Perceptions of dental students on introduction of simulation-based BLS teaching in their course

Shazia Ibnerasa[2], Willem de Garve[3]

Corresponding author: Prof Shazia Ibnerasa shazia.nilofar@lmdc.edu.pk
Institution: 1. Maastricht University, 2. Lahore Medical and Dental College, 3. Faculty of Health Medicine and Life Sciences (FHML), Maastricht University
Categories: Educational Strategies, Students/Trainees, Technology

Received: 30/08/2016
Published: 07/09/2016

Abstract

Introduction

Medical emergencies in dental clinic can be upsetting to any practicing dentist. Cardiac arrest requiring cardiopulmonary resuscitation (CPR) is one such medical emergency which can occur in dental office. Every dental practitioner therefore should at least be able to perform the basics of CPR. The purpose of the study was to demonstrate self-perceived perceptions of change in knowledge, skills and confidence level of 3rd year dental students after introduction of simulation based basic life support (BLS) teaching. It was assumed that after simulation based BLS teaching, dental students would feel more confident in providing immediate management to a patient of cardiac arrest during dental practice.

Methods

3rd year dental students attending General Medicine clinical rotation received two hours simulation based BLS teaching and perceptions of students were taken on a questionnaire, based on Likert scale. Change in self-perceived perceptions of knowledge, skills and confidence of students was analyzed.

Results

Analysis showed that simulation based teaching significantly increases the level of knowledge, skills and self-perceived confidence of students regarding BLS skills.

Conclusion

The study determined the perceived effectiveness of simulation based teaching in increasing the confidence level of dental students regarding performance of BLS skills in dental office.
Introduction

One of the most important single determinants for quality healthcare provision is the competence of medical/dental practitioner, particularly, when an unexpected emergency arises (Ibnerasa, Hashmi, & Chaudhry, 2011). Cardiac arrest is a medical emergency requiring immediate Cardio-pulmonary resuscitation (CPR) for survival (Li et al., 2013). Dentists sometimes have to face similar medical emergency requiring CPR during dental procedures. Such emergencies most likely occur during and after local anesthesia, primarily during tooth extraction and endodontics (Carvalho, Costa, & Marcelo, 2008). According to Carvalho et al. 2008, the frequency of medical emergencies during dental practice are increasing as dentists are seeing an increasing number of elderly and medically compromised patients and are performing more sedation procedures. This justifies the need for every dental practitioner to be able to perform the basics of cardiopulmonary resuscitation (CPR): chest compression and rescue breaths (Laurent et al., 2009), especially when chances of survival of the patient of cardiac arrest are reduced by 7 to 10 percent every minute if CPR is not done on time (Carvalho et al., 2008).

Cardiopulmonary resuscitation training is not mandatory in dental schools in Pakistan and certification in BLS is not a requirement for dental graduation. BLS skills are taught during general medicine rotation and only theoretical part of the subject is covered in the form of lecturing. The students therefore do not feel confident to manage a medical emergency requiring CPR.

Medical education increasingly relies on simulation technology to provide a tool to increase learner knowledge (Wayne et al., 2006). Simulation training in resuscitation helps in improving the knowledge of the participants in a relatively realistic arena and allows them to familiarize themselves with the equipment and procedures (Hamilton, 2005). Wadas (1999), reported that both confidence and performance improved following the initiation of a cardiac arrest simulation programme, and that the documentation of actual cardiac arrest situations improved as a result. Little information has been published about the self-perceived competence and confidence of dental undergraduates in regard to managing a medical emergency with BLS or CPR in the dental practice (Carvalho et al., 2008).

The purpose of this study is to demonstrate the effect of simulation-based BLS teaching on the self-perceived confidence level of 3rd year dental students regarding management of a patient of cardiac arrest. The goal is to highlight the gap that exists in clinical knowledge and skill of the students in this regard. It is assumed that after simulation based teaching, dental students will feel more confident in performing BLS on a patient of cardiac arrest. The study also reports perceptions of students regarding simulation based BLS learning experience.

Methods

Setting

The study was carried out in Lahore Medical and Dental College, Lahore, Pakistan in 2014.

Participants

The study participants were 3rd year dental students. The study group comprised of 45 students (N = 45) doing
General medicine clinical attachment at the affiliated Hospital.

Ethical approval was obtained through the Institutional Review Board of Lahore Medical and Dental College, Lahore. Participants were briefed about the details of the study and verbal consent was taken. To ensure students participation, they were told that attending this session will be counted towards their one day of medicine ward rotation.

