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Effects of a Hybrid Basic Life Support Program in Improving Nurses' Cardiopulmonary Resuscitation (CPR) Knowledge, Attitude, and Self-Efficacy

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Abstract

Cardiac arrest management heavily relies on Cardiopulmonary Resuscitation to improve survival outcomes and enhance patients' quality of life. This study evaluated the effectiveness of a Basic Life Support Program between a hybrid program and a face-to-face program. Conducted at Universiti Malaya Medical Centre, the quasi-experimental time series study involved 70 nurses. A 58-item questionnaire was used to measure knowledge, attitudes, and self-efficacy. Results indicated moderate knowledge (M = 11.86, SD = 2.63), positive attitudes (M = 76.09, SD = 9.16), and high self-efficacy (M = 84.54, SD = 15.51). The Hybrid program effectively combines flexibility with traditional training and emphasizing the importance of refresher sessions to sustain CPR competency among nursing professionals.

Keywords: Cardiopulmonary Resuscitation; Basic Life Support Program; Quality of Life

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1.0 Introduction

Cardiac arrest is a life-threatening emergency that requires immediate intervention. Cardiopulmonary Resuscitation (CPR) is a critical component of the chain of survival, encompassing early recognition, prompt resuscitation and post-cardiac arrest care (Khaledi et al., 2024). The American Heart Association (AHA) and the European Resuscitation Council (ERC) emphasize evidence-based recommendations and hands-on Basic Life Support (BLS) training to enhance CPR knowledge, attitude and self-efficacy among healthcare providers (Chaudhary et al., 2023). However, the implementation of large-scale BLS training remains challenging due to costs, limited instructor availability and time constraints (Koyuncu et al., 2024).

Therefore, integrating computer-assisted learning, advanced manikins, and multimedia resources into simulation-based training can effectively enhance long-term retention of CPR knowledge and skills (Abbasi et al., 2025). Furthermore, the AHA recommends cost-effective educational strategies to improve access to training (Koyuncu et al., 2024)

Therefore, this study aimed to evaluate the effectiveness of a Hybrid Basic Life Support Program compared with a conventional face-to-face program in improving nurses' CPR knowledge, attitudes, and self-efficacy at Universiti Malaya Medical Centre.

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2.0 Literature Review

CPR is a vital life-saving intervention during cardiac arrest, often initiated by nurses before advanced medical personnel arrive (Chaudhary et al., 2023). Studies in Malaysia reported high knowledge levels among healthcare professionals ranging from 84.0% to 91.7% (Ming et al., 2025; Chik et al., 2023), although 76.0% demonstrated moderate knowledge in another study (Ahmad et al., 2023). Furthermore, CPR knowledge was significantly associated with prior BLS training in Ethiopia (p-value < 0.05) (Mersha et al., 2020) and Nepal (p = 0.026) (Chaudhary et al., 2023). Overall, evidence suggests that regular BLS training and continuous competency development are essential for maintaining optimal CPR knowledge among nurses.

Attitude is a key determinant of nurses' willingness and effectiveness in performing CPR during cardiac emergencies, with negative attitudes potentially hindering resuscitation efforts (Tomas & Kachekele, 2023). Studies reported positive attitudes in Jordan (M = 7.8, SD = 6.3) (Oteir et al., 2025) and Malaysia (M = 38.07, SD = 6.15) (Ming et al., 2025). In contrast, Shah et al. (2022) found that 60% of nurses and doctors were unwilling to perform CPR voluntarily, while 30.0% performed BLS only when required, reflecting a negative attitude.

In addition, self-efficacy enhances nurses' knowledge, attitudes, and ability to deliver high-quality BLS care. A strong sense of self-efficacy positively influences nurses' decisions and the effort invested in patient care during cardiac arrest (Alaryani et al., 2021). Studies reported generally high self-efficacy levels among nurses in Saudi Arabia (89.4% and 63.8%) (Mohebi et al., 2023; Alaryani et al., 2021), Indonesia (86.7%) (Sasmito et al., 2024), and Kenya (77.5%) (Angute et al., 2023). Self-efficacy was significantly associated with age and years of experience in Saudi Arabia (p = 0.001) (Mohebi et al., 2023), age in Indonesia (r = 0.447), and the number of cardiac arrest cases managed (r = 0.419) (Sasmito et al., 2024). Overall, nurses generally demonstrate high self-efficacy in performing CPR, with training, clinical experience, and continuous professional development playing key roles in strengthening confidence and resuscitation performance.

