

## Basic Life Support (BLS) Training Among Senior Secondary Students: A Narrative Review

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### KEYWORDS

*Basic Life Support, CPR, secondary school students, emergency training, skill retention*

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### Abstract

**Introduction:** Basic Life Support (BLS) is a crucial emergency intervention that significantly improves survival in cases of cardiac arrest and other life-threatening conditions. Training laypersons, especially senior secondary students, is an effective strategy to enhance early response, as they possess the cognitive and physical ability to perform cardiopulmonary resuscitation (CPR) and can act as potential first responders in community settings.

**Material & Methods:** A narrative review was conducted using electronic databases including PubMed, Google Scholar, Scopus, and ResearchGate. Relevant studies published in English over the past 10–15 years were included. The review focused on senior secondary students (14–18 years) and evaluated knowledge, skills, attitudes, and retention related to BLS training. Data were synthesized qualitatively due to heterogeneity in study designs and outcome measures.

**Result:** Baseline knowledge of BLS among students was low, generally ranging between 10–30%. Following training, knowledge and skill levels improved significantly to approximately 80–90% ( $p < 0.001$ ). Confidence and willingness to perform CPR also increased markedly. However, skill retention declined over time, with a reduction of about 20–30% observed within 3 to 6 months. Simulation-based and instructor-led training methods demonstrated the highest effectiveness and retention compared to other approaches.

**Conclusion:** BLS training among senior secondary students is highly effective in improving knowledge, skills, and attitudes toward emergency care. However, regular refresher training is essential to maintain long-term competency. Integrating BLS training into school curricula can play a vital role in improving community response to emergencies and increasing survival rates.

## INTRODUCTION

Basic Life Support (BLS) refers to the immediate care provided to individuals experiencing life-threatening conditions such as cardiac arrest, respiratory failure, or choking. It primarily includes early recognition of emergencies, activation of emergency medical services, and timely initiation of cardiopulmonary resuscitation (CPR), along with the use of automated

external defibrillators (AEDs). These interventions are crucial in maintaining circulation and oxygenation until advanced medical care becomes available. Globally, sudden cardiac arrest remains a leading cause of death, and survival largely depends on the promptness and effectiveness of bystander intervention. In this context,

equipping laypersons with BLS skills has emerged as a vital public health strategy.<sup>1</sup>

Schools provide an ideal platform for imparting such lifesaving skills, particularly among senior secondary students aged 14 to 18 years<sup>2</sup>. At this stage, students possess the cognitive ability to understand complex concepts, the physical capability to perform chest compressions effectively, and the emotional maturity to respond in emergency situations. Moreover, adolescents are often present in diverse community settings—homes, schools, and public spaces—where emergencies may occur, positioning them as potential first responders. Training this age group not only enhances immediate response capacity but also contributes to building a generation that is more aware, responsible, and prepared to handle health emergencies.<sup>3</sup>

Despite the recognized importance of BLS, studies have consistently reported low levels of awareness and knowledge among school students prior to formal training. Many students are unfamiliar with basic emergency response steps, including recognizing cardiac arrest, calling for help, or performing CPR correctly. This lack of preparedness can lead to missed opportunities for early intervention, thereby reducing survival chances. However, encouragingly, research also indicates a high level of interest and willingness among students to learn BLS skills, suggesting that the primary barrier is not motivation but access to structured training programs.<sup>4</sup>

The inclusion of BLS training in school curricula has gained increasing attention worldwide. Several countries and health organizations advocate for mandatory CPR education in schools as part of a broader strategy to improve out-of-hospital cardiac arrest outcomes.<sup>5</sup> Evidence shows that even short-duration training sessions can

significantly improve students' knowledge, psychomotor skills, and confidence in performing BLS. Furthermore, early exposure to such training fosters long-term retention and increases the likelihood of skill application in real-life situations.<sup>6</sup>

