Background: Considering the occurrence of medical emergencies in dental practice, and the essential need of acquiring competency in Basic Life Support (BLS), the aim of the present study was to evaluate the effect of BLS workshop on the skills of dental students in the cardiopulmonary resuscitation.

Methods: In this switching replication experimental study, students in the 5 year of Mashhad dental school (Iran) in 2013 participated in the study. All participants completed a baseline assessment at the skill lab (pre-test). To evaluate the practical skills of students in the cardiopulmonary resuscitation, a scenario was presented, and the students were asked to demonstrate all the actions that are necessary to rescue the patient on a manikin. A trained instructor scored their skills according to a standard checklist. Then, the participants were randomly divided into two groups. The first group took BLS workshop and was assessed immediately after the workshop (immediate post test), while pretest was conducted one month after the course. The same scenario was used for all participants at each testing point. To compare the score of competency in BLS in the two groups, participants of the second group did not take any BLS workshop. To compare the score of competency in BLS in the two groups, participants of the second group did not take any BLS workshop.

Results: Considerable increases in the scores of competency in BLS in the two groups were found. Participants of the group which took BLS workshop and was evaluated immediately after the workshop (immediate post test) had a significantly higher competency score compared to the pre test (P=0.003). Considering the occurrence of medical emergencies in dental practice, and the essential need of acquiring competency in Basic Life Support (BLS), the aim of the present study was to evaluate the effect of BLS workshop on the skills of dental students in the cardiopulmonary resuscitation.

Conclusions: BLS workshops can significantly increase dental students’ competency in life support. However, considering the retention time of skills, refresher courses are strictly recommended.

Keywords: Cardiopulmonary Resuscitation, Education, Skills, Students.
INTRODUCTION

Competence in performing Basic life support (BLS) or advanced cardiac life support (ACLS) is essential in all medical professions (1). Emergency event during dental procedures were reported on average for every 4.5 practice years in England (2). Resuscitation training is an increasingly popular concern in undergraduate medical education curricula. However, given the high cost of simulation-based courses, one of the most important considerations is the effectiveness of these trainings (3).

Learning theories indicate that learning from simulation-based training may rapidly degrade over time (1, 4). This is confirmed by several studies on the competence in cardiopulmonary resuscitation of health professionals (5–7). Most of these studies have demonstrated that the acquired ALS competence suffers from significant decay over time. It is therefore vital to identify strategies that improve the retention of learning from resuscitation courses. Ringsted et al (8) reported that retention of knowledge and skills is probably dependent on the level of primary learning outcome, and that some degree of over-learning might prolong the retention of adequate life support competence.

Broadbent and Thomson (9) reported that more than half of the general dental practitioners in New Zealand were dissatisfied with the training they had received for medical emergencies as undergraduate students. On the other hand, 20% of general dentists in Great Britain felt inadequately prepared for management of medical emergencies (10). Similarly, in a previous survey in Brazil, most of the dentistry students were not satisfied with the training they had received on medical emergencies (11).

In Iran, a recent study showed that only 37% of dentists acquired enough knowledge and experience about cardiopulmonary resuscitation (CPR). Although 70% had gained relative information about CPR, most of them had not been trained in practical-simulated conditions (12). The aim of the present study was to evaluate the effect of BLS workshop on the clinical skills of dental students in the cardiopulmonary resuscitation.

METHODS

This prospective, repeated – measure, switching replication experimental designed study was conducted at the dental school of Mashhad University of Medical Sciences (Iran) in 2013, and was approved by the institutional ethical committee. Undergraduate students in the 5th year of dental school participated in the study. Uncooperative students who did not have the tendency to participate in the workshop, and also those who had already passed the workshop were excluded from the study. Participants were informed about the aim and scope of the study and signed a written informed consent. Before taking the training BLS workshop, all participants completed the baseline assessment at the skill lab (pre-test). To evaluate and score the practical skills of students in the cardiopulmonary resuscitation, the following scenario was presented to students. They were asked to demonstrate exactly and in the order, all the actions that are necessary to rescue the patient on a manikin.

*Presented scenario:* You are going to visit your patients at the hospital ward in the morning. Suddenly, you see an averaged-old man falling down on the ground. No one except you is available at the place. You run into him for help. What would you do to rescue the patients?

An instructor watched and scored the performance skills of students according to a checklist. To increase the validity of the assessments, AHA evaluation checklist was used and the instructor was certified in ACLS and BLS with experience in practice, teaching and evaluating performance. The instructor was not allowed to talk to participants and only observed and scored their skills according to standard checklist. Evaluated skills were as follows: recognition of need for resuscitation, establishing unresponsiveness, Automated External Defibrillator (AED), opening the airway by manual maneuvers, establishing lack of breath, rescue breathing, establishing lack of pulse, cardiac compressions. The participants were randomly divided into two groups. The first group took BLS workshop. Total average time for training was 3 hours including one hour of theoretical training and 2 hours of practical training on standard manikin. Adequacy of compressions and ventilations was assessed using a skills recorder.

The first group was assessed immediately after taking the workshop (Immediate post-test), and final examination was conducted one month after the course (second post-test). The same scenario was used for all participants at each testing point. In the second group, the second pretest was taken within one month of the first pretest. Immediately after taking the second post-test, the students participated in the BLS workshop. This group was assessed for the third time, immediately after the course. The design and flow of participants are summarized in Diagram 1.