Regular BLS training plays a role in maintaining CPR knowledge among nurses. According to Saidu et al. (2023), in Nigeria, both instructor-led training and video self-instruction, supported by a BLS Heart Code CD and manual provided seven days before training, significantly improved nurses' knowledge and skills immediately after training and at 3 months (p < 0.05). However, there were no significant differences between the two teaching approaches (p > 0.05), indicating similar short-term effectiveness, and information retention dramatically decreased at 6 months (p = 0.003).

Another study conducted in Taiwan by Hsieh et al. (2021) contrasted online instruction and situational simulation training for nurses' first-aid knowledge and abilities. Participants in the simulation group underwent 90 minutes of training led by an instructor, which included discussions and video analysis, whereas the online group engaged in self-directed learning. Post-intervention findings indicated that there were no significant differences in First-Aid Knowledge Test (FAKT) scores (p = 0.76) or First-Aid Skills Test (FAST) scores (p = 0.45) between the groups, implying that online instruction is a cost-effective and time-efficient substitute for simulation-based training.

Siddiqi et al. (2023) conducted a study in Pakistan that revealed the Peyton's Four-step BLS training program (Group A) led to more significant enhancements in knowledge compared to non-standardized conventional training (Group B). Group A's mean knowledge score increased from 56.40 ± 17.66 pre-training to 70.50 ± 11.22 post-training, whereas Group B improved from 55.50 ± 14.20 to 59.60 ± 11.88, demonstrating the superior effectiveness of the standardized 4-step approach.

In conclusion, simulation-based training provides realistic clinical experiences with the use of high-fidelity manikins and organized feedback, which enhances nurses' psychomotor abilities, decision-making skills, self-assurance, and proficiency in procedures like airway management and defibrillation. In contrast, online education provides more flexibility and is more cost-effective, but it lacks practical experience and immediate feedback. Despite these distinctions, both methods contribute to improved cognitive outcomes, indicating that a blended learning approach—integrating online theoretical courses with occasional simulation sessions, may be the most effective method for maintaining BLS competency.

3.0 Methodology

A quasi-experimental time-series study was conducted among 70 nurses at Universiti Malaya Medical Centre (UMMC) between June to October 2025 to evaluate traditional and hybrid BLS training, with 35 participants in each group calculated using the Sakpal Formula and a 20% adjustment. Data were collected using a validated online questionnaire that examined demographics (10 items), CPR knowledge (20 items), attitudes towards CPR (16 items), and self-efficacy in performing CPR (12 items). The instrument, adopted from Moon and Hyun (2019), demonstrated acceptable reliability and validity, with Cronbach's α values of 0.63, 0.85, 0.87 and 0.93 for emotional, behavioural, cognitive attitudes, and self-efficacy. The knowledge domain was established through expert review, and a pilot study (n= 19) yielded Cronbach's alpha values of 0.50 (knowledge), 0.74 (total attitude), 0.75 (emotional attitude), 0.59 (cognitive attitude), 0.43 (behavioural attitude), and 0.90 (self-efficacy). The study obtained ethical approval from Universiti Teknologi MARA (UiTM), and UMMC was recruited, with participant inclusion criteria being registered nurses eligible for English proficiency and not attending the BLS program yet having no prior training in AHA 2020 BLS guidelines.

3.1 Intervention

The intervention group (IG) received a Hybrid BLS Program that allowed participants to complete seven days of self-paced online learning with WhatsApp-supported discussion before assessment, whereas the control group attended a one-day face-to-face program. The learning module is based on AHA (2020) guidelines for both groups. The Hybrid BLS Program module was highly rated by a multidisciplinary evaluation team of emergency physicians, nursing officers, tutors, ward managers, and nurses assessed using a 5-point Likert scale for objectives (Mean = 4.29, SD = 0.95), content (M = 4.86, SD = 0.38), format (M = 4.86, SD = 0.38), language (M =

4.86, SD = 0.38), presentation (M = 4.86, SD = 0.39), usefulness (M = 4.86, SD = 0.39) and overall assessment. Both groups were assessed before training, immediately after, and at Week 12 (Figure 1).

