

## Do Medical and Dental Students Have Adequate Knowledge in Basic Life Support?

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### ABSTRACT

Basic Life Support, though it appears to be a simple life-saving procedure, can be useless or fatal if performed wrongly. Our study was conducted to assess knowledge of basic life support and the factors influencing it among medical and dental students. Further, our study discusses the proposal for basic life support knowledge to be incorporated into the academic curriculum and therefore, making it a compulsory assessment prior to graduation for both medical and dental courses. A cross-sectional study was conducted whereby a questionnaire was distributed to 300 students at a private medical college. Excluding the incomplete response forms, the data of 280 responders was analyzed. Of these 280 students, 157 (56.07%) were medical students and 123 (43.93%) dental students. The results of the questionnaire were categorized as satisfactory (scored 11 to 20 marks out of 20) and unsatisfactory (scored 0 to 10 marks out of 20). It was found that only 106 (67.52%) medical students and 57 (46.34%) dental students scored satisfactory results. This highlighted the need to improve the knowledge of basic life support amongst these students; they are after all our aspiring healthcare professionals.

**Keywords:** *basic life support, knowledge, medical, dental, students*

### INTRODUCTION

Basic Life Support (BLS) includes recognition of signs of sudden cardiac arrest (SCA), heart attack, stroke and foreign-body airway obstruction (FBAO); also the commonly used cardiopulmonary resuscitation (CPR); and defibrillation with an automated external defibrillator (AED).<sup>[1]</sup> Management of each of these life-threatening situations involves stepwise procedures with simple instructions and hazards depending on the life-threatening situation the victim is in. For an instance, in a spontaneously breathing, unresponsive victim there is no role for CPR and the recovery position is optimal to provide the proper position for free breathing and protection from various complications such as aspiration.<sup>[2]</sup> Further, performing chest

compressions at the correct location and correct depth increases the likelihood of enhancing coronary circulation and lessens the risks of accompanying complications such as rib fractures.<sup>[2]</sup>

Therefore, medical and dental students must learn that basic life support encompasses several critical steps and precautions for the benefit of the victim and most importantly, safety to the rescuer, whether a junior doctor, a dental surgeon or layperson. It is a great failure to the healthcare professional if they cause more harm than good in the process of saving their patient due to lack of knowledge about BLS. Medical and dental colleges are the stepping stones for students and BLS should be emphasized from first year of study. Students should be made aware of the

burden of cardiovascular disease in the world, where 15 million people died in 2015, [3] and in Malaysia, the principal cause of death was ischemic heart disease in 2014 where 13.5% of population was affected with just a small decline of 0.2 percentage points from 13.7% in 2013. [4]

Despite these statistics available, it was alarming to read that there is a significant lack of knowledge of BLS among health students, dental interns and junior doctors around the globe. [5-7] Therefore, we have decided to study factors such as scholarship status of students, their motivation to learn BLS and also reasons that may affect BLS knowledge amongst students such as their source of information of BLS, henceforth propose for any improvements in the academic curriculum. Furthermore, we also went further to evaluate each question from our questionnaire and scores obtained by students. Only theoretical knowledge is tested in our study as we would like to highlight the importance of theoretical knowledge as a prerequisite to effective practical skills.

## **MATERIALS & METHODS**

The study was conducted from the 1st June 2017 to the 16th June 2017 at Melaka-Manipal Medical College (MMMC) (Muar Campus), Parit Bunga, Johor, Malaysia and Melaka-Manipal Medical College (Melaka Campus), Bukit Baru, Melaka, Malaysia.

A sample size of 300 was targeted for this cross-sectional study, taking into account 95% confidence level, infinite population size, 24% of expected proportion of poor results and 5% margin of error.

The consecutive sampling method was used, where a total of 300 questionnaires were randomly distributed among Bachelor of Medicine and Bachelor of Surgery (MBBS) and Bachelor of Dental Surgery (BDS) students at the aforementioned institution. Both groups of students are in semesters 6 and 7 of their course of study (total 10 semesters). The

questionnaires were answered unmonitored on a self-administration basis. After excluding the incomplete response forms the data for 280 responders was analyzed. The results were appraised using an answer key prepared from the advanced cardiac life support manual.

The questionnaires consist of 2 parts:

### **Part A: Analysing factors associated with BLS knowledge**

Demographic profile (gender, age, course, scholarship status) and feedback on their BLS knowledge such as source of information of BLS knowledge. These were analyzed to determine factors affecting knowledge in basic life support among both groups of students.

### **Part B: Theory and practical knowledge of BLS**

Basic theoretical knowledge about BLS (BLS abbreviation, AED abbreviation, etc.) and practical knowledge in real life scenarios (immediate response, method of chest compression and steps of operating an AED etc.) were assessed using 20 multiple choice questions.