![Diagram 1. The design and flow of participants in the study](image-url)
Comparison of the mean score of the first and second investigated one month after taking the workshop.

Retention pretest itself on basic skills of students was evaluated. Also, needs of attendees (successful and motivating provided that they cover the real experimental studies (Switching replication is considered as a reliable at each measurement is shown in Table

The result of the mean scores of the students in both groups did not show a significant difference (P = 0.003). On the other hand, mean score of the first group in the post test after the workshop considerably decreased compared to their gained score immediately after the course (P = 0.09).

The result of the mean scores of the students in both groups at each measurement is shown in Table 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ± SD</th>
<th>P - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline assessment in the first group</td>
<td>7.22 ± 2.70</td>
<td>0.77</td>
</tr>
<tr>
<td>Baseline assessment in the second group</td>
<td>6.97 ± 3.41</td>
<td></td>
</tr>
<tr>
<td>First pretest</td>
<td>6.96 ± 3.40</td>
<td>0.12</td>
</tr>
<tr>
<td>Second pretest in the second group</td>
<td>7.40 ± 3.75</td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>7.21 ± 2.69</td>
<td>P &lt; 0.0001</td>
</tr>
<tr>
<td>Immediate post-test in the first group</td>
<td>20.69 ± 2.67</td>
<td></td>
</tr>
<tr>
<td>Immediate post-test in the second group</td>
<td>6.96 ± 3.40</td>
<td>P &lt; 0.0001</td>
</tr>
<tr>
<td>Immediate post-test in the second group</td>
<td>20.40 ± 2.01</td>
<td></td>
</tr>
<tr>
<td>Second pretest Immediate post-test in the second group</td>
<td>7.40 ± 3.57</td>
<td>P &lt; 0.000</td>
</tr>
<tr>
<td>Immediate post-test in the first group</td>
<td>20.40±2.01</td>
<td></td>
</tr>
<tr>
<td>Immediate post-test in the second group</td>
<td>20.69±2.67</td>
<td>0.09</td>
</tr>
<tr>
<td>Immediate post-test in the second group</td>
<td>20.14±2.01</td>
<td></td>
</tr>
<tr>
<td>Final exam in the first group</td>
<td>20.69 ± 2.67</td>
<td>P &lt; 0.0001</td>
</tr>
<tr>
<td>Final exam in the second group</td>
<td>18.65 ± 2.42</td>
<td>0.003</td>
</tr>
</tbody>
</table>

To compare the score of two groups at each measurement, t-test or Mann-Whitney U-test was used. P < 0.05 was set as significant.

RESULTS

53 fifth year dental students participated in this study. There were 23 and 50 participants in the first and second group, respectively. Subjects were in the age range of 24-25 years old. 60% of participants were female. Baseline assessment did not show a significant difference between the two groups (P = 0.77). Also comparison between the first and second pretest in group two did not reveal a significant difference in students' BLS skills (P = 0.12). However, mean score of the first group in the post test (immediately after taking the course) was significantly higher than their pretest score (P < 0.0001). Similarly, there was a significant difference between the mean scores of the first and also the second pretest and final exam in the second group (P < 0.0001).

Mean score of the two groups immediately after taking the course did not show a significant difference (P = 0.09). On the other hand, mean score of the first group one month after the workshop considerably decreased compared to their gained score immediately after the course (P = 0.003).

The result of the mean scores of the students in both groups at each measurement is shown in Table 1.

DISCUSSION

Switching replication is considered as a reliable method in experimental studies (13). Educational programs are successful and motivating provided that they cover the real needs of attendees (14, 15). In present study, the effect of pretest itself on basic skills of students was evaluated. Also, retention of the students' competence in BLS was investigated one month after taking the workshop.

Comparison of the mean score of the first and second pretest did not show a significant difference in the second group. This indicates that the pretest itself did not motivate students to improve their abilities in resuscitation. On the other hand, although taking pretest and post-test, the retention of BLS skills in students decayed significantly over time. This finding is in contrast to the results of Komelasky and Bond (16), who reported that pretest / post-test can be a good learning reinforcement upon retention of CPR skills.

Webb et al (17) reported that mere theoretical training increased BLS competency in only 22% of medical professionals. The students in present study had passed some theoretical training in the fourth year of their education. However, their basic skill in BLS was considerably low. This result highlights the importance of receiving practical hands-on training.

We found a significant decay in students' competence within one month after the course. This result is consistent with most of the previous literature on retention times of skills in BLS (1, 18, and 19). This emphasizes the importance of frequent BLS refreshing course and allowing more time for hands-on skill practice for health care professionals to reduce the potential risk of death and disability secondary to delay in resuscitation. On the other hand, it has been shown that strategically placed CPR wall posters markedly improve retention of both resuscitation knowledge and practical skills (20).

Role expectation and responsibility demand that dentists provide competent and safe resuscitation. Unfortunately, there is not a required demand for CPR certification when graduating from dental school in Iran. Actually, BLS skills are mainly thought theoretically as part of the surgery course, which shows a strong demand for revision in dental curriculum. According to Jensen et al (21) the overall average grade of a student is a significant contributor to BLS-competence. This reflects that the generally good students do well in this area.
Effect of Basic Life Support

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Conflict of Interest: The authors declare that they have no conflict of interests.

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