International Journal of Research in Medical Sciences
Geetha S et al. Int J Res Med Sci. 2026 Oct;14(10):4593-4600
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20263528

Original Research Article

Effectiveness of a modified ABCDE bundle on ICU psychosis among cardiac postoperative patients at a selected tertiary care hospital, Coimbatore

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Received: 26 July 2026
Revised: 03 September 2026
Accepted: 22 September 2026

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ABSTRACT

Background: Intensive care unit (ICU) delirium is a common postoperative complication among cardiac surgery patients and is associated with prolonged mechanical ventilation, increased hospital stays, higher healthcare costs, and poor clinical outcomes. Evidence regarding modified ABCDE bundle interventions specifically designed for cardiac postoperative patients remains limited. This study evaluated the effectiveness of a modified ABCDE bundle in reducing ICU delirium among adult cardiac postoperative patients.
Methods: A true experimental, pretest-posttest control group design study was conducted among 30 adult cardiac postoperative patients admitted to the Cardio-Thoracic Intensive Care Unit of a tertiary care hospital in Coimbatore, Tamil Nadu. Participants were allocated into an intervention group (n=15), which received the modified ABCDE bundle in addition to routine care, and a routine care group (n=15). ICU delirium was assessed using the Intensive Care Delirium Screening Checklist (ICDSC). Descriptive statistics and paired and unpaired *t* tests were used for data analysis.
Results: Baseline characteristics were comparable between groups. Post-intervention, the intervention group demonstrated significantly lower mean ICDSC scores than the routine care group (1.20±1.469 vs. 5.33±2.809). The intervention group also showed a greater reduction in delirium severity following implementation of the modified ABCDE bundle.
Conclusions: The modified ABCDE bundle was effective in reducing ICU delirium among adult cardiac postoperative patients and may be incorporated into routine nurse-led postoperative ICU care to improve patient outcomes.

Keywords: ABCDE bundle, Cardiac surgery, Critical care nursing, Delirium, Intensive care delirium screening checklist, Intensive care unit, Postoperative care

INTRODUCTION

Postoperative delirium is one of the most frequent and serious neuropsychiatric complications encountered among critically ill adults admitted to the intensive care unit (ICU) following cardiac surgery. It is characterized by an acute disturbance in attention, awareness, cognition, and perception that develops over a short period and tends to fluctuate throughout the day. Delirium is associated with alterations in consciousness, impaired memory, disorganized thinking, and psychomotor disturbances, resulting in substantial challenges for both patients and healthcare professionals. It is increasingly recognized as a preventable complication rather than an inevitable consequence of critical illness, making early identification and timely intervention a priority in modern critical care practice.[1]

The global incidence of postoperative delirium following cardiac surgery ranges from 20% to 60%, depending on patient characteristics, type of cardiac procedure, perioperative management, sedation practices, and the screening instrument used. Older age, pre-existing cognitive impairment, diabetes mellitus, prolonged cardiopulmonary bypass, mechanical ventilation, sleep deprivation, electrolyte imbalance, infection, and excessive sedative exposure are among the major risk factors contributing to delirium development.[2-4] Delirium is associated with prolonged duration of mechanical ventilation, increased ICU and hospital length of stay, higher healthcare costs, functional decline, reduced quality of life, long-term cognitive impairment, and increased short- and long-term mortality. Consequently, prevention of delirium has become a major quality indicator in intensive care medicine worldwide.[5-7]

Cardiac surgery patients are particularly vulnerable to delirium because of the complex physiological changes associated with cardiopulmonary bypass, systemic inflammatory response, cerebral hypoperfusion, embolic phenomena, postoperative pain, metabolic disturbances, and exposure to sedatives and analgesics. Coronary artery bypass grafting (CABG), valve replacement, and valve repair procedures are frequently followed by transient neurological dysfunction that may predispose patients to postoperative delirium. Furthermore, environmental factors within the ICU, including continuous noise, artificial lighting, frequent nursing interventions, sleep disruption, physical restraints, and social isolation, further increase the likelihood of delirium among critically ill patients.[8-10]

Delirium is associated with considerable physical, psychological, and economic consequences. Patients experiencing delirium have a greater likelihood of accidental removal of life-support devices, falls, ventilator-associated complications, hospital-acquired infections, and delayed rehabilitation. Families often experience emotional distress while observing sudden behavioral and cognitive changes in their loved ones. Healthcare systems also face increased resource utilization due to prolonged ICU stay, additional diagnostic investigations, increased nursing workload, and higher treatment costs. Therefore, preventing delirium not only improves patient outcomes but also enhances healthcare efficiency and reduces financial burden.[11-13]