**Instruments for data collection**

Data was collected on a 10-item test-questionnaire with items relating to knowledge, skills and perception of ability to perform CPR. Reliability of the questionnaire was checked, Cronbach’s α .732. The students were asked to mark their responses on a 5-point Likert scale with options ranging from 1- Strongly disagree to 5- Strongly agree.

Perceptions of students regarding Simulation based learning experience were also taken on separate Likert scale based proforma.

**Intervention**

All the students were asked to mark their responses prior to the Simulation based skill session (Pre-test). The students were shown a 15-minute video of a real life event of emergency BLS procedure, followed by demonstration of all the steps of BLS procedure by the tutor on non-automated Basic buddy™ mannequin manufactured by Nasco life/form. Product # SB27354U (“Nasco Lifeform.”). The students were then asked to practice the steps of BLS skills on the manikin. Every participant was given same time to practice with necessary feedback by the tutor during the session. After the session was over, the students were asked to self-evaluate their knowledge, skills and confidence level regarding basic life support skills by marking their responses on the test-questionnaire (Posttest-S).

A post session evaluation of the skill session was done to see the perceptions of students about BLS training with the help of simulator. The students were asked to rate their experience using 5-point Likert scale. Students’ perceptions are tabulated in Table 2.

SPSS version 20 was used for data entry and analysis. Descriptive statistics were applied, and means and standard deviations were calculated for pre and post-tests. Student’s T test was applied to compare pre and post-test means. p-value of <0.05 was taken as significant.

**Results**

Out of 45 students attending General Medicine rotation, 1 student was absent on the day of intervention (N = 44). Mean scores for the pre and post-test are shown with marked increase in all the post test scores. (table 1).

The analysis between pre-test and post-test scores reveals highly significant result (p = .000).

Regarding perceptions of students about simulation based learning experience, most of the students thought that simulation based learning session was extremely helpful in increasing the knowledge (100 %) and confidence (95.4 %) about BLS skills. They were of the opinion that video session (95.5%) and teachers’ feedback (84.1%) were very useful during the learning of BLS skills. 95.55% students regarded BLS skills as essential for the practice of dentistry (table 2).
Discussion

The study demonstrates change in 3rd year dental students’ perceptions of knowledge, skills and confidence level after simulation based BLS teaching. The results show that simulation-based training improves the self-perceived knowledge, skills and confidence level of students about BLS ($p = 0.001$) when compared with no hands on training (pre-test). Surcouf et al., (2013) reported, that simulation based training of residents on neonatal resuscitation show similar results. Their study provided strong evidence that simulation based training helps in increasing self-perceived confidence of residents (Wilcoxon signed rank test, total score $p = 0.000$). Similarly, Sopka et al., (2012), observed students attitude and self-assessment towards emergency medical care after practical training. The results revealed that the comparison of pre and post-evaluation showed a great increase in self-confidence ($p < 0.0001$).

The study by Hendrickse et al., 2001 cited by Hamilton 2004, also suggested that simulation training in resuscitation helps the participants to improve their knowledge in a relatively realistic arena and allows them to familiarize themselves with the equipment and procedures.

Wadas (1999) also reported that confidence and performance improved following the initiation of a cardiac arrest simulation programme. Mundell, Kennedy, Szostek, Cook, (2013), conducted a meta-analysis on the effect of simulation technology for resuscitation training and revealed that in comparison to no intervention, simulation training improved outcomes of knowledge 1.05 (95% confidence interval, 0.81–1.29), process skill 1.13 (0.99–1.27), product skill 1.92 (1.26–2.60), time skill 1.77 (1.13–2.42) and patient outcomes 0.26 (0.047–0.48). In comparison with non-simulation intervention, learner satisfaction 0.79(0.27–1.31) and process skill 0.35 (0.12–0.59) outcomes favored simulation.

The above findings validate the research hypothesis that simulation based teaching in BLS will help dentists develop deeper knowledge about medical emergencies. Patient care tasks require teamwork and traditional curricular formats do not prepare students for such collaborative practice (Sperling, Clark, & Kang, 2013). Classroom teaching especially lectures, provide little chance for interaction between students and between students and instructor. The students therefore are unable to integrate such knowledge during clinical practice especially in an emergency situation (Patel, Arocha, Branch, & Karlin, 2004).