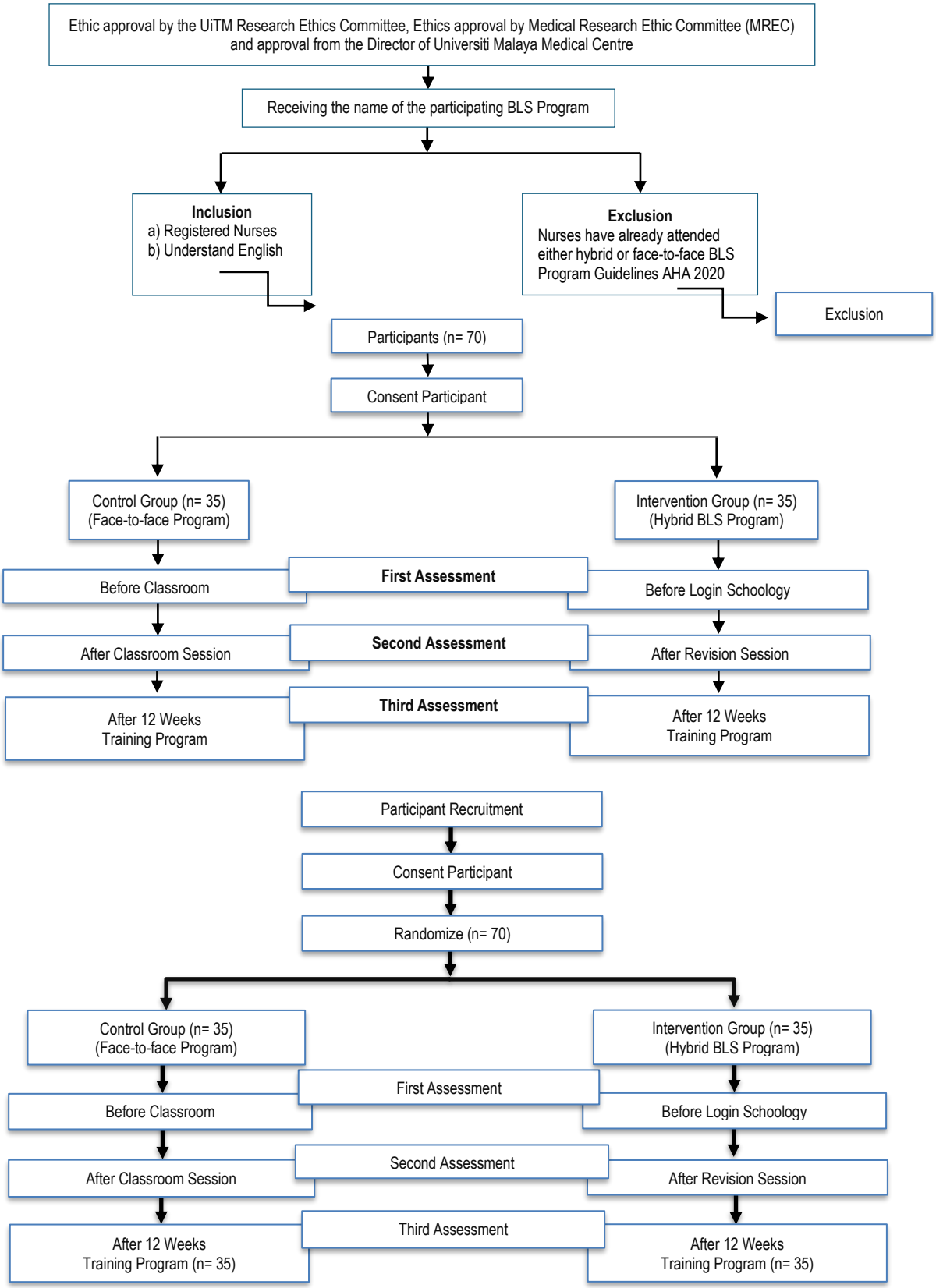


Figure 1: CONSORT Flow Chart of the assessment for the Intervention and Control Group

4.0 Findings

4.1 Demographic Data

Table 1 shows that 70 nurses were divided into CG and IG groups to assess characteristics before a BLS program. Baseline demographic and professional characteristics were comparable between groups, with no statistically significant differences in age (p = 0.590), gender (p = 0.099), education level (p = 0.754), working area (p = 0.440), years of service (p = 0.280), working hours (p = 0.260), CPR experience (p = 0.620), or exposure to cardiac arrest (p = 0.620). However, participants in the control group had attended significantly more previous BLS courses than those in the intervention group (p = 0.010).

