

# Cardiopulmonary Resuscitation Training and Reinforcement: A Bulwark against Death

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Successful resuscitation from cardiac arrest requires early recognition, rapid activation of trained response teams, effective basic life support (BLS), and early defibrillation followed by advanced life support. High-quality cardiopulmonary resuscitation (CPR) aimed at achieving adequate coronary and cerebral perfusion which is the key to improving outcomes. Survival rates from in-hospital cardiac arrest are estimated at less than 20% despite advancements in skills and technology.<sup>1</sup> This could be attributed to inadequate or ineffective BLS due to lack of uniformity in mandatory training programs as well as poor retention skills with advanced cardiac life support (ACLS) skills declining more rapidly than BLS skills on periodic assessment.<sup>2</sup> This emphasizes the need for guideline-based training programs focusing on both knowledge about CPR and psychomotor skills with periodic refresher courses to assess and maintain competency.

In this issue of the journal, Agarwal et al.<sup>3</sup> report the results from a study to assess the baseline knowledge among resident doctors and nurses about different domains of basic and advanced cardiopulmonary resuscitation based on a questionnaire covering scene safety, chest compression, airway, breathing and ventilation, defibrillation, team dynamics, management of arrhythmias and post-cardiac arrest care. This was followed by simulation-based training sessions which incorporated didactic lectures and skill stations covering case scenarios on manikins encompassing extensive training on the aforementioned domains of CPR by experts. The impact of this training was assessed immediately thereafter using a questionnaire to assess the theoretical knowledge and adequacy of practical skills was also tested following the training. The retention of knowledge was assessed by a repeat questionnaire after 6 months.

The study found that the participants had a reasonable baseline knowledge about recognition of cardiac arrest, activation of emergency response systems (EMS), cardiopulmonary resuscitation whereas they lacked in important domains, such as defibrillation, advanced life support, and post-cardiac arrest care. Post-training, a significant improvement was noted in all the domains with the maximum impact in post-cardiac arrest care; however, proficiency in defibrillation and ACLS was still lacking.

A repeat questionnaire-based assessment at 6 months revealed that the improvement in knowledge as compared with the baseline was sustained but there was a decline as compared with the scores immediate post-training, the major lacunae remaining identical in terms of defibrillation and advanced life support which reaffirms the need for periodic refresher programs to maintain skills and knowledge.

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These results bear resemblance to prior studies conducted in India by Bhatnagar et al. in postgraduate students who also reported that the baseline knowledge on resuscitation did undergo significant improvement following training but the residual knowledge tends to wane over time and periodic sessions are invaluable to maintain the quality and proficiency.<sup>4</sup> The unfortunate paucity of knowledge regarding resuscitation appears to be widespread as is evident from another study in Kerala by Chandran and Abraham which was conducted among new interns who had just graduated from medical college which again highlights the lack of baseline knowledge and skills among young doctors which remarkably improve following training.<sup>5</sup> This should prompt policymakers to incorporate mandatory BLS training into the medical curriculum in the near future.

Dearth of knowledge regarding resuscitation is not unique to India as there have been studies reported from other parts of the world which show a huge discrepancy regarding the awareness about resuscitation and its various aspects among various categories of health care providers across health care settings.<sup>6</sup> A survey conducted among more than 1,000 medical students from 99 universities across 14 European countries by Baldi et al. just before their graduation also found that knowledge about cardiac arrest and CPR was scarce highlighting that this was probably a worldwide issue affecting patient care which needs to be addressed as a priority.<sup>7</sup> Considering these aspects, there is a guidance note promoted by the European Resuscitation Council which proposes a step-wise approach whereby CPR training needs to be initiated from the first year of undergraduate training followed by annual refresher sessions leading up to advanced life support in senior undergraduate students.<sup>8</sup> The instructors need to conduct the sessions adhering to international guidelines thereby imparting the knowledge as well as life-saving competencies to the students and trainees.

## DO THESE TRAINING PROGRAMS IMPACT OUTCOMES?

Although life support courses are widely advocated, there are very few studies which have assessed their effectiveness in improving CPR outcomes after formal resuscitation training. There have been reports of significant improvement in both return of spontaneous circulation (ROSC) as well as survival to discharge rates following training programs and the presence of even one team member who was ACLS trained showed a positive effect on outcomes.<sup>9–12</sup> In a retrospective analysis, Sodhi et al. studied the impact of an AHA certified BLS/ACLS training program in 627 in-hospital cardiac arrest cases over a period of 18 months (284 before and 343 after training). They found a significant increase in ROSC (28.3% vs 18.3%) as well as a higher percentage of survivors to hospital discharge (69.1% vs 28.3%) following the training program for doctors in the code blue team and ICU which re-emphasizes the value of formal CPR training in improving CPR outcomes.<sup>13</sup> A systematic review aimed at highlighting the effect of CPR training on knowledge and skill retention as well as the impact of different methods of training among nurses. They found that there is a significant improvement in knowledge acquisition and retention. However, skills start to decay as early as 2 weeks post-training while knowledge decline varies between 1 and 6 months which puts forward an unmet need to define the ideal timeline after the initial training for renewal or re-certification.<sup>14</sup>

## WHAT IS THE WAY FORWARD IN IMPROVING RESUSCITATION OUTCOMES?

Deficient resuscitation skills are an important contributor to poor outcomes post-cardiac arrest. In 2003, the International Liaison Committee on Resuscitation Advisory (ILCOR) included a hypothetical formula—“the formula for survival” or the “Utstein Formula.” The Utstein Formula for Survival from cardiac arrest defines three factors to determine the potential survival rates: guideline quality, educational/training efficiency, and local implementation.<sup>15</sup> The latter two factors play a key role in delineating the strengths and weaknesses of a training program.

The “Chain of Survival” in case of in-hospital cardiac arrest comprises of key components, such as early access, early CPR, rapid defibrillation and advanced life support. The audit of the processes in the chain of survival helps find gaps in the training/chain and helps correlate these gaps with survival outcomes. Nurses and resident doctors usually are the first responders and there is an emergent need to ensure high-quality structured CPR training of all health care workers in our country to improve the survival of victims after a sudden cardiac arrest.<sup>16</sup>

In order to improve upon the current situation—there are certain key areas which need to be focused on:

- Record keeping, audit, and monthly analysis of all cardiac arrests to be done—identify lacunae.
- Structured resuscitation training to be made mandatory for all health care personnel with periodic refresher courses to ensure maintenance of knowledge and skills.
- Incorporating updated CPR training techniques, such as using real-time visual feedback in CPR manikins might help in improving the quality of chest compressions (rate and depth) which can help to adjust and perfect the technique during training sessions.

- Simulation-based CPR training can help to gain and hone skills thereby improving the quality of training<sup>17</sup> and provide exposure to scenarios; however, high-fidelity simulation manikins are expensive and may not be universally available.
- Focused training on key skills such as high-quality chest compression and defibrillation as well as periodic reassessment—is of paramount importance in enhancing and maintaining CPR quality and skills.

Cardiopulmonary resuscitation is an indispensable skill which transcends the boundaries of medical training thereby making the knowledge and skills pivotal in saving lives. Comprehensive training and repeated practice empowers healthcare providers to recognize and perform all the essential steps flawlessly, even when life-threatening situations create an extremely stressful environment. It is time to incorporate CPR training early in our medical curriculum.

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