaire consisting of 3 parts was used to obtain the following components of information: 1) Demographic details of the study participants such as gender, age, year of study, ethnicity, previous exposure to BLS training, whether parent's occupation related to medical field and experience of doing CPR on patient. 2) Awareness about BLS: 20 multiple choice questions to assess the awareness regarding BLS based on the guidelines of the American Heart Association. The questionnaire interrogated various aspects like the abbreviation of BLS, AED, and EMS (Emergency Medical Service), sequential steps in BLS, assessment and resuscitation techniques with regard to airway, breathing and circulation in unresponsive victims of different age groups, techniques

determine the awareness and attitude toward Basic Life Support among undergraduate medical students, hence 800 medical students from this college were selected as study population.

2.1. Sampling Size and Sampling Method

Purposive sampling approach has been used in this study. It is a non probability sampling method. Based on the equation by Statistic and Sample Size software, the minimum required sample size was calculated to be 156, with an allowable estimation error of 0.07%. After adding 20% nonrespondents, the final sample size was calculated to be 195. Hence, a total of 195 students were selected through purposive sampling method. However, only those participants present on the day of the study and who gave informed consent were included for the study. Also, according to inclusion criteria, selected participants who provided informed consent regardless of age, gender, and ethnicity were included in our study. Based on the exclusion criteria, incomplete questionnaires and unsigned consent forms were rejected.

The sample size was determined using the following formula (Estimate a proportion in finite equation):

$$n \geq \frac{NZ^2_{1-\frac{\alpha}{2}}ap(1-p)}{d^2(N-1) + Z^2_{1-\frac{\alpha}{2}}ap(1-p)} n \geq 156$$

regarding removal of foreign body obstruction, recognition of early signs of stroke and acute coronary syndrome [16]. These questions were from a questionnaire used in a similar study conducted by Chandrasekaran et al in 2010 [16]. The wrong answer were allocated a score of "0", while the right answer were allocated a score of "1", hence the maximum total score a subject can achieve is 20. Those who scored 17 or more (i.e: >85%) were regarded as "good", a score ranging from 12-16 (i.e: 60-80%) were regarded as "fair" and those who scored less than 12 (i.e: <60%) were regarded as "poor". [22] A p-value of less than 0.05 is considered as statistically significant. 3) Attitude of the participants towards BLS: 15 categorical and Likert type questions regarding their attitude to BLS were used. The participants score is calculated on a 10-level Likert type scale. Likert scores were categorized into three levels: "no" (1-3 on Likert-type scale), "unsure" (4-7) and "yes" (8-10). [23]With 15 attitude questions, the maximum score a subject can achieve is 150. Those who scored 120 or more (i.e: >85%) were regarded as "good", a score ranging from 90-120 (i.e: 60-80%) were regarded as "fair" and those who scored less than 90 (i.e: <60%) were regarded as "poor". These questions were used and validated by a study conducted by Shinya Hamasu in Japan [23]. Likert scores were categorized into three levels: "no" (1-3 on Likert-type scale), "unsure" (4-7) and "yes" (8-

10). [23] The Cronbach's Alpha coefficient for awareness is 0.309 and for attitude is 0.602.

2.3. Data Processing and Data Analysis

Data collected was tabulated using Microsoft Excel 2010 while data analysis was done using EPI INFO software

Following statistical test was used in our study:

Independent variable	Dependent variable	Statistical test
Age	Attitude	ANOVA
Gender	Attitude	Unpaired T test
Ethnicity	Attitude	ANOVA
Parent's occupation	Attitude	Unpaired T test
Exposure to BLS course	Attitude	Unpaired T test
Academic year	Attitude	ANOVA
Experience of doing CPR on a patient	Attitude	Unpaired T test

The p value and 95% confidential interval were calculated to identify any significance result. A p-value of less than 0.05 is considered as statistically significant.

2.4. Ethical Consideration

Official permission was obtained from the Research Ethics Committee, Faculty of Medicine, Melaka Manipal Medical

College, Malaysia before the commencement of this study. The participants were told that participation in the study was completely voluntary and written informed consent forms were collected. At the same time the participants were assured that the study was completely confidential and were encouraged to answer all the questions provided in the questionnaire. Completed questionnaires were collected from all the participants.

3. Results

Table 1. Socio demographic Distribution of the subjects based on age, gender, ethnicity and semester (n, %).