Table 1: The comparison of demographic characteristics between the CG (Face-To-Face Program) and the IG (Hybrid Program) (N = 70)

Variable	Total (n= 70)	CG (n = 35)		IG (n = 35)		Variable	
		n	%	n	%	Test Statistics	p-value
Age (years) [a]	Mean (SD)	34.54 (9.16)		33.40 (6.95)		0.59	0.590
Duration of Services [a]	Mean (SD)	13.46 (8.09)		11.57 (6.30)		1.09	0.280
Gender [c]							
	Female	30	85.7	34	97.1	0.198	0.099
	Male	5	14.3	1	2.9		
Level Education [c]							
	Diploma/ Adv. Diploma	34	97.1	34	97.1	1.00	0.754
	Degree	1	2.9	1	2.9		
Clinical Practice [b]							
	Critical Care Unit	6	17.1	8	22.9	1.645	0.440
	General Ward	15	42.9	18	51.4		
	Others	14	40.0	9	25.7		
Working Hours [b]							
	Office Hours (8 am – 5 pm)	10	28.6	6	17.1	1.30	0.260
	Shift	25	71.4	29	82.9		
Have performed CPR within the last 12 Months [b]							
	No	24	68.6	22	62.9	0.25	0.620
	Yes	11	31.4	13	37.1		
Number of BLS Courses attended throughout Service [a]	Mean (SD)	3.09 (1.70)		2.20 (0.99)		2.66	*0.010
Number of Heart Attack cases treated in the last 12 months [a]	Mean (SD)	1.66 (4.35)		1.26 (1.77)		0.50	0.620

Note: [a] independent t-test was used to compare the means of two groups for normally distributed data; [b] Chi-square test was used to compare the proportion of two groups for categorical data; [c] Fisher's Exact Test was used to examine the association between categorical variables for the sample size was small (< 5); *p-value < 0.05 = statistically significant

4.2 The baseline level of knowledge, attitude and self-efficacy

A survey of 70 respondents on CPR knowledge showed that 8.57% had good knowledge, 57.14% had moderate knowledge, and 34.29% had poor knowledge, as shown in Table 2. Table 2 shows that the average knowledge score was 11.86 (SD = 2.63). The overall mean total attitude score is 76.09 (SD = 9.16), indicating a generally positive outlook, with scores ranging from 52 to 94. The emotional attitude score averages 53.37 (SD = 8.38), indicating aspects of performing basic CPR on patients with cardiac arrest. Nurses exhibit a highly positive attitude towards CPR, with an average score of 11.53 (SD = 0.85), showing strong agreement and reinforcing their belief in the necessity of CPR. The cognitive attitude score is similarly elevated at 11.19 (SD = 1.28), indicating an acknowledgment of the significance of prompt CPR for patient results. Overall, while attitudes toward CPR are favorable, areas such as confidence in specific scenarios may benefit from further training. The baseline self-efficacy scores of 70 nurses in CPR reflected generally high confidence, with a mean score of 84.54 (SD = 15.51).

Table 2: Baseline results of total knowledge, attitude and self-efficacy regarding CPR (N = 70)

Variable	Score	Total			
		n/ Mean	%/ SD	Min	Max
Poor Knowledge	0 - 10	24	34.29		
Moderate Knowledge	11 - 15	40	57.14		
Good Knowledge	16 - 20	6	8.57		
Total Knowledge		11.86	2.63	6.00	19
Total Attitude		76.09	9.16	52.00	94.00
Total Attitude Emotional		53.37	8.38	28.00	70.00
Total Attitude Behavioural		11.53	0.85	9.00	12.00
Total Attitude Cognitive		11.19	1.28	7.00	12.00
Total Self-efficacy		84.54	15.51	54.00	120.00

4.3 The effect of the Hybrid BLS on knowledge, attitude and self-efficacy of performing CPR among nurses in Universiti Malaya Medical Centre before and after the intervention program

Table 3 summarizes knowledge, attitude and self-efficacy scores for the CG and the IG at Pre, Post, and 12-week Post. A mixed-design ANOVA was used to assess changes over time between groups. Knowledge scores increased following training in both groups and remained above baseline at 12-week follow-up despite a slight decline. The CG increased from 11.57 (SD = 1.82) to 13.42 (SD = 1.75), then dropped to 12.71 (SD = 2.07) at 12 weeks. The IG scores improved from 11.20 (SD = 3.18) to 13.17 (SD = 2.46), then decreased to 12.37 (SD = 1.93) at follow-up. Both groups indicated sustained knowledge retention.

