

Comparative Analysis of Basic Life Support Knowledge and Ability of Handling Medical Emergencies among Medical and Dental Undergraduates

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Introduction

Medical emergencies can happen anywhere and to anyone¹. A medical emergency can be as simple as syncopal episode or a life-threatening cardiac arrest. Each person should be prepared to handle the initial situation until assistance arrives. Anxiety, stress, stroke, anaphylactic shock, cardiac arrest, and other medical problems are frequently treated by medical and dental

ABSTRACT

Background: Medical emergencies can happen anywhere and to anyone. A medical emergency can be as simple as syncopal episode or a life-threatening cardiac arrest. Each person should be prepared to handle the initial situation until assistance arrives.

Objective: To evaluate and compare basic life support knowledge and medical emergency response skills among medical and dentistry professionals.

Methodology: A descriptive cross-sectional study was carried out at Heavy Industrial Technology, from September 2023 to January 2024. Those who had not taken a Basic Life Support (BLS) course in the previous two years were included such as house officers and final-year students. A written informed permission was acquired following an explanation of the study's objectives. A 19-question questionnaire measuring BLS knowledge and five scenarios-based questions measuring emergency management skills were used. While wrong answers were given a score of zero and right responses were given a score of two. Knowledge and ability to manage emergency scores were computed independently for each participant. Excellent ($\geq 75\%$), good (51-75%), average (26-50%), and poor ($< 25\%$) were the categories used to classify the scores. Analysis of the data was done with SPSS version 23.0.

Results: In present study, 80 participants 40(50%) were from MBBS and 40(50%) BDS from final year and house officers participated. Majority of the students were females 66(82.5%) and 14(17.5%) were males. The mean age of these participants was 23 ± 1.688 . Currently 50(62.5%) participants were house officers and 30(37.5%) were in final year.

Conclusion: In conclusion, ensuring that MBBS and BDS final year students and house officers are well-versed in basic life support (BLS) and emergency management is essential for their effective transition into clinical practice.

Keywords: Cardiopulmonary Resuscitation, Medical Emergency, BLS, Dentist.

specialists. Compared to medical offices, researchers have shown that dentist offices had a 5.8-fold higher incidence of medical emergency.² The stress of needles and manual manipulation in the oral cavity may be considered as one of the reasons.¹

Cardiac emergency is a leading cause of fatality worldwide with 17 million fatalities every year; contributing to 30% of global mortality rate. less than 1% is the reported survival rate of sudden cardiac arrest worldwide mostly owing to delay in the out of the hospital emergency management.³ Promptly identifying and treating these crises is critical to the patient's survival. Life-saving basic life support (BLS) procedures can be used in cases of cardiac arrest. It is an emergency resuscitation program that uses high-quality cardiopulmonary resuscitation (CPR) to guarantee the patient has enough ventilation and circulation.⁴In addition to preparing the candidate for cardiac arrest emergencies, this training program also trains them for certain other typical medical emergencies.⁵ Numerous studies have been carried out to assess medical and dental healthcare professionals' individual basic life support competence. This study aims to evaluate and compare the two healthcare professionals' basic life support knowledge and emergency medical response skills.

Methodology

A Descriptive cross-sectional study was conducted at Dental College HITEC-IMC, Taxilla Cant Heavy Industrial technology from September 2023 to January 2024. The Ethical permission was sought out from the Institutional Review Board (IRB) of Dental College HITEC-IMS, Taxilla Cant with reference no; Dental/HITEC/IRB/54. After approval of study from IRB an informed written consent from the participants was obtained. Using a WHO sample size calculator, the sample size was determined using a simple random sampling technique and the BLS knowledge scores of 32.64% for medical professionals and 68.0% for dentistry practitioners. The sample size was 40 participants in each specialization and a total of 80 participants were included in this study.^{1,6}In this study final year of BDS and MBBS students and house officers were included. Participants who had attended any BLS workshop during the last two years were excluded from the study. Data was collected by using printed Performa in which demographic data such as gender, age, and current positions (i-e Final year student, HO) specializations in which currently performing duties was

taken. Knowledge regarding BLS will be assessed by using a questionnaire having 19 different questions. The questionnaire is designed based on previous research conducted by Prashanthi et al¹ and from American Heart Association BLS manual.⁵ Performa is divided into three section. Section I was used to collect the demographic data, Section II was used to assess the theoretical knowledge of the subject related to BLS in the form of closed ended BCQs and Section III was used to assess the ability to manage the medical emergency in the form of solving scenario-based questions.

Each right response was valued two points, and each wrong answer was valued zero points. The sum of the scores for each knowledge and ability question was used to determine each participant's overall score. Scores of 75% or higher, 51-75%, 26-50%, and less than 25% were classified as excellent, good, average, and inadequate knowledge and capacity to manage medical situations, respectively. SPSS version 23.0 was utilized for the analysis of the data. Frequencies and percentages were used to measure gender, knowledge, current positions (e.g., HO, PGR), and specializations in which duties are being carried out. The mean and standard deviation were used to measure quantitative parameters like age and score.