Looking at the results of the above study it can be concluded that theoretical information is not enough to ensure CPR competence (Kavari & Chohedri, 2007). Hands on training sessions in emergency medical care will enhance dental students’ awareness of importance of BLS skills as well as increase their self-confidence in performing these procedures.

Limitations and future research

This study design has lots of limitations. First, this study has been carried out on one class of one dental school. This limits the generalization of the findings. Future studies involving more classes from different dental schools should be carried out to improve the reliability of findings. Second, the study measures self-assessed perceptions of students regarding their knowledge, skills and confidence after intervention, and lacks objective assessment of the acquired skill. Objective assessment of the skill with perceptions about increase in confidence will be more valid in documenting procedural competence. Third, this study only measures immediate improvement of knowledge of BLS skills after one instructional intervention and does not account for the decay of knowledge over-time and how much
such decay affects the confidence level of the student. Literature cites many studies about decay of procedural knowledge after some time. In one study, 88 percent of people who had received basic life support training were not capable of carrying out effective CPR one year after their training (Laurent et al., 2008). Longitudinal studies in this regard should be carried out in dental graduates.

**Conclusions**

In spite of number of limitations pointed out in this study, the study sheds some light on the deficient training of dental students regarding medical emergencies like cardiac arrest especially in our part of the world. Similar studies cited in the literature are carried out on practicing dentists or on dental graduates (Carvalho et al., 2008) (Laurent et al., 2009). The results of this study shows that one teaching session in basic life support skills is able to enhance dental students' awareness of importance of BLS skills and to increase their self-confidence in performing the procedure (Sopka et al., 2013). The results of the study will useful in developing countries where dental students either receive no teaching of emergency medical skills or where only lecture based teaching of emergency medical skills are done.

**Take Home Messages**

**Notes On Contributors**

Dr. Shazia Ibnerasa, is Professor of Pathology at Lahore Medical and Dental College, Lahore, Pakistan. She is working as Director Skills Lab in her institute and introduced emergency medical skills training for dental students in Clinical skills lab at her institute. This study is part of her master thesis research for Masters in Health Professions Educations, from the University of Maastricht, Netherlands.

Dr. Willem de Garve is Senior Lecturer, at Department of Educational Development and Research, Faculty of Heath Medicine and Life Sciences (FHML), Maastricht University, Netherlands. He supervised the research thesis of Dr. Shazia Ibnerasa.

**Acknowledgements**

**Bibliography/References**

Carvalho, R. M., Costa, L. R., & Marcelo, V. C. (2008). Brazilian Dental Students' Perceptions About Medical Emergencies: A Qualitative Exploratory Study Journal of Dental Education, 72(11), 1343-1349.

Hamilton, R. (2005). Nurses' knowledge and skill retention following cardiopulmonary resuscitation training: a review of the literature. Journal of Advanced Nursing 51(3), 288-297.

[http://dx.doi.org/10.1111/j.1365-2648.2005.03491.x](http://dx.doi.org/10.1111/j.1365-2648.2005.03491.x)
Ibnerasa, S. N., Hashmi, N. R., & Chaudrhy, A. M. (2011). Staff and students perceptions regarding a clinical skills laboratory learning experience. IJOCS Vol 5 issue 2: 126-129. International Journal of Clinical Skills, 5(2), 126-129.

Kavari, S. H., & Chohedri, A. H. (2007). Cardiopulmonary Resuscitation: Knowledge and Personal Experience in Iranian Dentists. Pak J Med Sci, 23(2), 296-297.

Laurent, F., Augustin, P., Nabet, C., Ackers, S., Zamaroczy, D., & Maman, L. (2009). Managing a Cardiac Arrest: Evaluation of Final-Year Predoctoral Dental Students Journal of Dental Education, 73(2), 211-217.

Li, Q., Zhou, R. H., Liu, J., Lin, J., Ma, E. L., Liang, P. Xiao, H. (2013). Pre-training evaluation and feedback improved skills retention of basic life support in medical students. Resuscitation, 84(9), 1274-1278.

Patel, V. L., Arocha, J. F., Branch, T., & Karlin, D. R. (2004). Relationship Between Small Group Problem-Solving Activity and Lectures in Health Science Curricula. Journal of Dental Education, 10, 1058-1080.

Sopka, S., Biermann, H., Rossaint, R., Rex, S., Jäger, M., Skorning, M., Beckers, S. K. (2013). Resuscitation training in small-group setting – gender matters. Scand J Trauma Resusc Emerg Med, 21(30).