Moreover, total attitude score improved after the training in both groups, CG from 77.91 (SD = 8.42) to 81.54 (SD = 8.61), then decreased to 79.31 (SD = 9.20), and IG rose from 74.26 (SD = 9.61) to 80.29 (SD = 8.50), stabilizing at 79.09 (SD = 7.45). In emotional attitude, CG improved from 55.51 (SD = 7.39) to 58.54 (SD = 7.59), then fell slightly to 56.80 (SD = 8.18), and the IG went from 51.23 (SD = 8.85) to 56.77 (SD = 7.91), then to 55.77 (SD = 7.17). Behavioral attitude remained relatively stable over time; the CG scores were 11.37 (SD = 0.97), 11.60 (SD = 0.88), and 11.31 (SD = 1.05), and the IG scores started higher at 11.69 (SD = 0.68), increased to 11.83 (SD = 0.57), then fell to 11.63 (SD = 0.81). Similarly, cognitive attitude improved slightly in CG from 11.03 (SD = 1.20) to 11.40 (SD = 1.14), then decreased to 11.20 (SD = 1.26), and the IG rose from 11.34 (SD = 1.35) to 11.69 (SD = 0.80) and remained at 11.69 (SD = 1.80) at 12 weeks. Indicating an understanding and sustained positive attitude following training.

Finally, self-efficacy demonstrated the greatest improvement following training in both groups, increasing markedly post-program and remaining above baseline at the 12-week follow-up despite a slight decline. The CG increased from 82.43 (SD = 15.44) to 93.09 (SD = 12.30) post-program, before declining to 89.89 (SD = 14.80), and the IG demonstrated a similar pattern, rising from 80.66 (SD = 15.75) to 95.71 (SD = 12.75), and then reducing to 89.97 (SD = 15.61). These findings suggest that both training formats effectively enhanced participants' confidence in performing CPR with sustained effects over time (Figure 2).

Table 4 showed significant Time effects for knowledge ($F(2,136) = 16.851$, $p < 0.001$, partial $\eta^2p = 0.199$), total attitude ($F(1.685, 114.583) = 8.867$, $p < 0.001$, $\eta^2p = 0.115$), emotional attitude ($F(1.754, 119.248) = 9.008$, $p < 0.001$, $\eta^2p = 0.117$), and self-efficacy ($F(1.733,117.853) = 19.940$, $p < 0.001$, partial $\eta^2p = 0.227$), indicating significant improvements over time, with self-efficacy showing the largest and sustained increase up to 12 weeks. In contrast, behavioural attitude ($F(1.732,117.802) = 1.880$, $p = 0.163$, partial $\eta^2p = 0.027$) and cognitive attitude ($F(1.705,115.945) = 2.421$, $p = 0.102$, partial $\eta^2p = 0.034$) did not show significant changes over time. All Time × Group interactions were non-significant for knowledge, $F = 0.016$, $p = 0.984$; total attitude, $F = 1.145$, $p = 0.315$; emotional attitude, $F = 1.370$, $p = 0.257$; behavioural attitude, $F = 0.071$, $p = 0.908$; cognitive attitude, $F = 0.209$, $p = 0.777$; and self-efficacy, $F = 0.571$, $p = 0.542$. These findings indicate that the patterns of change over time did not differ significantly between the Hybrid BLS and Face-to-Face BLS groups for any of the measured outcomes.

Table 3: Descriptive statistics for knowledge, attitude and self-efficacy between the CG (Face-to-Face Program) and the IG (Hybrid Program) and time (N = 70)

Variables	Time	Total (n)	CG (n = 35)		IG (n = 35)	
			Mean	SD	Mean	SD
Knowledge						
	Pre Program	70	11.57	1.82	11.20	3.18
	Post Program	70	13.42	1.75	13.17	2.46
	12 Weeks Post Program	70	12.71	2.07	12.37	1.93

Variables	Time	Total (n)	CG (n = 35)		IG (n = 35)	
			Mean	SD	Mean	SD
Total Attitude						
	Pre Program	70	77.91	8.42	74.26	9.61
	Post Program	70	81.54	8.61	80.29	8.50
	12 Weeks Post Program	70	79.31	9.20	79.09	7.45
Emotional Attitude						
	Pre Program	70	55.51	7.39	51.23	8.85
	Post Program	70	58.54	7.59	56.77	7.91
	12 Weeks Post Program	70	56.80	8.18	55.77	7.17
Behavioral Attitude						
	Pre Program	70	11.37	0.97	11.69	0.68
	Post Program	70	11.60	0.88	11.83	0.57
	12 Weeks Post Program	70	11.31	1.05	11.63	0.81
Cognitive Attitude						
	Pre Program	70	11.03	1.20	11.34	1.35
	Post Program	70	11.40	1.14	11.69	0.80
	12 Weeks Post Program	70	11.20	1.26	11.69	1.80
Self-efficacy						
	Pre Program	70	82.43	15.44	80.66	15.75
	Post Program	70	93.09	12.30	95.71	12.75
	12 Weeks Post Program	70	89.89	14.80	89.97	15.61