However, the implementation of BLS training in schools is not without challenges. Constraints such as limited resources, lack of trained instructors, insufficient training equipment, and competing academic priorities often hinder widespread adoption.<sup>7,8</sup> Additionally, while initial training improves competency, skills tend to decline over time without regular practice and reinforcement. Therefore, it is essential to design sustainable training models that include periodic refresher sessions and interactive learning methods.<sup>9</sup>

In light of these considerations, this review aims to explore the significance, effectiveness, and challenges of BLS training among senior secondary students. By analyzing existing literature, it seeks to highlight the need for integrating BLS education into school systems and to provide recommendations for improving training outcomes and long-term retention.<sup>10</sup>

## METHODOLOGY

This review article employs a narrative literature review approach to examine the effectiveness, knowledge, attitudes, and skill retention associated with Basic Life Support (BLS) training among senior secondary students. A structured and comprehensive search of electronic databases was conducted to identify relevant studies. Major academic sources such as PubMed, Google Scholar, ResearchGate, and Scopus were utilized. Various keywords including “Basic Life

Support,” “BLS training,” “CPR in schools,” “secondary school students,” “adolescents,” and “skill retention” were used in different combinations. Boolean operators such as AND and OR helped refine the search results to ensure relevance and comprehensiveness.

### Inclusion and Exclusion Criteria

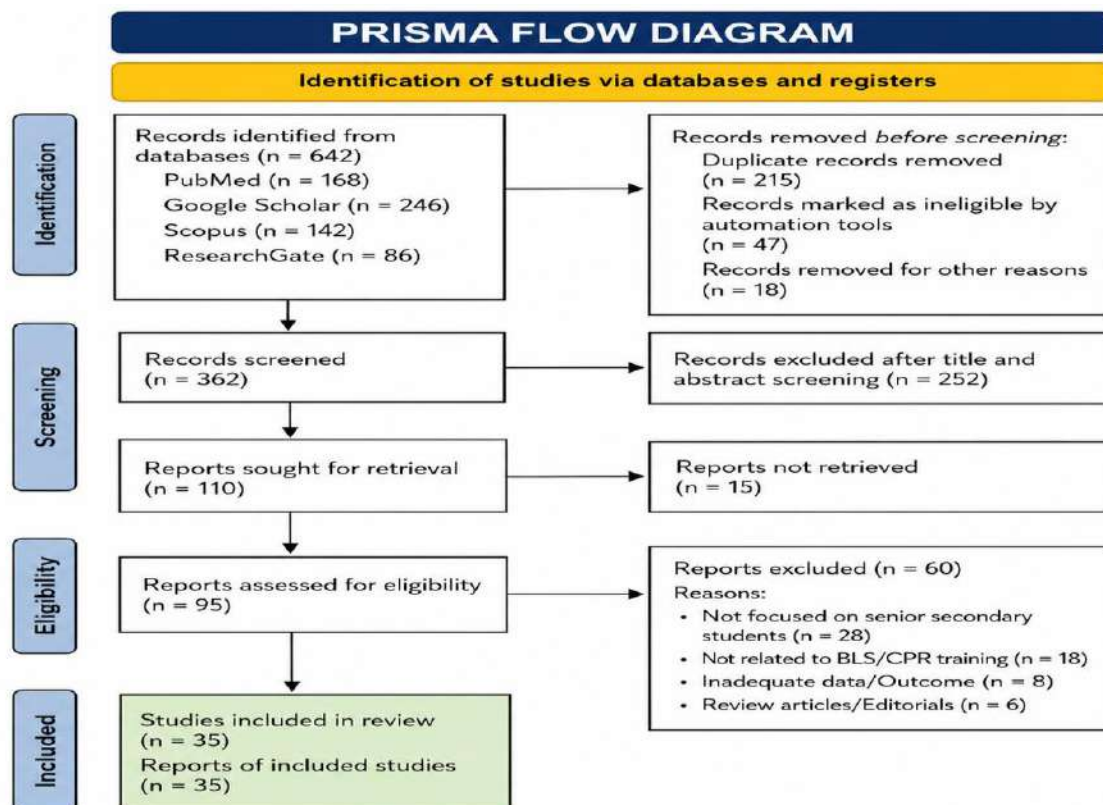
#### Inclusion Criteria

- Studies focusing on senior secondary or high school students (ages 14–18)
- Articles assessing knowledge, attitude, or practice (KAP) related to BLS
- Studies evaluating effectiveness of BLS/CPR training programs