Results

In present study we have 80 participants 40(50%) MBBS and 40(50%) BDS final year students and house officers from the HITECH. Majority of the students were females 66(82.5%) and 14(17.5%) were males. The mean age of these participants was 23.1±1.688.

Currently 50(62.5%) participants were house officers and 30(37.5%) were in final year. Furthermore, MBBS and BDS participants were categories according to their specialization. We observed that in BDS participants, 15(18.8%) were working in Oral & Maxillofacial Surgery (OMFS) department, 7(8.8%) in Orthodontic department, 5(6.3%) in Prosthodontic department, 7(8.8%) in Periodontology department, 6(7.5%) in operative and Pead's dentistry department while in MBBS groups 22(27.5%) were in medicine and allied

Table No I. Comparison of BLS Knowledge and Ability to manage medical emergency among MBBS and BDS students.

Variable	Response	Qualification		P-value
		MBBS	BDS	
Assessment of BLS knowledge	Excellent	1(2.5%)	1(2.5%)	≥ 0.05
	Good	17(42.5%)	19(47.5%)	
	Average	20(50%)	17(42.5%)	
	Poor	2(5.0%)	3(7.5%)	
Ability to manage Medical Emergency	Excellent	13(32.5%)	16(40%)	≥ 0.05
	Good	9(22.5%)	7(17.5%)	
	Average	11(27.5%)	9(22.5%)	
	Poor	7(17.5%)	8(20%)	

Table No. II Assessment of BLS knowledge of participants based on questionnaire responses.

Question	Correct Answer	MBBS N (%)	BDS N (%)	p-value
Q1. Emergency management order	Position → Airway → Breathing → Circulation → Care	28 (70%)	31 (77.5%)	≥ 0.05
Q2. Airway opening in trauma	Jaw thrust	25 (62.5%)	21 (52.5%)	≥ 0.05
Q3. Pulse check in adult	Carotid artery	19 (47.5%)	16 (40%)	≥ 0.05
Q4. CPR indication	Cardiac arrest	33 (82.5%)	31 (77.5%)	≥ 0.05
Q5. Adult CPR ratio	30 compressions: 2 breaths	30 (75%)	29 (72.5%)	≥ 0.05
Q6. Compression location in adults	Mid chest	15 (37.5%)	16 (40%)	≥ 0.05
Q7. Adult compression rate/depth	100–120/min, ~5 cm	24 (60%)	20 (50%)	≥ 0.05
Q8. Infant compression location	Below nipple line	13 (32.5%)	15 (37.5%)	≥ 0.05
Q9. 3-year-old (1 rescuer) CPR ratio	15:2	21 (52.5%)	21 (52.5%)	≥ 0.05
Q10. 7-year-old (2 rescuers) CPR ratio	15:2	10 (25%)	12 (30%)	≥ 0.05
Q11. Two-thumb encircling technique use	Infant <1 year	26 (65%)	24 (60%)	≥ 0.05
Q12. Chest compression depth in child	1/3 of chest (~4 cm)	12 (30%)	13 (32.5%)	≥ 0.05
Q13. Chest compression depth in infant	1/3 of chest (~4 cm)	25 (62.5%)	25 (62.5%)	≥ 0.05
Q14. Rescue breath effectiveness	Chest rise observed	24 (60%)	22 (55%)	≥ 0.05
Q15. Identify non-opioid	Naloxone	29 (72.5%)	29 (72.5%)	≥ 0.05
Q16. Sign of anaphylaxis	Life-threatening breathing/circulation issue	30 (75%)	27 (67.5%)	≥ 0.05
Q17. Epinephrine injection site	Mid-thigh	27 (67.5%)	24 (60%)	≥ 0.05
Q18. Sign of partial airway obstruction	Wheezing between coughs	10 (25%)	17 (42.5%)	≥ 0.05
Q19. Abdominal thrusts indicated for	Normal adult	23 (57.5%)	26 (65%)	≥ 0.05

department and 18(22.5%) were in surgery and allied departments. When overall knowledge of BLS and ability to manage medical emergency was observed, it was analyzed that the average score was 9.09 ± 2.93 and only 2(2.5%) had excellent knowledge, 36(45%) good, 37(46.3%) average and 5(6.3%) poor knowledge of BLS. On other hand the average score of ability to manage medical emergency was 3.99 ± 8.33 and 29(36.3%) had excellent ability to manage medical emergency, 16(20%) good ability, 20(25%) average and 15(18.8%) had poor ability to manage medical emergency. Upon allocating these participants based on their qualifications, we found that the MBBS and BDS participants did not significantly differ in their knowledge and capacity to handle medical emergencies (Table I, Fig A & B). Assessment of questionnaire for BLS Knowledge and Ability to manage medical emergency among MBBS and BDS students were analyzed and there was no significant association as P value ≥ 0.05 (Table II & III).