Table 4: Test of within-subject effect knowledge, attitude, and self-efficacy (N = 70)

Variables	Source	Type III SS	df	MS	F	Sig.	Partial η^2p
Knowledge	Time	130.124	2	65.062	16.851	0.001*	0.199
	Time × Group	0.124	2	0.062	0.016	0.984	0.001
Total Attitude	Time	838.895	1.685	497.846	8.867	0.001*	0.115
	Time × Group	108.343	1.685	64.297	1.145	0.315	0.017
Emotional Attitude	Time	670.629	1.754	382.418	9.008	0.001*	0.117
	Time × Group	101.981	1.754	58.153	1.370	0.257	0.020
Behavioral Attitude	Time	2.257	1.732	1.303	1.880	0.163	0.027
	Time × Group	0.086	1.732	0.049	0.071	0.908	0.001
Cognitive Attitude	Time	4.752	1.705	2.787	2.421	0.102	0.034
	Time × Group	0.410	1.705	0.240	0.209	0.777	0.003
Self-efficacy	Time	5964.467	1.733	3441.425	19.941	0.001*	0.227
	Time × Group	170.771	1.733	98.842	0.571	0.542	0.008

*p<0.05 statistically significant

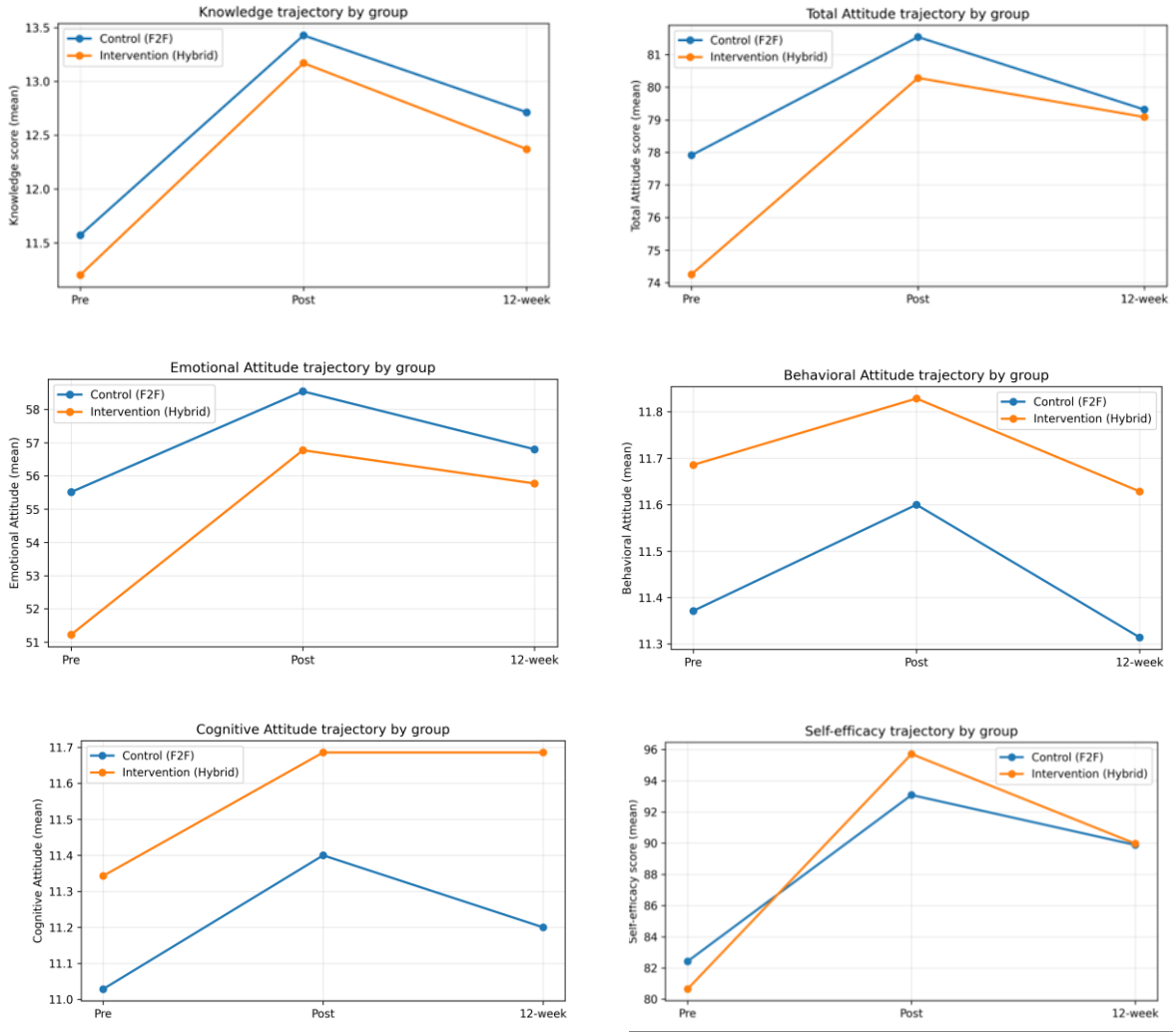


Figure 2: The Trajectory between Control Group and Intervention Group regarding knowledge, attitude and self-efficacy.

5.0 Discussion

5.1 Level of nurses' knowledge, attitude and self-efficacy regarding CPR

BLS and CPR are essential for effective emergency care. Even though UMMC nurses showed a moderate understanding of defibrillation and chest compressions, deficiencies in airway management and initial patient assessment highlight the necessity for focused hands-on CPR training to improve their skills (Oteir et al., 2025). Nonetheless, inconsistent retention of knowledge and execution emphasizes the importance of continuous training for nurses (Chik et al., 2023). Additionally, discrepancies in various CPR elements were noted, and while concerns about the use of Automated External Defibrillators (AED) remain, their availability has been linked to better skill levels and survival rates (Oteir et al., 2025).

Nurses at UMMC showed a predominantly positive outlook on CPR, aligning with research that indicates a strong perceived significance and self-assurance in executing CPR. Factors such as culture and personal beliefs may affect the willingness to perform CPR, even though there are noticeable gaps in knowledge about the current BLS guidelines despite these favorable attitudes. Educational programs can further improve readiness for CPR and the use of AEDs (Ming et al., 2025; Shah et al., 2022).