- Peer-reviewed articles published in English
- Studies published within the last 10–15 years to ensure relevance

#### Exclusion Criteria

- Studies involving healthcare professionals or medical students
- Articles focusing only on advanced life support (ALS)
- Case reports, editorials, and opinion pieces without empirical data
- Studies with insufficient or unclear methodology



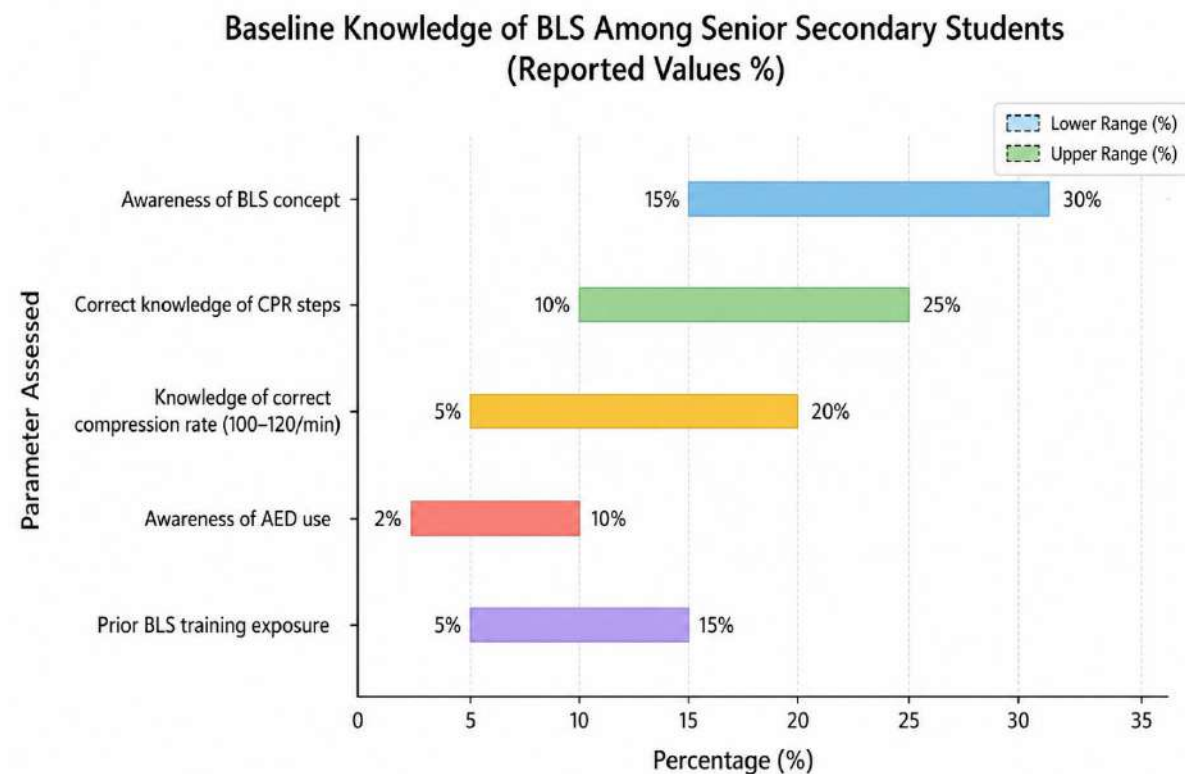
## RESULT

The review included a total of 35 studies that met the predefined inclusion criteria, as illustrated in the PRISMA flow diagram. The findings from these studies were

synthesized to evaluate the knowledge, effectiveness, skill retention, and attitudes related to Basic Life Support (BLS) training among senior secondary students.