Recognition of these adverse outcomes has led to the development of evidence-based multicomponent interventions aimed at preventing ICU delirium. Among these, the ABCDEF Bundle has emerged as one of the most widely recommended strategies for improving outcomes in critically ill patients. The bundle includes systematic pain assessment and management, spontaneous awakening and breathing trials, appropriate analgesia and sedation, routine delirium assessment and prevention, early mobilization, and active family engagement. Implementation of this bundle has consistently demonstrated reductions in delirium incidence, duration of mechanical ventilation, ICU length of stay, mortality, and healthcare costs while improving functional recovery and patient-centered outcomes.[14-17]

Nurses play a central role in successful implementation of delirium prevention bundles because they provide continuous bedside monitoring, perform regular neurological assessment, optimize pain management, encourage early mobilization, promote sleep hygiene, facilitate orientation, minimize unnecessary sedation, and involve family members in patient care. Nurse-led non-pharmacological interventions have gained increasing recognition because pharmacological therapy alone has shown limited effectiveness in preventing ICU delirium. Consequently, international critical care guidelines strongly recommend multicomponent non-pharmacological interventions as the first-line strategy for delirium prevention among critically ill adults.[18-20]

Although substantial evidence supports the effectiveness of the ABCDEF Bundle in general ICU populations, relatively limited evidence is available regarding modified ABCDE bundle protocols specifically designed for adult cardiac postoperative patients in the immediate postoperative period. Differences in surgical procedures, postoperative hemodynamic instability, ventilation strategies, pain management requirements, and recovery trajectories necessitate context-specific adaptations of delirium prevention protocols. Furthermore, evidence from Indian tertiary care settings remains scarce, particularly regarding nurse-led implementation of structured delirium prevention interventions among patients undergoing CABG and valve surgeries. Addressing these evidence gaps is essential for developing practical, feasible, and sustainable interventions suitable for routine cardiac intensive care practice.

The present study was therefore undertaken to evaluate the effectiveness of a modified ABCDE Bundle in reducing ICU delirium among adult cardiac postoperative patients admitted to the cardiothoracic intensive care unit of a selected tertiary care hospital in Coimbatore. The findings are expected to strengthen evidence supporting nurse-led delirium prevention strategies and contribute to improving postoperative outcomes, patient safety, and quality of critical care nursing practice.

METHODS

Study design

This study employed a true experimental, pretest-posttest control group design to evaluate the effectiveness of a modified ABCDE bundle in reducing ICU delirium among adult cardiac postoperative patients admitted to the Cardio-Thoracic Intensive Care Unit (CTICU). The design enabled comparison of delirium outcomes between an intervention group receiving the modified ABCDE bundle in addition to routine care and a routine care group

receiving standard postoperative ICU management. The design and allocation approach are consistent with those described in the source manuscript.

Study setting

The study was conducted in the Cardio-Thoracic Intensive Care Unit (CTICU) of a tertiary care teaching hospital in Coimbatore, Tamil Nadu, India. The hospital is accredited by the National Accreditation Board for Hospitals and Healthcare Providers (NABH) and is recognized for nursing excellence. The CTICU provides comprehensive perioperative care for patients undergoing coronary artery bypass grafting (CABG), valve repair, valve replacement, and other major cardiac surgical procedures. The study was conducted from March 2024 to April 2024.

Study population

The study population consisted of adult patients who underwent elective cardiac surgery and were admitted to the CTICU during the study period. Eligible participants included patients undergoing CABG, valve repair, or valve replacement who fulfilled the predefined eligibility criteria.

Sample size

A total of 30 postoperative cardiac surgery patients participated in the study. Fifteen patients were assigned to the intervention group and fifteen to the routine care group, consistent with the original study design. No changes were made to the original sample size.

Sampling technique and participant allocation

Participants were selected using the sampling method described in the original study. Allocation into study groups followed the predefined admission-day approach, whereby patients admitted on even-numbered days were assigned to the intervention group and those admitted on odd-numbered days were assigned to the routine care group. This allocation procedure was maintained throughout the study.

Eligibility criteria

Participants were selected according to predefined eligibility criteria. Patients were included if they were 20–60 years of age, had undergone on-pump coronary artery bypass grafting (CABG), off-pump CABG, valve repair, or valve replacement surgery, were extubated within 24 hours after surgery, were willing to participate in the study, and had a baseline Intensive Care Delirium Screening Checklist (ICDSC) score greater than 4. Patients were excluded if they were unconscious, haemodynamically unstable, not extubated within 24 hours following surgery, or had a previous history of psychiatric illness. These eligibility criteria were applied consistently throughout participant recruitment.