After data collection, it was analyzed using descriptive statistics and qualitative analysis and the results tabulated. Results of questionnaires were categorized as satisfactory (scored 11 to 20 marks out of 20) and unsatisfactory (scored 0 to 10 marks out of 20). The Chi-square test was then used to compare several appropriate factors and their association with BLS knowledge. Logistic regression models were used to assess the multiple factors that were significantly associated ( $p < 0.05$ ). Scores of each question from the questionnaire was tabulated as percentages for number of correct and incorrect answers. Confounder variables and independent risk factors were included in the final logistic regression model. All calculations were performed using Epi-Info version 7.2 by CDC.

Participation in this research was purely on a voluntary basis. A written and informed consent was obtained from each

participant prior to the study commencing and complete confidentiality of all personal data was preserved throughout. Our research was approved by Institutional Ethics Committee (IEC) of Melaka-Manipal Medical College, Malaysia.

## RESULTS

From table 1, we can conclude that our participants consisted of 1.5 times more females than males. MBBS students were 1.25 times more than BDS students. The number of students with studying on

scholarship was 2.5 times higher than non-scholarship holders.

**Table 1: Descriptive Statistics of basic variables among Medical and Dental Students of MMMC in 2017**

Variables	Values (%)
Gender	
Female	168 (60.00)
Male	112 (40.00)
Age	Mean ± Std deviation : 22.97 ± 0.94
Course	
MBBS	157 (56.07)
BDS	123 (43.93)
Scholarship Status	
Scholar	201 (71.79)
Non-scholar	79 (28.21)

**Table 2: BLS knowledge among dental and medical students of MMMC in 2017**

No.	Questions	Correct No. (%)	Incorrect No. (%)
1	Abbreviation of BLS	271 (96.79)	9 (3.21)
2	Safety rules when conducting BLS	222 (79.29)	58 (20.71)
3	Location of chest compression in adults	142 (50.71)	138 (49.29)
4	Location of compression in infants	132 (47.14)	148 (52.86)
5	Depth of compression in adults during CPR	121 (43.21)	159 (56.79)
6	Depth of compression in children during CPR	162 (57.86)	118 (42.14)
7	Rate of chest compression in adult and children	132 (47.14)	148 (52.86)
8	Chest compression and ventilation ratio in adults	56 (20.00)	224 (80.00)
9	Chest compression and ventilation ratio in newborn	117 (41.79)	163 (58.21)
10	Signs of airway obstruction	86 (30.71)	194 (69.29)
11	First response to choking	130 (46.43)	150 (53.57)
12	Abbreviation of AED	156 (55.71)	124 (44.29)
13	Steps of Operating an AED	55 (19.64)	225 (80.36)
14	Importance of early defibrillation in adults	169 (60.36)	111 (39.64)
15	Abbreviation of EMS	199 (71.07)	81 (28.93)
16	First response to drowning victim	86 (30.71)	194 (69.29)
17	First response to chest pain	134 (47.86)	146 (52.14)
18	Maneuver to open airway in child	75 (26.79)	203 (72.50)
19	Site of pulse check in cardiac arrest	139 (49.64)	141 (50.36)
20	First response to stabilize patient	192 (68.58)	88 (31.43)

Major findings (Table 2):

- Majority of 96.79% students answered question 1 correctly for abbreviation of BLS, followed by 79.29% students for question 2 for safety rules when conducting BLS.
- Majority of 80.36% students answered question 13 wrongly for steps of operating an AED, followed by 80.00% for question 8 for chest compression and ventilation ratio for adults.
- According to overall findings, only 2 students scored 17 out of 20 marks which is

the highest score in our study; both these students are MBBS students. Questions answered incorrectly by them were questions 5, 16, 17 and 8, 9, 10 respectively. Lowest score in our study was 4 out of 20 marks. Questions answered correctly by them were 5, 11, 14, 20; 1, 2, 7, 14 and 9, 11, 12, 20 respectively. All three students were BDS students.

- Conclusively, only 164 (58.57%) students scored satisfactory results and 116 (41.43%) students scored unsatisfactory students and mean score of all students was 9.91.