**Table 1: Baseline Knowledge of BLS Among Students**

| Parameter Assessed                                  | Reported Values (%) |
|-----------------------------------------------------|---------------------|
| Awareness of BLS concept                            | 15–30%              |
| Correct knowledge of CPR steps                      | 10–25%              |
| Knowledge of correct compression rate (100–120/min) | 5–20%               |
| Awareness of AED use                                | 2–10%               |
| Prior BLS training exposure                         | 5–15%               |



Baseline knowledge of Basic Life Support (BLS) among senior secondary students is notably low. Awareness of BLS concepts ranges from 15–30%, while correct knowledge of CPR steps is only 10–25%. Understanding of the correct chest compression rate is even lower (5–20%).

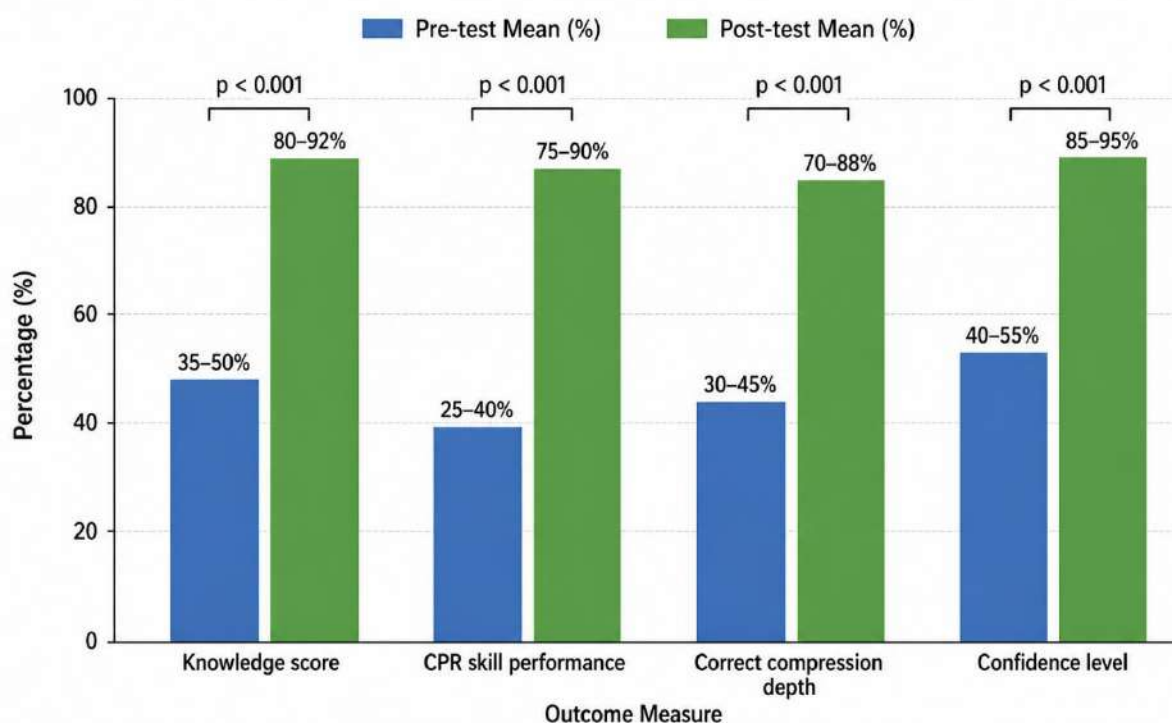
Awareness of Automated External Defibrillator (AED) use is minimal at 2–10%, and only 5–15% of students have prior BLS training. These findings indicate a significant gap in essential lifesaving knowledge and skills before training.