Variable	Frequency (n)	Percentage (%)
1. Age	<22	15
	22-25	4
	>25	119
	Mean (SD)	22.27 (1.28)
	Min-Max	19-28
2. Gender	Female	74
	Male	64
	Chinese	35
3. Ethnicity	Indian	48
	Malay	31
	others	24
4. Semester	6	82
	7	37
	8	19

Table 1 shows the socio demographic data for awareness and attitude on BLS among undergraduate medical students. Out of 160 questionnaires distributed, 138 students completed the questionnaire with a response rate of 86.25%. The data was collected from 138 medical students with female 74 (53.62%) and male 64 (46.38%). The age range of medical students was from 19 to 28 years. The mean age for the medical students participating was 22.27. The age distribution of participants is shown in detail in table 1. The

medical students included were those who were in their semester 6 to 8 in Muar and Melaka campuses. Majority of 82 (59.42%) students belonged to semester 6. 37 (26.81%) students were from semester 7 while only 19 (13.77%) students were from semester 8. From the data collected, the highest participation 48 (34.78%) were Indians while 35 (25.36%) were Chinese, 31 (22.46%) were Malay and 24 (17.39%) fell into the category of others.

Table 2. BLS experience Distribution of the subjects based on exposure, place and experience (n, %).

Variable	Frequency (n)	Percentage (%)
1. Exposure	Yes	138
	No	0
2. Place	Private medical college	130
	Other	8

Variable		Frequency (n)	Percentage (%)
3. Experience	No	122	84.41
	Yes	16	11.59

Table 2 shows the BLS experience for awareness and attitude on BLS among undergraduate medical students. A total of 138 (100%) medical students have had exposure to Basic Life Support BLS. Majority of 130 (94.2%) students had their previous BLS training in this medical college while

8 (58.4%) students had their BLS training outside college. 122 (84.41%) students had no experience in performing BLS by themselves while 16 (11.59%) had experience in performing BLS by themselves.

Table 3. Awareness and Attitude.

Variable		n	Percentage (%)
Awareness	Good	2.00	1.45
	Fair	38.00	27.54
	Poor	98.00	71.01
Mean (SD)	10.25		
Min-Max	4.00-18.00		
Attitude	Good	10.00	7.25
	Fair	88.00	63.77
	Poor	40.00	28.99
Mean (SD)	98.61		
Min-Max	61.00-135.00		

Table 3 shows the percentage score for awareness and attitude on BLS among undergraduate medical students. Overall, the awareness percentage score for the students was poor, with majority of students (71%) demonstrated a very low BLS knowledge level. Followed by 27.54% of students

having fair awareness and only 1.45% of them having a good awareness towards BLS. On the other hand, 63.77% of the respondents were found to have positive attitude, 63.77% fair attitude and 7.25% of students having a good attitude as compared to 28.99% of students with negative attitude.

Table 4. Correct response for awareness towards BLS among undergraduate medical students questionnaire.

No	Question	Results	
		Frequency (n)	Percentage (%)
1	What is the abbreviation of “BLS”?	130	100
2	When you find someone unresponsive in the middle of the road, what will be your first response? (Note: You are alone there)	121	87.68
3	If you confirm somebody is not responding to you even after shaking and shouting at him, what will be your immediate action?	68	49.28
4	What is the location for chest compression?	64	46.38
5	What is the location for chest compression in infants?	51	36.96
6	If you do not want to give mouth-to-mouth CPR, the following can be done EXCEPT	78	56.52
7	How do you give rescue breathing in infants?	87	63.04
8	Depth of compression in adults during CPR	25	18.12
9	Depth of compression in Children during CPR	53	38.41
10	Depth of compression in neonates during CPR	51	36.96
11	Rate of chest compression in adult and Children during CPR	38	27.54
12	Ratio of CPR, single rescuer in adult is	94	68.12
13	In a newborn the chest compression and ventilation ratio is	26	18.84
14	What does abbreviation AED stand for?	52	37.68
15	What does abbreviation EMS stand for?	105	76.09
16	If you and your friend are having food in a canteen and suddenly your friend starts expressing symptoms of choking, what will be your first response?	50	36.23
17	You are witnessing an infant who suddenly started choking while he was playing with the toy, you have confirmed that he is unable to cry (or) cough, what will be your first response?	83	60.14
18	You are witnessing an adult unresponsive victim who has been submerged in fresh water and just removed from it. He has spontaneous breathing, but he is unresponsive. What is the first step?	34	24.64
19	You noticed that your colleague has suddenly developed slurring of speech and weakness of right upper limb. Which one of the following can be done?	75	54.35
20	A 50-year-old gentleman with retrosternal chest discomfort, profuse sweating and vomiting. What is next?	122	88.41

