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Best Practices of Basic Life Support Training in Undergraduate Medical Education: A Guide to Medical Teachers

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ABSTRACT

Basic life support (BLS) is an essential clinical skill that needs to be mastered by graduating medical officers as potential first responders in clinical settings. Inadequate resuscitation skills of healthcare professionals in BLS have been identified as contributing to poor prognosis in cardiac arrest victims. Thus, BLS training has been incorporated into undergraduate medical curricula using various instructional methods to equip their graduates with BLS skills. Despite such training, medical students and junior doctors were found to be under-competent in delivering BLS primarily due to different methods of instruction utilised in BLS training as opposed to simulation-based training, which is identified as the gold standard in BLS training. It is recommended that simulation-based BLS training be conducted, giving more weight to the skill component, in small groups of 3–10 students, complemented by yearly refresher courses and just-in-time training. This article aims to build awareness and inform medical teachers and programme directors on the current best practices of BLS training in undergraduate medical education.

Keywords: *Basic life support, Medical education, Simulation, Medical students, Resuscitation training*

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INTRODUCTION

Cardiac arrest is a lethal condition that amounts to 15% of global mortality (1). The prognosis of cardiac arrest victims can be improved by simple maneuvers and skills known as basic life support (BLS) (2). As the name implies, BLS refers to the immediate life-saving protocol designed to reduce the complications of a cardiac arrest until advanced treatment is made available (3) by maintaining perfusion of the brain, heart, and other vital organs (4). It includes recognising the signs of sudden cardiac arrest and foreign-body airway obstruction, cardiopulmonary resuscitation (CPR), and defibrillation with an automated external defibrillator (5). The importance of BLS training is well acknowledged. Evidence suggests that trained BLS providers can improve the prognosis of cardiac arrest victims (6–7). Therefore, many countries across the world have integrated BLS training into educational curricula and even workplaces, aiming to equip not only the healthcare professionals but also laypeople

in the society with sufficient awareness, knowledge, and skills to provide BLS when needed (8).

IMPORTANCE OF BLS TRAINING IN UNDERGRADUATE MEDICAL EDUCATION

Healthcare professionals' lack of resuscitation skills in basic and advanced life support has contributed to poor outcomes in cardiac arrest victims (9). As potential first responders in various clinical settings, junior doctors might find themselves responsible for handling such events; hence, being competent in BLS is vital for these young doctors (10). Studies have shown that professionally trained undergraduates can better manage medical emergencies during their practice (11).

Therefore, in preparation to build up the capacity to perform BLS, medical schools worldwide have incorporated training in BLS using various teaching/learning methods into their undergraduate medical curricula (3, 10).

METHODS OF INSTRUCTION

For various medical, ethical and practical reasons, training medical students in an actual situation of a medical emergency with real patients is hardly possible. However, appreciating the importance of BLS training, many medical schools worldwide conduct BLS courses during the years of training, employing various programmes and methods (12). Training using mannequins, feedback devices, multimedia and computer-based guidance, e-learning and virtual reality (2–3, 13–15), are therefore commonly used to circumvent the issue mentioned above, with simulation becoming essential in BLS training (16–17).

Gaba defines medical simulation as an instructional process that substitutes real patient interactions with artificial models, virtual reality patients, or live actors, which aims to replicate patient care scenarios in a realistic environment (18), simulation promotes effective learning through the provision of a safe learning environment, opportunity for repetitive (deliberate) practice, individualised learning, active participation of learners, learning through feedback and reflection and collaborative learning (19–20). Studies show that practice on high-fidelity mannequins under instructor supervision is the most effective training modality (21–23). Furthermore, the number of hours dedicated to teaching theory and practice and the academic years in which BLS courses are taught also differ between institutions (3). However, in resource-poor settings, face-to-face instructor-led training programmes using mannequins remain limited (24).

Despite the glaringly obvious need to train medical students in BLS, it appears that even at present, some medical schools do not have mandatory training for undergraduates (25–28).

STUDENT COMPETENCE

Most medical students and just passed out graduates have been found to lack the knowledge, self-assessed confidence, and skills to perform BLS effectively (6–7, 10, 17, 25–28). Furthermore, a significant loss of knowledge, confidence and skills was observed one year after training in BLS (12–13, 29), with skill-based components deteriorating more rapidly than the knowledge component (30). These findings could be attributed to different methods of instructions utilised in training, such as theory-based classes (25), demonstrations without hands-on-skills sessions (31–32), non-adherence to international guidelines in resuscitation training, insufficient resources with limited availability of high-fidelity systems for training and knowledge deterioration as time passes due to lack of refresher courses.