**Table 2: Effectiveness of BLS Training**

| Outcome Measure           | Pre-test Mean (%) | Post-test Mean (%) | p-value |
|---------------------------|-------------------|--------------------|---------|
| Knowledge score           | 35–50%            | 80–92%             | <0.001  |
| CPR skill performance     | 25–40%            | 75–90%             | <0.001  |
| Correct compression depth | 30–45%            | 70–88%             | <0.001  |
| Confidence level          | 40–55%            | 85–95%             | <0.001  |

The table shows a significant improvement in all outcome measures following BLS training among senior secondary students. The mean knowledge score increased from 35–50% before training to 80–92% after training. CPR skill performance improved markedly from 25–40% to 75–90%, while

correct compression depth increased from 30–45% to 70–88%. Confidence levels also rose substantially from 40–55% to 85–95%. All results were statistically significant ( $p < 0.001$ ), indicating that the improvements were not due to chance.

**Effectiveness of BLS Training Among Senior Secondary Students****Table 3: Skill Retention Over Time**

| Time After Training | Knowledge (%) | Skills (%) | Trend            |
|---------------------|---------------|------------|------------------|
| Immediately after   | 85–95%        | 80–90%     | Peak performance |
| 3 months            | 75–85%        | 65–80%     | Mild decline     |
| 6 months            | 65–75%        | 50–70%     | Moderate decline |

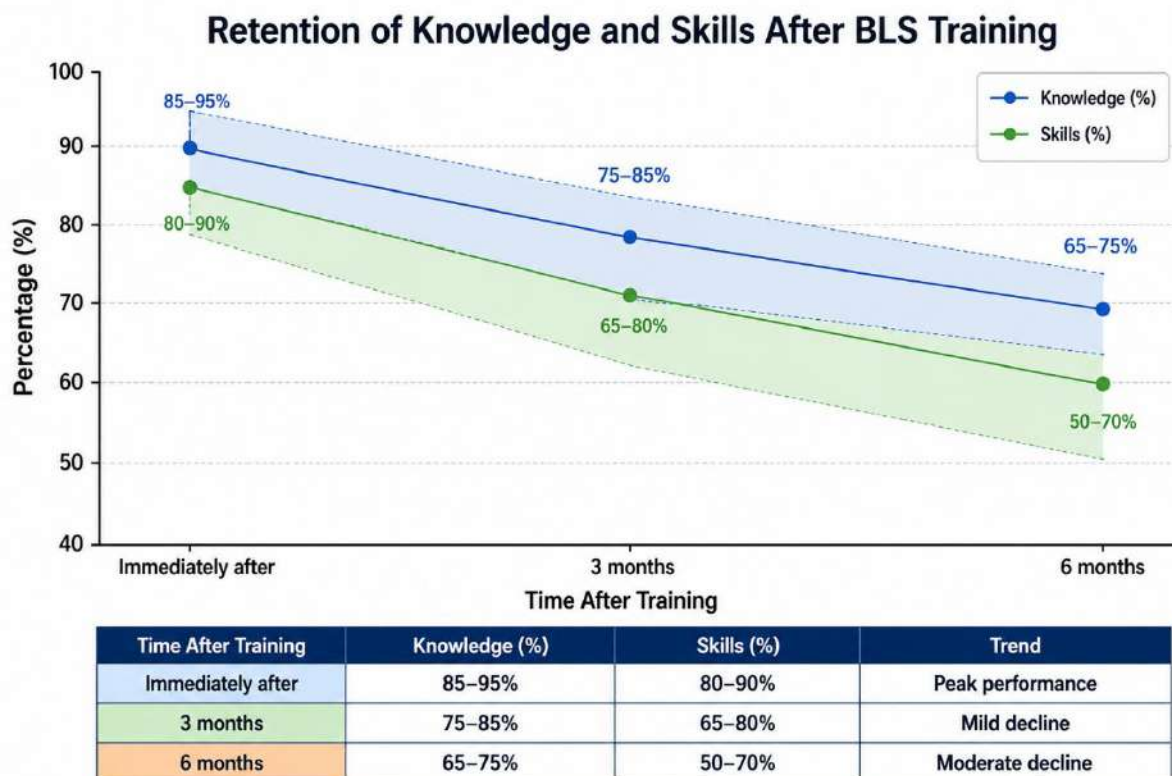
The table illustrates the retention of BLS knowledge and skills over time following