Table 4 shows response by the students for the awareness on BLS among undergraduate medical students questionnaire. 100% of the respondents were aware of the abbreviation of BLS as basic life support. 87.68% of them considered calling for help as the first step in BLS. About 49.28% managed to

insist on activating EMS immediately after confirming the unresponsiveness in an adult. 46.38% of the respondents were aware of the correct location of chest compression in an adult while only 36.96% of the respondents were aware of the correct location of chest compression in an infant. 56.52% of

the respondents were familiar with alternative techniques of resuscitation when mouth-to-mouth ventilation was not opted. 63.04% of the responders managed to select mouth-to-mouth and nose technique as the rescue breathing for infants.

On the other hand, only 18.12%, 38.41%, 36.96% were aware of the depth of chest compression in an adult, child and an infant respectively. 68.12% of the respondents were aware of the compression to ventilation ratio in a child and adult in a single rescuer CPR. Only 27.54% of the respondents had answered correctly regarding the rate of chest compression in adults and children CPR. 18.84% of the students knew the ratio of compression to ventilation in a newborn while only 37.68% of the respondents knew that the

abbreviation of AED was 'Automated External Defibrillator' and 76.09% of students knew that the abbreviation of EMS was 'Emergency Medical Service'. 36.23% of respondents knew the first step in aiding a suspected foreign body obstruction victim is to check for the severity of obstruction by talking to him. A majority of 60.14% of the students were aware about the right technique of foreign body removal from an infant. 24.64% of students knew about the role of the recovery position in a spontaneously breathing unresponsive victim. 54.35% of the respondents knew the early signs of stroke and 88.41% of them knew how to recognize and help a patient with acute coronary syndrome.

Table 5. Response for attitude towards BLS among undergraduate medical students questionnaire.

NO.	Question	Result					
		No		Unsure		Yes	
		n	%	n	%	n	%
21	Will you call ambulance immediately, if you witness a stranger collapse in front of you?	9	6.52	42	30.43	87	63.04
22	Will you perform BLS if you see a stranger collapse in front of you?	11	7.97	70	50.72	57	41.30
23	Will you attempt BLS if you see your family member collapse in front of you?	11	7.97	42	30.43	85	61.59
24	Will you hesitate to attempt BLS because you don't know how to resuscitate well?	16	11.59	73	52.90	49	35.51
25	Will you hesitate to attempt BLS because you have an anxiety for a bad outcome?	23	16.67	65	47.10	50	36.23
26	Will you hesitate to attempt BLS because you have an anxiety for being sued because of a bad outcome?	29	21.01	68	49.28	41	29.71
27	Do you know you can use AED even if you are not healthcare providers?	25	18.12	48	34.78	65	47.10
28	Do you have anxiety of being infected if you attempt BLS on a stranger?	48	34.78	59	42.75	31	22.46
29	Will you hesitate to apply mouth-to-mouth ventilation to strangers?	36	26.09	68	49.28	34	24.64
30	Will you hesitate to perform mouth-to-mouth ventilation to your family?	59	42.75	56	40.58	23	16.67
31	Will you attempt BLS without ventilation if the outcome is the same as compared with the standard method?	23	16.67	76	55.07	39	28.26
32	Will you hesitate to expose the chest of a woman if she collapses in front of you?	33	23.91	68	49.28	37	26.81
33	Do you understand what the defibrillator is?	13	9.42	44	31.88	81	58.70
34	Do you think it is necessary to promote BLS to the general public?	11	7.97	27	19.57	100	72.46
35	Will you participate in the promotion of BLS to the general public?	12	8.70	44	31.88	82	59.42