**Table 3: Comparison of characteristics via qualitative analysis of factors associated with knowledge of BLS; satisfactory or unsatisfactory among medical and dental students of MMMC in 2017**

Independent Variables	Satisfactory (n=164) No. (%)	Unsatisfactory (n=116) No. (%)	OR (95% C I)	Chi- square	P value
Course					
MBBS	107 (65.24%)	50 (43.10%)	2.48 (1.52 – 4.04)	13.52	p<0.001*
BDS	57 (34.97%)	66 (56.41%)			
Scholar					
Yes	35 (21.34%)	44 (37.93%)	0.44 (0.26 – 0.75)	9.23	0.002*
No	129 (78.66%)	72 (62.07%)			
BLS Observed					
Yes	58 (35.37%)	27 (23.28%)	1.80 (1.05 – 3.08)	4.70	0.030*
No	106 (64.63%)	89 (76.72%)			

\*p &lt; 0.05: results significant

From table 3, we can conclude that these factors of course of study, scholarship status and students whom had previously observed BLS being conducted revealed to be significant in affecting their BLS knowledge indicated by p values less than 0.05. MBBS students are better by 2.48 times than their BDS counterparts. Students without scholarship have scored better by 0.44 times than scholarship holders. Finally, students whom have not observed BLS previously have scored 1.80 times than students whom have observed one previously. Overall only 107 (65.24%) MBBS students and 57 (34.97%) scored satisfactory results.

**Table 4: Feedback Regarding BLS among medical and dental students of MMMC in 2017**

Opinion	Value
Information about BLS (practical and theory)	
Internet	219 (78.21%)
Scientific Magazines	4 (1.43%)
Workshops outside college	7 (2.50%)
Academic curriculum	50 (17.86%)
Motivation to learn BLS	
Bad experience of wrong BLS performed	10 (3.57%)
Self Interest	103 (36.79%)
To be a competent Doctor	158 (56.42%)
To teach others around me	9 (3.21%)
Self-grade BLS knowledge	
Poor	23 (8.21%)
Below Average	71 (25.36%)
Average	159 (56.79%)
Good	27 (9.64%)
Lack of BLS knowledge reason	
Non Availability of training	129 (46.07%)
Lack of Interest	27 (9.64%)
Busy curriculum	102 (36.43%)
To learn when start working	22 (7.86%)

From table 4, we can conclude that 78% of students selected Internet as their main source of information to learn BLS, followed by academic curriculum at only

17%. Students were asked their motivation to learn BLS, they selected to be a competent doctor in future (56%), followed by self-interest (36%). Also, 56% of students have graded their BLS knowledge to be average, followed by 25% for below average. Reasons for lack of BLS knowledge were non-availability of training (46%), followed by busy curriculum (36%) and lack of interest (9%).

## DISCUSSION

Basic Life Support is an essential skill in saving a life. However, it was devastating to discover that both medical and dental students lack this knowledge. The largest number of incorrect response was for question on steps of operating an AED (80.36%). AED is the most effective treatment for a Ventricular Fibrillation (VF) in cardiac arrest and the chance of a successful treatment decline at a rate of about 10% for each minute delay in cardiac defibrillation. [8] This was followed by chest compression and ventilation ratio for adults (80.00%). The knowledge of compression-ventilation ratio for a single rescuer is extremely important, as it ensures that proper time is allowed for coronary arteries to circulate blood. [2] Also another important knowledge commonly used for saving lives is performing chest compressions. 56% did not know the correct depth of chest compressions in adults and 42% did not know correct depth of chest compressions in children. Performing chest compressions of incorrect depth can be harmful to the victim.

It was reported that due to excessive depths during CPR resulted in adverse consequences such as rib fractures, sternal fractures, anterior mediastinal haemorrhage and injury to great vessels. [9] In addition, there were still 9% of students whom did not know how to expand BLS and 20% did not know the safety rules prior to conducting BLS. These abbreviations such as BLS are commonly used at healthcare facilities, but there were still students whom could not expand it accurately. Also, students whom did not know safety rules prior to conducting BLS would put themselves in danger and this affects survival of a victim. This was one of the major reasons this study was undertaken, not to assess the intelligence of the students, but to evaluate their knowledge of BLS with very detailed questions, to evaluate their knowledge on that minute details because BLS if done wrongly, it can be useless or harmful to the patient; every live counts.

Only 164 (58.57%) students scored satisfactory results and 116 (41.43%) students scored unsatisfactory students and mean score of all students were 9.91. The highest score of 17 out of 20 was obtained by medical students and lowest score of 4 out of 20 was obtained by dental students. This reflects in our results that conclusively, only 65% medical and 34% dental students scored satisfactory results. This corresponds to previous studies that no medical and dental student had 100% knowledge in BLS. [2, 6, 7, 10] Majority of medical students scored better than dental students because medical students had more exposure to real-life scenarios in the hospital settings during postings. Dental students are only exposed to a limited number of patients whom visit the dental clinic at Melaka-Manipal Medical College, Melaka, Malaysia. Surprisingly, only 65% of medical students have scored satisfactory results despite getting more exposure at the hospitals. This may be due to the fact that the academic curriculum is not catering to the needs of students in terms of BLS knowledge. Training and certification was given to these groups of