Furthermore, nurses at UMMC exhibited favorable behavioral tendencies towards CPR, indicating their preparedness to execute life-saving measures. Nevertheless, their negative perceptions regarding specific resuscitation techniques, like mouth-to-mouth ventilation without protective gear, underscore the necessity for ongoing education and training to enhance readiness for emergencies (Ming et al., 2025; Tomas & Kachele, 2023). The cognitive attitude of UMMC nurses showcased positive beliefs and self-assurance in their CPR knowledge. However, feelings of anxiety, fear of inflicting harm, a lack of self-confidence, and insufficient training may diminish their willingness to perform CPR, emphasizing the importance of continuous education and reinforcement of skills (Silverplats et al., 2022).

Overall, nurses demonstrated positive cognitive and behavioral attitudes toward CPR. However, emotional factors, particularly confidence in emergency situations, may require additional support, and repeated educational interventions are essential to strengthen CPR attitudes and preparedness (Moon & Hyun, 2019; Ming et al., 2025). Enhancing CPR knowledge is essential, and simulation-based training, supportive environment, clear CPR policies, and accessible training opportunities can improve nurses' CPR preparedness and attitudes (Ming et al., 2025; Oteir et al., 2025).

CPR is essential for the management of cardiac arrest, and nurses' self-efficacy reflects their confidence in performing resuscitation-related tasks. Participants demonstrated good CPR self-efficacy, influenced by training, legal concerns, and previous experiences. Nevertheless, high self-efficacy remains essential for effective cardiac arrest management and emergency response (Sasmito et al., 2024; Alamri et al., 2022; Alaryani et al., 2021). Lower confidence and negative perceptions toward CPR learning were evident among some healthcare providers. However, simulation-based training can enhance self-efficacy and knowledge retention, highlighting its value in CPR education (Sasmito et al., 2024). Continuous BLS education can enhance CPR competence, self-efficacy, and preparedness for cardiac arrest management (Alamri et al., 2022).