Discussion

Regardless of their field of study or specialization, the American Heart Association advises that everyone undergo BLS training.⁷ Following a cardiac arrest, Basic Life Support (BLS) is a simple practice that can save lives. An essential part of emergency resuscitation care is keeping the blood flowing and oxygen delivery sufficient until the cause of the arrest is found and eliminated.⁸ All staff members and medical students who interact with patients should receive training on providing basic life support.⁹ In this descriptive cross-sectional study, it was observed that knowledge of the majority of participants

regarding BLS was average and there was non-significant difference in knowledge and ability to manage medical emergency between MBBS and BDS participants which is also reported by Al-Johani et al.¹⁰ According to a study conducted in Malaysia, health care students score highly on attitude and awareness tests but poorly on BLS knowledge.¹¹ A study conducted in India discovered that undergraduate students lacked awareness and expertise regarding BLS.¹² Additionally, practicing medical professionals from different cities of Pakistan admitted to lacking basic CPR expertise in their day-to-day work.¹³⁻¹⁴

Chest compressions performed at the proper position improve coronary circulation and lower the incidence of related problems like rib fractures. It has been discovered that the outcome of cardiac arrest is directly impacted by the site, depth, rate, and duration of the compressions. Nonetheless, the majority of undergraduate medical and dental students in this study were able to pinpoint the exact site of chest compressions (75%–72.5%) and the depth of compression for adults (60%–50%). The majority of students, however, were unable to accurately respond when asked about the child's level of compression depth. There was non-significant difference between the site, depth rate and duration compression among dental and medical undergraduates { P value (>0.05)}. According to a study conducted on dental students by Raja, ZS et al., only 51.9% of participants knew where to do chest compressions during cardiopulmonary resuscitation and About one-third (34.6%) of participants were aware of how deep to pressure the chest when performing CPR on an

Table: III. Assessment of ability to manage medical emergency of participants based on questionnaire responses.

Question asked	Qualification		P-value
	MBBS	BDS	
Q1. A 43-year-old man collapsed and became unconscious. You see his collapse and are the first responder on the scene, where the man lies lifeless on the floor. Which is the first step you should do in this situation?			
a) Turn on the emergency response mechanism.	6(15%)	5(12.5%)	≥0.05
b) Perform high-quality cardiopulmonary resuscitation, starting with chest compressions.	10(25%)	11(27.5%)	
c) Begin administering rescue breaths.	7(17.5%)	6(15%)	
d) Confirm that both you and the victim are secure at the scene.	17(42.5%)	18(45%)	
Q2. You ask a number of rescuers to activate the emergency response system and collect an AED after they arrive at the scene of a 54-year-old man who has fallen. You observe that the man is snorting and struggling for air while you look for a pulse and breathing. There is no pulse in your body. What should be your next course of action?			
a) Perform high-quality cardiopulmonary resuscitation, starting with chest compressions.	23(57.5%)	26(65%)	≥0.05
b) Keep an eye on the victim until more qualified assistance shows up.	5(12.5%)	6(15%)	
c) Deliver one breath every six seconds to provide rescue breathing.	9(22.5%)	7(17.5%)	
d) Locate someone to assist in getting the closest AED.	3(7.5%)	1(2.5%)	
Q3. A 56-year-old woman who has been taking hydromorphone for postoperative pain is unresponsive when you meet her. She has no pulse and is not breathing. Her medicine bottle is empty, and you assume a life-threatening opioid-related emergency. While getting the naloxone and AED, a coworker triggers the emergency response system. What would be the best course of action for you next?			
a) Do not take any action until the naloxone arrives..	5(12.5%)	4(10%)	≥0.05
b) Start chest compressions as the first step in CPR.	21(52.5%)	18(45%)	
c) Until naloxone comes, give one rescue breath every six seconds.	9(22.5%)	12(30%)	
d) Accompany the automated external defibrillator (AED) with a fast defibrillator.	5(12.5%)	6(15%)	
Q4. You have an 18 years old male patient reported to you in emergency with the complaint of severe shortness of breath, stridor, hypotension and tachycardia just after taking oral amoxicillin. You are advised to administer epinephrine by your colleague. Where on body will you administer an epinephrine injection?			
a) About midway between the hip and knee on the individual's thigh.	32(80%)	30(75%)	≥0.05
b) On the individual's torso, roughly midway between the ribs and hips.	2(5%)	3(7.5%)	
c) On the individual's arm, around midway between the wrist and elbow.	2(5%)	3(7.5%)	
d) On the individual's neck, around midway between the shoulder and ear.	4(10%)	4(10%)	
Q5. When you are giving a 9-year-old abdominal thrust, he abruptly stops responding. What should be your next course of action after seeking out close assistance?			
a) Start good quality CPR using chest compressions first.	11(27.5%)	15(37.5%)	≥0.05
b) Look for a pulse	14(35%)	11(27.5%)	
c) Keep doing the abdominal thrusts.	10(25%)	9(22.5%)	
d) Give five thrusts to the chest and five back slaps.	5(12.5%)	5(12.5%)	