training. Immediately after training, both knowledge (85–95%) and skills (80–90%)



are at peak levels, indicating excellent learning outcomes. After 3 months, there is a mild decline, with knowledge dropping to 75–85% and skills to 65–80%. By 6 months, a moderate decline is observed,

with knowledge ranging from 65–75% and skills from 50–70%. The reduction is more pronounced in practical skills than theoretical knowledge.



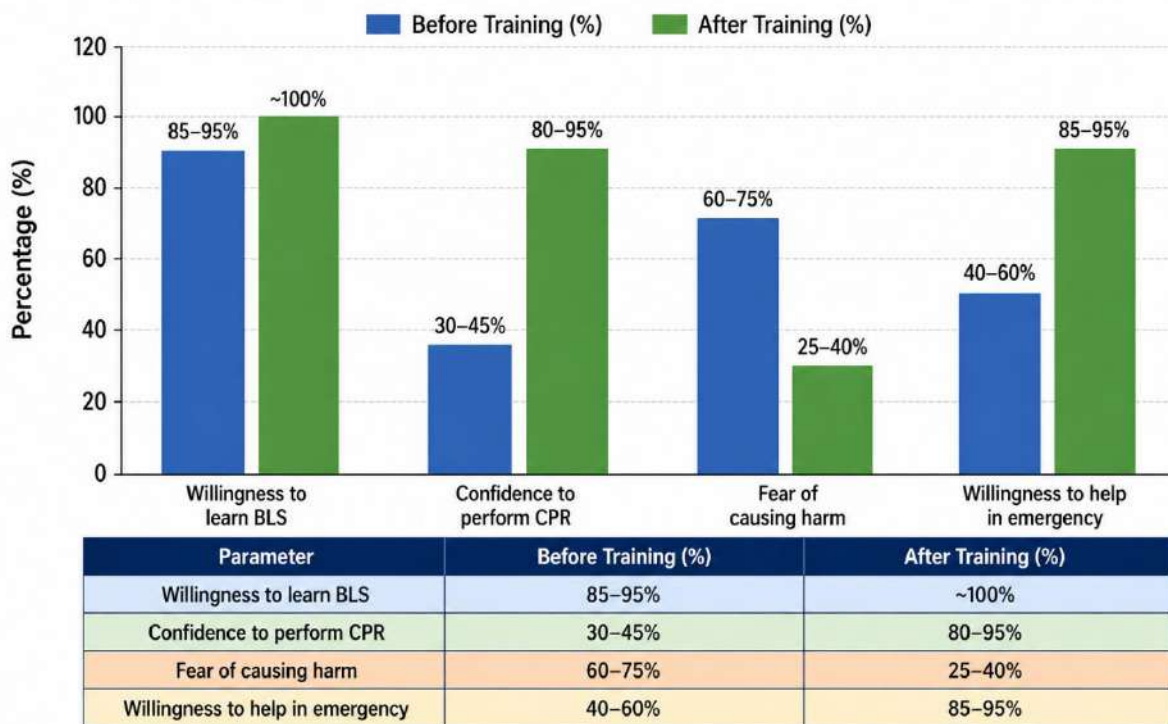
**Table 4: Attitudes and Perception**

| Parameter                        | Before Training (%) | After Training (%) |
|----------------------------------|---------------------|--------------------|
| Willingness to learn BLS         | 85–95%              | ~100%              |
| Confidence to perform CPR        | 30–45%              | 80–95%             |
| Fear of causing harm             | 60–75%              | 25–40%             |
| Willingness to help in emergency | 40–60%              | 85–95%             |

The table demonstrates a significant positive change in students' attitudes after BLS training. Willingness to learn BLS was already high (85–95%) and increased to nearly 100% after training. Confidence to perform CPR showed a marked rise from

30–45% to 80–95%, indicating improved self-efficacy. Fear of causing harm, a major barrier, decreased substantially from 60–75% to 25–40%. Additionally, willingness to help in emergency situations increased from 40–60% to 85–95%.