Table 5 shows the response regarding attitude on BLS among undergraduate medical students. 63.04% of the respondents were willing to call the ambulance quickly in an emergency situation and only 41.30% of students were confident to perform BLS in an emergency situation. 61.59% of the respondents were willing to attempt BLS on their family members while 11.59% of students were not hesitant to attempt BLS. 16.67% and 21.01% of the respondents confirmed that their hesitancy to perform BLS is neither due to their anxiety nor fear of bad outcomes. 47.10% of the respondents were aware that AED can be used not just by the healthcare provider. A minority of 22.46% respondents were

not afraid of infection. 26.09% of the respondents were not hesitant to demonstrate mouth-to-mouth ventilation to strangers and 42.75% of the respondents were not hesitant to demonstrate mouth-to-mouth ventilation to their family members. About 28.26% respondents preferred performing BLS without ventilation if the outcome is similar to standard method while only 23.91% of students were not hesitant to expose the chest of a woman in an emergency. 58.70% of the respondents has knowledge on the use of a defibrillator. A majority of 72.46% of the respondents agreed that it is necessary to promote BLS while only 59.42% of them were willing to participate in promoting BLS training to the public.

Table 6. Association between semester, gender, ethnicity, parents' occupation, experience and awareness towards BLS among undergraduate medical student.

Variables		Awareness percentage Mean (SD)	Mean difference (95% CI)	t statistic (df)/F (df1, df2)	P value
Semester ^a	6	52.01 (11.81)	-	2.86 (2, 135)	0.061
	7	47.70 (10.90)			
	8	55.00 (12.58)			
Gender ^b	FEMALE	51.76 (13.66)	1.05 (-2.95 to 5.06)	0.52 (136)	0.604
	MALE	50.70 (9.38)			
	CHINESE	49.00 (8.64)	-	1.09 (3, 134)	0.365
	INDIAN	52.29 (12.84)			
Ethnicity ^a	MALAY	53.55 (11.99)	-	-0.73 (136)	0.469
	OTHER	49.58 (13.43)			
	Parent's occupation (Related to medical	RELATED	52.58 (13.06)	-1.72 (-6.40 to 2.96)	

Variables		Awareness percentage Mean (SD)	Mean difference (95% CI)	t statistic (df)/F (df1, df2)	P value
field or not ^b	NOT RELATED	50.86 (11.47)			
Experience in doing CPR ^b	YES	45.31 (10.56)			
	NO	52.05 (11.81)	6.74 (0.59 to 12.88)	2.17 (136)	0.032

^aANOVA, ^bUnpaired T-test.

Table 6 shows the association between semester, gender, ethnicity, parents' occupation, experience and awareness towards BLS among undergraduate medical students. There is no significant difference of awareness percentage between semester 6, 7 and 8. However, semester 8 had the highest awareness percentage mean of 55 (12.58) followed by semester 6 which had a mean of 52.0 (11.81) and semester 7 which had a mean of 47.7 (10.9). Although female students had a slightly higher mean score of 51.76 (13.66) compared to male students who had a mean score of 50.70 (9.38) there is no significant difference of awareness percentage in gender.

Furthermore, there is no significant difference of awareness percentage in terms of ethnicity, with Malay having the highest percentage mean score of 53.55 (11.99),

followed by a mean score of 52.29 (12.84) pertaining to Indian students, and mean scores of others and Chinese students being 49.58 (13.43) and 49.00 (8.64) respectively. Similarly there is also no significant difference of awareness percentage between parents' occupation. Yet, those whose parent's occupation is related to medical field has a comparatively higher mean score of 52.58 (13.06) than those whose parents are not related to medical field 50.86 (11.47). However, it is found that experience in doing CPR was the only variable to be significant ($P\text{-value}<0.05$), with the awareness percentage score significantly higher in those who have no experience in doing CPR (mean=52.05) compared to those who had experience in doing CPR (mean=45.31).

Table 7. Association between semester, gender, ethnicity, parents' occupation, experience and Attitude against BLS.

Variables		Attitude percentage Mean (SD)	Mean difference (95% CI)	t statistic (df)/F (df1, df2)	P value
Semester ^a	6	64.82 (8.47)			
	7	66.88 (11.26)	-	1.02 (2, 135)	0.364
	8	67.51 (8.69)			
Gender ^b	FEMALE	65.96 (9.20)	0.46 (-2.70 to 3.61)	0.28 (136)	0.776
	MALE	65.50 (9.53)			
Ethnicity ^a	CHINESE	67.66 (10.33)			
	INDIAN	64.61 (8.35)	-	1.64 (3, 134)	0.181
	MALAY	67.31 (10.02)			
	OTHER	63.19 (8.27)			
Parent's occupation (Related to medical field or not) b	RELATED	65.13 (11.16)	0.81 (-2.89 to 4.50)	0.43 (136)	0.667
	NOT RELATED	65.94 (8.72)			
Experience in doing CPR ^b	YES	60.46 (9.98)	5.98 (1.16 to 10.79)	2.46 (136)	0.0153
	NO	66.44 (9.05)			

^aANOVA, ^bUnpaired T-test.