adult.¹⁵ Another study of dental students, only 46.6% of participants understood the proper location (site) for chest compressions during cardiopulmonary resuscitation (CPR), whereas two-thirds (67.1%) knew the depth of chest compressions in adults during CPR.¹⁶ According to a study done on medical students in Karachi, they had very low skill levels and lacked knowledge, yet they had a very positive attitude on the value of BLS.¹⁷ Research conducted in Saudi Arabia and India revealed that medical students in particular had inadequate CPR knowledge.¹⁸⁻

Almost half of the students who participated in our survey expressed confidence in their ability to handle medical emergencies with ease and effectiveness and in their knowledge of basic life support. Given that certain research suggest that cardiac episodes are more common in dentistry clinics than syncope, we strongly advise reviewing BLS and CPR method.²⁰

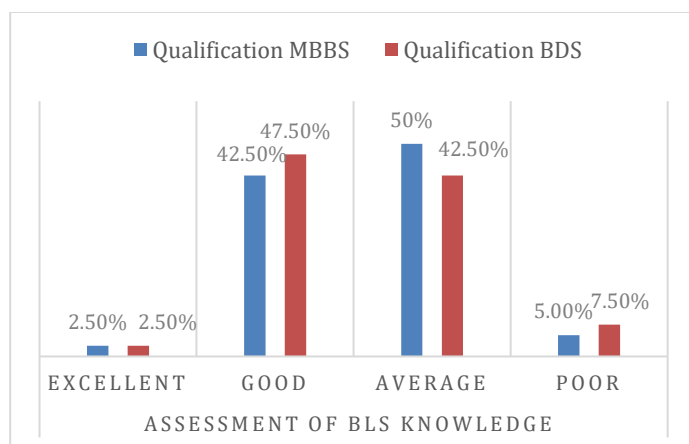


Figure No A. Frequency and percentages of BLS knowledge of the participants based on qualification.

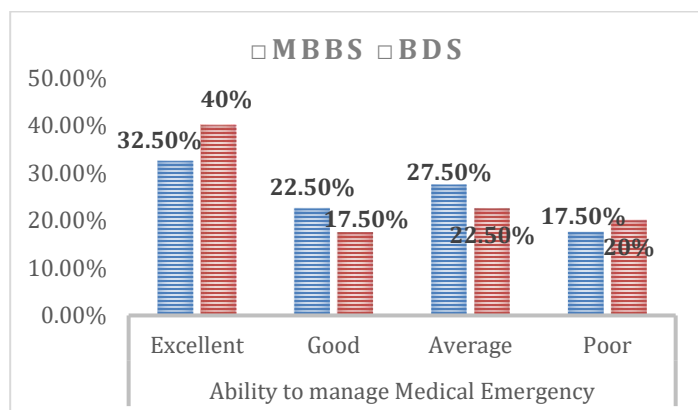


Figure No B. Frequency and percentages of the abilities to manage medical emergency of the participants based on qualification.

Discussions about emergency management and basic life support (BLS) expertise among MBBS and BDS students frequently reveal areas where they lack proficiency. For example, although many students know how to perform cardiopulmonary resuscitation (CPR), their proficiency in

advanced airway management or handling choking situations can vary. Frequent scenario-based exercises and refresher courses are essential for filling in these gaps and guaranteeing that both BDS and MBBS students can function with assurance and efficiency in actual medical emergencies. According to assessments, adding more frequent and intense BLS instruction to their curriculum might improve their preparedness and response skills.

Conclusion

In conclusion, ensuring that MBBS and BDS final year students and house officers are well-versed in basic life support (BLS) and emergency management is essential for their effective transition into clinical practice. While current training programs provide foundational knowledge, ongoing assessments and practical drills reveal a need for more comprehensive and frequent BLS training. By integrating rigorous, hands-on practice and scenario-based learning into their education, healthcare institutions can significantly improve these future professionals' readiness to handle medical emergencies. Ultimately, this enhanced preparedness will not only boost their confidence but also contribute to better patient outcomes in critical situations.

Limitation: A comparatively small sample size of 80 participants, which might not accurately reflect the larger population of medical and dental students, is one of the study's limitations. In addition, the study only included final-year students and house officers from a single university, which restricted the generalizability of the findings. The self-reported nature of the questionnaire and participant biases may potentially affect the data's accuracy.

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