### Impact of BLS Training on Attitudes and Perceptions



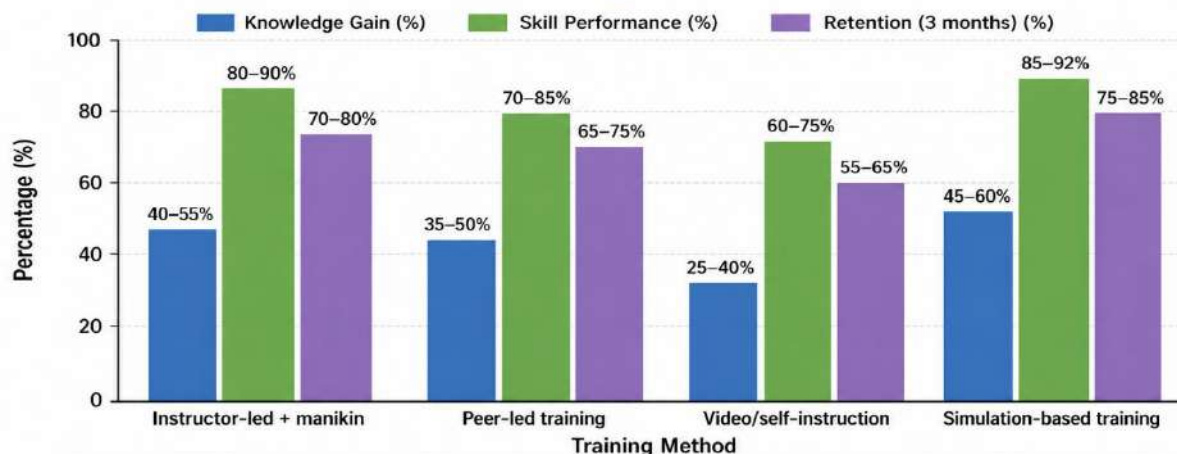
**Table 5: Effectiveness by Training Method**

| Training Method           | Knowledge Gain (%) | Skill Performance (%) | Retention (3 months) |
|---------------------------|--------------------|-----------------------|----------------------|
| Instructor-led + manikin  | 40–55% increase    | 80–90%                | 70–80%               |
| Peer-led training         | 35–50% increase    | 70–85%                | 65–75%               |
| Video/self-instruction    | 25–40% increase    | 60–75%                | 55–65%               |
| Simulation-based training | 45–60% increase    | 85–92%                | 75–85%               |

The table compares the effectiveness of different BLS training methods among students. Simulation-based training shows the highest outcomes, with knowledge gain of 45–60%, skill performance of 85–92%, and retention of 75–85% after 3 months. Instructor-led training with manikins also demonstrates strong results, with slightly

lower but comparable effectiveness. Peer-led training provides moderate improvement and is useful in resource-limited settings. In contrast, video or self-instruction methods show lower knowledge gain (25–40%) and skill performance (60–75%), with reduced retention.

### Effect of Different Training Methods on BLS Outcomes



| Training Method           | Knowledge Gain (%) | Skill Performance (%) | Retention (3 months) (%) |
|---------------------------|--------------------|-----------------------|--------------------------|
| Instructor-led + manikin  | 40–55% increase    | 80–90%                | 70–80%                   |
| Peer-led training         | 35–50% increase    | 70–85%                | 65–75%                   |
| Video/self-instruction    | 25–40% increase    | 60–75%                | 55–65%                   |
| Simulation-based training | 45–60% increase    | 85–92%                | 75–85%                   |