Table 7 shows the association between semester, gender, ethnicity, parents' occupation, experience and attitude towards BLS among undergraduate medical students. There is no significant difference in awareness percentage among semester 6, 7 and 8. However, semester 8 had the highest awareness percentage mean of 67.51 (8.69) followed by semester 7 and 6 having a mean percentage of 66.88 (11.26) and 64.82 (8.47) respectively. Also, there is no significant difference of attitude percentage between gender. Females had a slightly higher mean score of 65.96 (9.20) compared to males who had a mean score of 65.50 (9.53). Furthermore, there is no significant difference of awareness percentage in terms of ethnicity, with Chinese having the highest mean score of 67.66 (10.33) and Malay having a mean score of 67.31 (10.02) followed by a mean score of 64.61 (8.35) and a mean score of 63.19 (8.27) among Indians and Others respectively. There is also no significant difference of awareness percentage depending on parent's occupations. Yet, those whose parents' occupation is related to medical field

has a comparatively higher mean score of 65.13 (11.16) than those whose parents are not related to medical field with a mean score of 65.94 (8.72). However, it is found that experience in doing CPR was the only variable to be significant ($P\text{-value}<0.05$). The awareness percentage score was significantly higher in those who had no experience in doing CPR with a mean score of 66.44 (9.05) compared to those who had experience in doing CPR having a mean score of 60.46 (9.98).

The attitude percentage score according to semester, gender, ethnicity, parent's occupation and experience in doing CPR are shown in detail in table 7. There is no significant association between semester, gender, ethnicity, parent's occupation and attitude level towards BLS ($P\text{-value}>0.05$ for all). However, it is found that experience in doing CPR was the only variable to be significant ($P\text{-value}<0.05$), with the attitude percentage score significantly higher in those who have no experience in doing CPR having a mean of 66.44 compared to those who had experience in

doing CPR with a mean of 60.46.

Table 8. Simple linear regression analysis of correlation between awareness and attitude toward BLS among undergraduate medical students.

Variables	Attitude Percentage Score b (95% CI)	P Value
Awareness Percentage Score	0.03 (-0.09, 0.17)	0.618

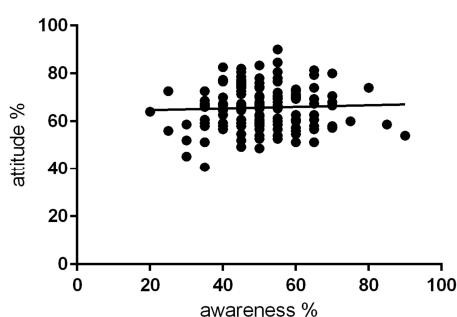


Figure 2. Simple linear regression analysis of correlation between awareness and attitude toward BLS among undergraduate medical students.

Table 8 shows the Simple linear regression analysis of correlation between awareness and attitude toward BLS among undergraduate medical students. There is a positive association between awareness percentage score and attitude with regression coefficient b 0.03 (95%CI-0.09 to 0.17) and P value of 0.618. There is no significant correlation.

4. Discussion

The aim of our study was to establish awareness and assess the attitude towards Basic Life Support (BLS) among undergraduate medical students of private medical colleges in Malaysia. We also studied the association between age, gender, having either one or both parents in the field of medicine, current academic semester, previous exposure to BLS training, having experience in giving CPR to a patient in the past along with one's ethnic group and their awareness and attitude towards BLS. In the assessment of awareness, 1.45% of medical students seemed to have a good awareness while 27.54% of students had a fair awareness towards BLS and 71.01% of them seemed to have a poor awareness regarding BLS. Even though the results showed that many of the students had poor knowledge regarding the concept of BLS, the entire student population had been exposed to BLS training in the past. However, this result appeared to be a common outcome in many of the studies conducted in other parts of the world, such as, Chandrasekaran et al. showed the lack of knowledge of BLS in medical, dental and nursing students in a medical college in Tamil Nadu. [15] A survey carried out in a hospital in Nepal revealed that the medical and paramedical professionals lack adequate knowledge of BLS. Only 9 of a total of 121 participants correctly answered more than 11 questions out of 15. [16] Another study conducted by Vinej et al which assessed the knowledge of dental interns of a sub population in India, showed a lack of knowledge regarding management of medical emergencies by showing a percentage of 39.89 lacking the knowledge thereof BLS. [17] A survey carried out by Al Mesned et al at