RECOMMENDED PRACTICE

Most studies confirm that simulation-based training of BLS is superior to other methods of training when the competence of performing BLS is considered (33–34). The existing BLS training programmes should be improved, giving more weight and emphasis to the practical skills of performing BLS than to the theory component (32, 35). The learners should be trained to perform "good quality BLS/CPR". This can be achieved through mandatory BLS courses with better instructional methods and simplifying procedures (35), aided by good learning objectives to encourage students to perform basic life support (17).

Adult learners are known to learn faster and show greater retention of knowledge when they participate in interactive settings (36), complemented by deliberate practice to achieve mastery (37). Simulation-based learning complies with established principles of adult learning (36, 38), in addition to principles of effective learning (39) and experiential learning (40), making it an ideal educational tool for resuscitation training, where the stakes are high, and patient outcomes are of paramount importance. Thus, several national and international organisations recognise it as the gold standard of resuscitation training to achieve mastery (8, 16, 41–42).

When considering the timing of BLS training, evidence suggests that it be offered early in the undergraduate medical curricula, ideally starting from the first year (2, 13–14). Integrating the course within the curriculum with end-of-the-year examinations have also proven effective as it ensures more sound learning driven by assessment for learning (3).

Conducting a simulation-based teaching/learning exercise is time and resource-intensive. Furthermore, in a given institution, the time a tutor can dedicate to the students, the number of resuscitation simulators available, and the number of students in a given group contributes to effectively conducting the training exercise. Accommodating many students to a training session with one simulator and a single tutor might make the teaching session more didactic, with less interaction, more passive bystanders, and discouraging students from speaking up or actively participating in the learning activity. It is widely believed that students in small groups perform better than their counterparts in large groups (43–44). The European resuscitation council and the American heart association support BLS training in small groups (16, 45). The group sizes pose significant implications on the quality of the BLS training programme and the resources needed to conduct one (46). Ideally, the group sizes should allow each instructor to oversee all the participants and give individual feedback, which would promote effective learning within the groups. Thus, several studies have investigated the ideal group size to be in a simulation-based BLS training session. Most studies support a group size between three to eight as conducive for effective learning of good quality BLS (47–49). Nabecker and colleagues (46) recommend that BLS training be given to groups with a number of participants between three to ten, which prevents the instructor from missing a significant proportion of mistakes made by the participants.

Resuscitation skills have been found to deteriorate merely 10 weeks following training (50–51), highlighting the importance of BLS refresher courses. The students should refresh their knowledge and skills on BLS on many occasions throughout the course of their undergraduate degree. They should be allowed to practice skills on mannequins at least once a year for a minimum period of 2 hours (16). "Refreshing" can be achieved via short re-training courses by the faculty, near-peers, or laypeople in the community (16, 25, 34, 52). The faculty are advised to create more scenario-based activities to make the learning more realistic and relevant to the learner (35–36, 41), rather than to have the students practice stiff algorithms on mannequins. Furthermore, providing just-

in-time training is also recommended to refresh and equip students with knowledge and skills of BLS (53), which complies with adult learning theory concepts of relevance (34–35). This can be given immediately before the clinical attachments (i.e., internal medicine), where students may witness BLS in real life, which ensures that the students are up to date and proficient in the skills when they are exposed to the clinical environment where they may obtain hands-on experience.

CONCLUSION

Evidence suggests simulation-based training as the gold standard for training medical students in BLS. Basic life support courses should be made mandatory and integrated into undergraduate curricula with provision to practice physical skills and improvement of knowledge. It is recommended that a simulation-based BLS training session should have a maximum of 10 students per instructor. BLS training should be introduced to the students from the very first year of their medical curriculum, and yearly refresher courses should be offered to minimise knowledge and skill deterioration. The refresher courses can be used to provide "just-in-time training," which would facilitate the application of learning in the clinical setting. The training sessions are best delivered as scenarios, making the learning relevant and interactive for the learner. Hopefully, this article will serve to guide medical teachers to implement current best practices in relation to BLS training in undergraduate medical curricula.

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