Sperling, J. D., Clark, S., & Kang, Y. (2013). Teaching medical students a clinical approach to altered mental status: simulation enhances traditional curriculum Med Educ Online, 18.

Surcouf, J. W., Chauvin, S. W., Ferry, J., Yang, T., & Barkemeyer, B. (2013). Enhancing residents' neonatal resuscitation competency through unannounced simulation-based training. Med Educ Online, 18, 1-7.

Wayne, D. B., Butter, J., Siddall, V. J., Fudala, M. J., Wade, L. D., Feinglass, J., & McGaghie, W. C. (2006). Mastery Learning of Advanced Cardiac Life Support Skills by Internal Medicine Residents Using Simulation Technology and Deliberate Practice J GEN INTERN MED, 21, 251-256.

Appendices
### Table 1

#### Mean scores for pre and post simulation based BLS skill session (N = 44)

| # | Questions                                                                 | Intervention         | Mean | Std. Deviation | p-value |
|---|---------------------------------------------------------------------------|----------------------|------|----------------|---------|
| 1 | I know all the steps of adult BLS                                        | Pre-test             | 2.03 | .971           | 0.000   |
|   |                                                                           | Post-test simulation | 4.41 | .497           |         |
| 2 | I can accurately access for no breathing                                  | Pre-test             | 3.06 | .993           | 0.000   |
|   |                                                                           | Post-test simulation | 4.70 | .462           |         |
| 3 | Emergency response activation is important in BLS                        | Pre-test             | 3.43 | .928           | 0.001   |
|   |                                                                           | Post-test simulation | 3.95 | .834           |         |
| 4 | I know how to check carotid pulse                                        | Pre-test             | 3.39 | 1.018          | 0.000   |
|   |                                                                           | Post-test simulation | 4.50 | .591           |         |
| 5 | I can give correct chest compressions                                     | Pre-test             | 2.36 | 1.090          | 0.000   |
|   |                                                                           | Post-test simulation | 3.75 | .811           |         |
| 6 | I can correctly place AED                                                 | Pre-test             | 1.79 | .804           | 0.000   |
|   |                                                                           | Post-test simulation | 3.77 | .743           |         |
| 7 | I can deliver AED                                                        | Pre-test             | 1.85 | .873           | 0.000   |
|   |                                                                           | Post-test simulation | 4.00 | .715           |         |
| 8 | I can give bag mask ventilation                                           | Pre-test             | 2.55 | 1.197          | 0.000   |
|   |                                                                           | Post-test simulation | 4.36 | .532           |         |
| 9 | I can communicate with 2nd rescuer                                        | Pre-test             | 2.31 | .924           | 0.000   |
|   |                                                                           | Post-test simulation | 3.77 | .937           |         |
| 10| I can give BLS in emergency                                               | Pre-test             | 2.33 | .963           | 0.000   |
|   |                                                                           | Post-test simulation | 4.11 | .754           |         |

### Table 2

#### Students’ perceptions simulation based BLS session (N=44)

| No. | Questions regarding Skills session                                      | Strongly Disagree | Disagree | Don’t know | Agree | Strongly Agree |
|-----|-------------------------------------------------------------------------|-------------------|----------|------------|-------|----------------|
| 1   | Allotted time was sufficient for learning of skills                     | 0                 | 0        | 2          | 4.5   | 15.9           |
|     |                                                                         | 22                | 50       | 10         | 22.7  | 13             |
| 2   | Training on simulator was helpful in increasing knowledge                | 0                 | 0        | 0          | 0     | 29             |
|     |                                                                         | 0                 | 0        | 0          | 0     | 65.9           |
|     |                                                                         | 29                | 65.9     | 15         | 34.1  |                |
| 3   | Lecture on BLS is as effective as skills session                         | 6                 | 13.6     | 22         | 50    | 10             |
|     |                                                                         | 22                | 50       | 10         | 22.7  | 13             |
|     |                                                                         | 6                 | 13.6     | 0          | 0     |                |
This type of learning will help me manage a patient of cardiac arrest better

This method has definitely increased my confidence

BLS is essential for the practice of dentistry

Teachers feedback was helpful

Video session was helpful in relating the knowledge with a real life event

N = 44

Declarations

The author has declared that there are no conflicts of interest.

This has been published under Creative Commons "CC BY 4.0" (https://creativecommons.org/licenses/by-sa/4.0/)

AMEE MedEdPublish: rapid, post-publication, peer-reviewed papers on healthcare professions’ education. For more information please visit www.medepublish.org or contact medepublish@dundee.ac.uk.