Qassim University pointed out that both health care students as well as healthcare providers had a poor knowledge of BLS. [18]

Looking in to a deeper aspect of the lack of knowledge hereof, 53.62% were unaware of the location of chest compression in adults while 63.04% were unaware of the same in infants. Furthermore, quite a few of the students did not know about the depth of compression during CPR in adults which accounted for a percentage of 81.88 and a percentage of 61.59 for the same in children with 63.04% not knowing about depth of compression in neonates. Many of them also seemed to lack the knowledge regarding the rate of chest compression along with the chest compression to ventilation ratio in children giving statistical values of 72.46% and 81.16% respectively. When asked what the first step in rescuing an unresponsive adult victim who had been submerged in fresh water, to which the correct response would be to place the victim in recovery position, 75.36% submitted incorrect responses. Similarly, when questioned about what the first response to someone who suddenly starts choking while eating food would be is, 63.77% submitted incorrect responses when in fact the correct answer was to confirm foreign body aspiration by talking to the victim. Finally, 62.32% of the sample population were unaware of the abbreviation AED.

On the other hand, the attitude among these undergraduate medical students towards BLS which was also assessed showed an overall attitude to appear on a positive aspect. 7.25% of medical students seemed to have a good attitude while 63.77% of students had a fair attitude towards BLS and 28.99% of them seemed to have a poor attitude regarding BLS. The students were questioned on various areas to assess their opinion and attitude. Majority of them responded relatively well in areas such as the immediate summoning of an ambulance if and when a stranger collapses in front of them, the action of performing BLS to one of their own family members, a general understanding of a defibrillator, the requirement of promoting BLS to the general public and their participation in doing so. All these criteria provided sufficient basis to infer a healthy attitude among undergraduate medical students towards BLS. Studies conducted in Iran and People's republic of China revealed that only a minor quantity of medical students were confident in their ability to carry out CPR. [19, 20] Many other studies also showed similar results where even though medical students, dental students and healthcare providers lacked the sufficient knowledge and skill of carrying out BLS they seemed to have a rather encouraging attitude towards the concept of BLS as a whole. [23] A study conducted among medical, dental and nursing students in the University Hospital, of the Kalinga Institute of Dental Sciences, Kalinga

Institute of Medical Sciences, KIIT University also showed a positive attitude among students towards BLS. [24] Furthermore studies continued to reveal the positive uplifting attitude towards BLS among healthcare professionals. [25-29]

Even though there is no significant association between the semester of study with awareness and attitude towards BLS, our study shows that Semester 8 students achieved the highest mean score compared to semester 6 and 7 (academic year 3), which could be due to higher clinical exposure among semester 8 (academic year 4) students compared to that of semester 6 and 7. However, there is significant difference of awareness and attitude towards BLS between those who had experience in giving CPR and those who did not have experience in giving CPR. Despite previous studies by Elif et al [30] and Mohamed et al [31] it was observed that previous experiences in real life resuscitation increased the incidence of correct responses. However in our study we found that the awareness and attitude percentage score is significantly higher in those who have no experience in doing CPR compared to those who have experience in doing CPR. Even so, this is because our study shows that only 1 out of 16 people who had experience in doing CPR is from semester 8, while the rest of the 15 students are from semester 6 and semester 7. Semester 8 students have more knowledge and less experience, while semester 6 and semester 7 students have less knowledge but more experience.

Our study has a response rate of 86.25% but there are few limitations. First, the response rate was lowest in semester 8 with 13.77%, which might have been due to preparation of semester 8 students towards their clinical exam so were unable to allocate much time to answer the questionnaires. Secondly, the questionnaires were used to assess the awareness of students in theory but the practical skills of students were not assessed during this study. Third, although attitude towards BLS was assessed during the study, the attitude towards hypothetical situation may not reflect the attitude in actual clinical scenarios. Lastly, as the questionnaire was distributed to the students and answered in an unmonitored environment, discussion among students when answering the questionnaires was unavoidable.