## DISCUSSION

This review highlights that Basic Life Support (BLS) training among senior secondary students is both highly effective and essential, particularly in improving early emergency response in the community. The findings consistently demonstrate that baseline knowledge of BLS among students is inadequate, with most studies reporting awareness levels below 30%.<sup>11</sup> This lack of preparedness is concerning, given that immediate bystander intervention plays a crucial role in improving survival outcomes in cardiac arrest cases. However, the strong willingness of students to learn BLS indicates that the primary barrier lies in the absence of structured training rather than lack of interest.<sup>12</sup>

One of the most significant findings of this review is the substantial improvement in knowledge and skills following BLS training. Post-training scores increased to approximately 80–90%, with statistically significant differences ( $p < 0.001$ ) reported across studies. This confirms that even

short-duration training programs can effectively equip students with lifesaving skills. The improvement in psychomotor skills, such as chest compression technique and sequence of CPR steps, further emphasizes the value of hands-on training. These results are consistent with global evidence supporting school-based CPR education as a cost-effective public health intervention.<sup>11</sup>

Despite the immediate success of training programs, skill retention over time remains a major challenge. The review shows a decline of approximately 20–30% in skill performance within six months of training. This decline is more pronounced in practical skills than in theoretical knowledge, suggesting that psychomotor abilities require regular reinforcement. These findings underline the importance of incorporating periodic refresher sessions into school curricula. Without reinforcement, the long-term effectiveness of BLS training may be compromised, limiting its real-world impact.<sup>13</sup>



The analysis of different teaching methods provides important insights into optimizing training strategies. Simulation-based and instructor-led methods were found to be the most effective, with higher skill acquisition and retention rates. These approaches offer hands-on experience and real-time feedback, which are critical for mastering CPR techniques. Peer-led training also showed promising results, particularly in enhancing student engagement and accessibility, making it a viable option in resource-limited settings. In contrast, video-based or self-instructional methods, while useful for theoretical understanding, were less effective in developing practical skills. Therefore, a blended approach combining theoretical instruction with hands-on practice appears to be the most effective model.<sup>14</sup>

Another important aspect highlighted in this review is the positive shift in students' attitudes following training. Confidence levels increased significantly, while fear of causing harm decreased. This psychological readiness is crucial, as hesitation and lack of confidence are common barriers to bystander CPR. By addressing these barriers, BLS training not only improves competence but also enhances the likelihood of real-life application.

However, several challenges hinder the widespread implementation of BLS training in schools. These include lack of trained instructors, limited access to manikins and AED trainers, time constraints within academic schedules, and financial limitations. In developing regions, these barriers are even more pronounced. To overcome these challenges, innovative approaches such as peer education, low-cost simulation tools, and integration of BLS into existing health education programs can be considered.<sup>15</sup>

## CONCLUSION

This review demonstrates that Basic Life Support (BLS) training among senior secondary students is a highly effective and practical intervention for improving emergency preparedness in the community. The findings reveal that although baseline knowledge and skills among students are generally low, structured BLS training programs lead to significant improvements in knowledge, psychomotor skills, and confidence, with most post-training scores reaching above 80%. These improvements are consistently supported by statistically significant outcomes across multiple studies.

However, the review also highlights an important limitation—decline in skill retention over time, particularly after 3 to 6 months. This emphasizes that one-time training is insufficient for long-term competency, and regular refresher sessions are essential to maintain proficiency. The effectiveness of training is further influenced by the teaching method, with simulation-based and instructor-led approaches showing the highest outcomes, while blended learning models offer a balanced and scalable solution.

In addition to skill enhancement, BLS training positively influences students' attitudes by increasing their confidence and willingness to act in emergency situations, while reducing fear and hesitation. These behavioral changes are crucial for improving real-life response to cardiac arrest and other emergencies.

Despite its proven benefits, the implementation of BLS training in schools faces challenges such as limited resources, lack of trained instructors, and curriculum constraints. Addressing these barriers

through policy-level integration, cost-effective training models, and innovative teaching strategies is essential.

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