students by Manipal University, Manipal, India which was part of the curriculum, however just eleven months later there was a significant deterioration in their knowledge. A study revealed that there is a significant decay of the skill and knowledge about BLS post-six-months of training. [11] One training is not sufficient in the entire curriculum; continuous training and teachings in the curriculum itself should be conducted and reinforced during each posting. Various authors have suggested that healthcare professionals ought to have regular courses of BLS so as to enhance and refresh knowledge of BLS [12, 13] Furthermore, Sushma and team explained that there was a need to begin BLS training from first year of the course of study as public and parents would already expect them to know. [14] Early exposure to BLS training in college with subsequent refresher courses for reinforcement is essential to improve BLS knowledge acquisition and retention among students. [15] BLS training should begin from first year of the course of study to impart interest and knowledge about BLS and this knowledge can be improved when students attend hospital or clinics as they will be able to relate easily to any emergency cases observed and perform BLS whenever the need arises.

On the other hand, dental students are already exposed to a limited number of patients and yet there is lacking in their curriculum about BLS and so this explains the results where only 34% dental students scored satisfactory results. Dental emergencies though thought to be rare, but very much possible. A study found that two-thirds of dentists have to face medical emergencies in one year period. [16] The majority of patients who experience an out-of-hospital cardiac arrest do not receive adequate resuscitation by health care professionals within the critical time, 3–5 min after onset, thus reducing the chance of survival. [17] Therefore, dental students should be equipped with BLS knowledge so if an emergency occurs in the clinic even during an ordinary scaling session, the

patient can be saved, this would be even more necessary when dental students one day open their own clinics. In an emergency situation in a private dental clinic, are they prepared to save a patient whom suddenly develops chest pain?

Some factors that were significant in our study were the course students are studying in, their scholarship status and previously observed BLS shown by p value less than 0.05. Also, majority have chosen the Internet to be their main source of information about BLS. Only a small 5% have chosen academic curriculum. And this explains that their source of information is not sufficient to cater to their knowledge as only 65 % medical and 34% dental students scored satisfactory. A study revealed that the knowledge of trained students remained better than those who were not trained. [15] This simply concludes that academic curriculum need to be refined to include BLS knowledge so that student will get the knowledge and practice their skills hands-on and not from the Internet.

Furthermore, we can highlight that a majority of 56% students have agreed that their ultimate motivation to learn BLS is to become a competent doctor. This shows that they are aware on the need to learn BLS which is an integral part of becoming a doctor. Therefore, the academic curriculum should provide BLS workshops, training, latest updates in its protocol (which changes every five years by the American Heart Association). Also, a final assessment should be done just prior to graduation.

Also, we found that 46% students chose non-availability of training as compared to busy curriculum (36%), lack of interest (9%) and to learn when start working (7%) as their reason for lack of BLS knowledge. This is clearly supported by a study done in South India where lack of professional training was the main reason for lack of knowledge. [10] Just one full day session was provided to all students in this study and it was not provided at all until graduation. Is one full day session sufficient to prepare students to be healthcare

professionals when they start working three years later? A study conducted by Maha et al. at a Saudi Women's University, showed that internal BLS training performed in colleges showed a better result than external training. [6] The curriculum itself should make BLS training and workshops available, where they can practise their skills regularly and hence, be assessed after the training program. Also, a final assessment be done prior to graduation. This is even more so important because only 56% students self-graded their BLS knowledge as average, followed by 24% as below average, 8% as poor and only 9% as good. Training initiatives conducted by Sushma and team could be implemented where their planned training program was effective and students were confident post-BLS training program. [14] Ruessler et al. also advocated that practising BLS on mannequins enhanced students' skills in recognizing and handling emergencies. [18] Therefore, effective training programs and refresher courses should be implemented into the academic curriculum to make students competent and confident to save a life, not only as healthcare students but also as fully qualified doctors.

## **CONCLUSION**

Many previous studies had separated the levels of knowledge among healthcare students and compared them, however in our study we see dental and medical students as a whole because managing emergency situations all pours down ultimately to BLS and every single healthcare professional is expected to know. More relevant is their theoretical knowledge which was studied in depth in our study. A strong theoretical knowledge could provide them with safety and avoid harm to the patient in any emergency situation and henceforth, their practical skills would be more effective too. Continuous workshops and training will help students to keep up with their BLS knowledge and be confident to perform BLS even on their first day of duty.

### Limitations

Only semester six and seven medical and dental students were included in this study, did not include semesters one to five and seven to ten. (total of ten semesters)

Students were left unmonitored to answer the questionnaire; there may be bias in marks

Students whom may have recently attended a BLS course was not identified, so marks may have bias

### Recommendations

To include all medical and dental students and teaching faculty in a practical and theory knowledge assessment; pre-test and post-test results could be included

BLS practical skills to be assessed by BLS experts, Anaesthesiologists or Emergency Medicine specialists

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