Since the current studies show lack of awareness among undergraduate medical students towards BLS we recommend early introduction of BLS training and regular reinforcement training to medical students. In any subsequent studies we also recommend the assessment of students' practical skills in BLS in addition to assessing the theoretical knowledge.

5. Conclusion

In conclusion, this study revealed that undergraduate medical students had suboptimal awareness regarding Basic Life Support however seemed to cultivate a rather positive attitude towards the same. Hence, earlier introduction of BLS training and more practical based teaching should be employed to improve medical students' awareness towards

BLS. A solid knowledge regarding BLS and CPR are very important to be cultivated within individuals especially in medical students because they are the future 'first line' members to be called to engage in life saving measures in case of any emergency. It is recommended to evaluate the students' ability in conducting CPR while further testing their theoretical knowledge in future studies.

Acknowledgements

We wish to thank the Research Ethics Committee, Faculty of Medicine, Melaka Manipal Medical College, Malaysia for approving our study as well as our Dean, Prof. Dr. Adi Negara Lufti. Furthermore, we extend our gratitude towards Prof. Dr. Htoo Htoo Kyaw Soe and Associate Prof. Dr. Sujata Khobragade for their continuous guidance throughout our study. We also wish to thank all our participants for their valuable time in the participation of our study.

References

- [1] Red cross.org (internet). Washington DC: American Red Cross; ©2019 American National Red Cross. Available from: <https://www.redcross.org/local/washington-dc.html>.
- [2] Berg RA, Hemphill R, Abella BS, Aufderheide TP, Cave DM, Hazinski MF, Lerner EB, Rea TD, Sayre MR, Swor RA. Part 5: Adult Basic Life Support: American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular care. Circulation. 2010 Nov; 122 (Suppl): S685-S705.
- [3] P. S. Philips and J. P. Nolan, "Training in basic and advanced life support in UK medical schools: Questionnaire survey," British Medical Journal, vol. 323, no. 7303, 22-23, 2001.
- [4] F. Bhanji, A. J. Donoghue, M. S. Wolff et al., "Part 14: Education: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care," Circulation, 2015 vol. 132, no. 18, S561-S573.
- [5] A. R. Aroor, R. P. Saya, N. R. Attar, G. K. Saya, and M. Pavithranth, "Awareness about basic life support and emergency medical services and its associated medical factors among students in a tertiary care hospital in South India," Journal of emergencies, Trauma and Shock, 2014 vol. 7, no. 3, 166-169.
- [6] Baker AB, Artificial respiration, the history of an idea, Med Hist 1971; 15: 336-46.
- [7] Tossach W, A man, dead in appearance, recovered by distending the lungs with air. In: Ruddimans, W, editors. Medical Essays and Observations, Edinburgh 1744; 5 (2): 605.
- [8] Hassan Zaheer, ZebaHaque. Awareness about BLS (CPR) among medical students: status and requirements. J Pak Med Assoc, 2009 Jan; 59 (1): 57-9 PubMed PMID: 19213385.
- [9] Cardiopulmonary resuscitation: Statement by the Ad Hoc Committee on Cardiopulmonary resuscitation of the Division of Medical Sciences, National Academy of Sciences, National Research Council. Cardiopulmonary Resuscitation. The Journal of the American Medical Association, 1966 vol. 198, 372-379.