5.2 The effect(s) of the Hybrid BLS on knowledge, attitude and self-efficacy before and after the intervention program

Both training methods significantly improved nurses' CPR knowledge, attitudes, and self-efficacy over time, indicating that learning outcomes were not influenced by mode of delivery, except for the overall time effect on behavioural and cognitive attitudes. However, a slight decline across all outcome measures at the 12-week follow-up highlights the need for periodic refresher sessions to maintain competency. Previous studies by Saidu et al. (2023) have similarly reported a decline in CPR skill retention over time, despite significant post-training improvements. Training interventions, including simulation and virtual learning approaches, have been shown to enhance resuscitation skills, engagement, and confidence compared with conventional methods (Abbasi et al., 2025).

Attitudes toward CPR improved over time, with increased confidence and positive perceptions. Simulation-based and blended learning approaches enhanced engagement and reflective learning, while cognitive attitudes showed minimal change, likely due to pre-existing positive beliefs about CPR. No significant differences were observed between training methods, indicating comparable outcomes in CPR attitudes and knowledge (Montoro-Pérez, 2025).

Self-efficacy improved significantly following training, with confidence remaining above baseline despite a slight decline at 12 weeks. The absence of significant group differences suggests that both training methods demonstrated comparable effectiveness in enhancing nurses' confidence in performing CPR. (Alamri et al., 2022). Moreover, previous studies have shown that CPR knowledge is positively associated with self-efficacy, while experience, frequent training, and mentorship contribute to greater confidence and competency in performing CPR, particularly among novice nurses (Alaryani et al., 2021; Ming et al., 2025).

Pairwise comparisons showed that improvements were greatest immediately post-intervention and largely maintained at 12 weeks, with self-efficacy demonstrating the largest sustained improvement. Slight declines in behavioural and emotional attitude were observed over time. These findings are consistent with Ahmad et al. (2023), who reported significant improvements in CPR knowledge and skills immediately after training ($p < .001$) followed by a decline at the 3-month follow-up. As behavioural attitude was the only significant predictor of performance, reinforcement strategies such as simulation drills and booster training are recommended to sustain CPR competence and action-oriented behaviours (Malureanu et al., 2021). Moreover, between time and group interaction, all domains presented no significant differences, suggesting that online teaching is a cost- and time-efficient alternative to simulation-based training (Hsieh et al., 2021). In addition, a study in Nigeria found that instructor-led training and video self-instruction showed no significant differences and had comparable short-term effectiveness ($p > .05$) (Saidu et al., 2023).

The Hybrid BLS program demonstrated comparable effectiveness to traditional training in improving CPR knowledge, attitudes, and self-efficacy. Its flexible and engaging blended-learning approach may particularly enhance behavioral outcomes, although ongoing follow-up and reinforcement are needed to sustain CPR competence and confidence over time (Moon & Hyun, 2019; Khaledi et al., 2024).

6.0 Conclusion and Recommendations

The study found that the Hybrid BLS program significantly enhanced nurses' knowledge, attitudes, and self-efficacy in performing CPR. It emphasized the importance of organized training that integrates theoretical knowledge with hands-on experience. Nurses exhibited significant advancements in emotional preparedness and proficiency in critical actions, though certain skills diminished by the 12-week follow-up, indicating the necessity for ongoing reinforcement.

A limitation of this study is that it consisted of 35 participants in the intervention group from a single institution, which restricts the generalizability of its results. Although the findings are valuable, they may not accurately reflect larger or more diverse populations. Future studies with larger samples from various institutions are necessary to enhance validation. Self-reported assessments of knowledge, attitudes, and self-efficacy could be influenced by social desirability, which raises concerns regarding the validity of these questionnaires and underscores the need for additional evaluation methods to improve accuracy.

The study highlights the significance of enhancing CPR skills for increasing patient survival rates during cardiac arrest and their contribution to achieving improved clinical results and better quality of life for survivors. It indicates that a combination of online and practical training methods works well in healthcare education. It also identified areas for further development, such as airway management. In conclusion, the Hybrid BLS model promotes innovative training methods and supports the integration of hybrid learning in BLS training, ultimately enhancing nurses' preparedness for emergency care and improving patient safety outcomes.

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Paper Contribution to Related Field of Study

This evaluation provides the effect of the hybrid program on CPR knowledge, attitudes, and self-efficacy of healthcare professionals. It highlights the alternative for proper training standards to enhance the quality of care in the healthcare sector.

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