- [10] Guidelines for the provision of Anaesthetic services. Anaesthetic practice in respect of resuscitation. Royal college of Anaesthetist; 1999.
- [11] Freund Y, Duchateau FX, Baker EC, Goulet H, Carreira S, Schmidt M, et al. Self perception of knowledge and confidence in performing basic life support among medical students. Eur J Emerg Med 2013; 20: 145-6.
- [12] Mastoridis S, Shanmugarajah K, Kneebone R. Undergraduate education in trauma medicine: the students' verdict on current teaching. Med Teach 2011; 33: 585-7.
- [13] Chojnacki P, Ilieva R, Kolodziej A, Krolikowska A, Lipka J, Ruta J. Knowledge of BLS and AED resuscitation algorithm amongst medical students—preliminary results. Anestezjol Intens Ter 2011; 43: 29-32.
- [14] Businger A, Rinderknecht S, Blank R, Merki L, Carrel T. Students' knowledge of symptoms and risk factors of potential life threatening medical conditions. Swiss Med Wkly 2010; 140: 78-84.
- [15] Chandrasekaran S, Kumar S, Bhat SA, Kumar S, Shabbir PM, Chandrasekaran VP. Awareness of Basic Life Support among medical, dental and nursing students and doctors. Indian J Anaesth. 2010; 54 (2): 121-6.
- [16] S. Roshana, K. B. Batajoo, R. M. Piryani, and M. W. Sharma, "Basic life support: knowledge and attitude of medical/paramedical professionals," World Journal of Emergency Medicine, 2012 vol. 3, 141–144.
- [17] V. Somaraj, P. S. Rekha, S. P. Ganesh et al., "Knowledge, attitude and anxiety pertaining to basic life support and medical emergencies among dental interns in Mangalore City, India," World Journal of Emergency Medicine, 2017 vol. 8, no. 2, 131–135.
- [18] A. Almesned, A. Almeman, A. M. Alakhtar et al., "Basic Life Support Knowledge of Healthcare Students and Professionals in the Qassim University," International Journal of Health Sciences, 2014 vol. 8, no. 2, 141–150.
- [19] Li Q, Ma EL, Liu J, Fang LQ, Xia T. Pre-training evaluation and feedback improve medical students' skills in Basic Life Support. Med Teach. 2011; 33 (10): e549-e55 PubMed PMID: 21942491.
- [20] Ravari H, Abrishami M, Ghezel- Sofla M, Vahedian-Shahroodi M, Abrishami M. Knowledge of Iranian medical interns regarding cardiopulmonary resuscitation. Trauma Mon. 2012; 17 (1) 242-244.
- [21] S. Hamasu et. al. Resuscitation 80 (2009) 359-364. Effects of BLS training on factors associated with attitude towards CPR in college students. ©2008 Elsevier Ireland Ltd.
- [22] Hazim Raffaa, Ayman Al-Shahrani, Saad Shaker, Ahmed Awwadh, Abdull Mgeed Asiri, Hadeel Al-Sanamah; et al. Medical students' Knowledge and Practices related to Basic Life Support. Med. J. Cairo Univ, Vol. 84, No. 1, 2016: 1383-1389.
- [23] O. Alotaibi, F. Alamri, L. Almufleh, and W. Alsougi. Basic life support: Knowledge and attitude among dental students and Staff in the College of Dentistry, King Saud University. Saudi Journal for Dental Research. 2016; vol. 7, 51–56.
- [24] N. C. Sangamesh, K. C. Vidya, Jugajyoti Pathi, and Arpita Singh. Awareness, Attitude, and Knowledge of Basic Life Support among Medical, Dental, and Nursing Faculties and Students in the University Hospital. J Int Soc Prev Community Dent. 2017; 7 (4): 161–167. PubMed Central PMCID; PMC5558248.
- [25] Kumar HH, Upadhy SP, Ashok SP, Chowdari AG, Niranj GM, Dinesh B. A cross sectional study on awareness and perception about basic life support/cardioresuscitation among undergraduate medical students from coastal South India. Int J Med Public Health. 2013; 3: 146–50.
- [26] Carvalho RM, Costa LR, Marcelo VC. Brazilian dental students' perceptions about medical emergencies: A qualitative exploratory study. J Dent Educ. 2008; 72: 1343–9.
- [27] Roshana S, Kh B, Rm P, Mw S. Basic life support: Knowledge and attitude of medical/paramedical professionals. World J Emerg Med. 2012; 3: 141–5.
- [28] Narayan DP, Biradar SV, Reddy MT, Sujatha BK. Assessment of knowledge and attitude about basic life support among dental interns and postgraduate students in Bangalore City, India. World J Emerg Med. 2015; 6: 118–22. PubMed PMID: 26056542; PubMed Central PMCID: PMC4458471.
- [29] Sharma R, Attar NR. Adult basic life support awareness and knowledge among medical and dental interns completing internship from deemed university. Nitte Univ J Health Sci. 2012; 2: 6–13.
- [30] Akpek A. Elif, Kayhan Zeynep. Knowledge of basic life support: a pilot study of the Turkish population by Baskent University in Ankara. Resuscitation. 2003; 58 (2): 187-92. PubMED PMID: 12909381.
- [31] Mohamed A. Seraj and Mohamed Naguib. Cardiopulmonary resuscitation skills of medical professionals. Rescuicitation. 20 1990; 20 (1): 31-9. PubMed PMID: 2171116.