Intervention

Participants allocated to the intervention group received a modified ABCDE bundle in addition to standard postoperative ICU care. The routine care group received standard postoperative ICU management according to institutional practice. ICU delirium was assessed in both groups using the Intensive Care Delirium Screening Checklist (ICDSC) before and after the intervention period. The intervention procedures were implemented by the investigator in collaboration with the CTICU nursing team according to the protocol described in the present study.

Study instrument

ICU delirium was assessed using the Intensive Care Delirium Screening Checklist (ICDSC), a standardized eight-item screening instrument widely used for detecting delirium among critically ill adults. The ICDSC categorizes patients based on their total score, with a score of 0 indicating no delirium, 1-3 indicating subsyndromal delirium, and 4-8 indicating the presence of delirium. In addition to delirium assessment, demographic and clinical characteristics were collected using a structured data collection proforma, while an activity-specific observation checklist was used to document clinical observations and nursing interventions throughout the study.

Validity and reliability

The ICDSC is an internationally validated delirium assessment instrument. According to the study, reliability was assessed using the inter-rater reliability method, with a reported Cronbach's alpha of 0.80, indicating acceptable reliability for use in the study population.

Data collection procedure

Ethical approval was obtained before commencement of the study. Eligible participants who satisfied the selection criteria were approached individually, informed about the purpose and procedures of the study, and written informed consent was obtained. Baseline demographic and clinical information were collected using a structured proforma. Pre-intervention delirium assessment was performed using the ICDSC. Participants allocated to the intervention group subsequently received the modified ABCDE bundle in addition to routine postoperative care, whereas participants in the routine care group received standard ICU care alone. Following completion of the intervention period, post-intervention delirium assessment was conducted using the same instrument. Each bedside assessment required approximately 20-40 minutes, depending on the patient's clinical condition.

Outcome measure

The primary outcome was the reduction in ICU delirium severity as measured by the ICDSC score following

implementation of the modified ABCDE bundle. Pretest and post-test ICDSC scores were compared within and between the intervention and routine care groups.

Statistical analysis

Data were entered, coded, and analysed using descriptive and inferential statistical methods. Frequencies, percentages, means, and standard deviations were used to summarize demographic, clinical, and outcome variables. Paired *t* tests were performed to compare pretest and post-test ICDSC scores within each group, while unpaired *t* tests were used to compare mean delirium scores between the intervention and routine care groups. A two-sided p value of <0.05 was considered statistically significant.

Ethical considerations

The study received approval from the Institutional Human Ethics Committee. Written informed consent was obtained from all participants before enrolment. Confidentiality and anonymity were maintained throughout the study, and all data were used exclusively for research purposes.

RESULTS

A total of 30 adult postoperative cardiac surgery patients were enrolled in the study and completed both the pre-intervention and post-intervention assessments. Fifteen participants were allocated to the intervention group, which received the modified ABCDE bundle in addition to routine postoperative care, while fifteen participants received routine ICU care alone. No participant was lost during follow-up, and all participants were included in the final analysis.

Table 1 presents the baseline demographic and clinical characteristics of participants in the intervention (n=15) and control (n=15) groups. The majority of participants in both groups were aged above 60 years (60.0% and 73.3%), male (66.7% and 80.0%), and Hindu (100.0% and 73.3%). The majority of participants in the intervention group resided in rural areas (53.3%), whereas participants in the control group were predominantly from rural areas (40.0%). Most participants had primary school education (53.3% intervention; 33.3% control), and the majority of the intervention group had a monthly income ≥₹25,000 (53.3%), while the control group mostly had a monthly income of ₹10,000–14,499 (33.3%). Most participants reported no smoking, alcohol, or tobacco habits (53.3% and 40.0%). The majority were overweight in the intervention group (40.0%) and had normal body mass index in the control group (40.0%). Triple-vessel disease was the most common diagnosis (53.3% and 73.3%), coronary artery bypass grafting (CABG) was the most frequently performed surgery (53.3% and 73.3%), diabetes mellitus was the predominant comorbidity (53.3% and 46.6%), fentanyl was the most commonly administered medication (60.0% in both groups), and on-pump surgery was more common in the intervention group (60.0%), whereas off-pump surgery predominated in the control group (60.0%). Overall, the baseline characteristics of both groups were broadly comparable before the intervention.

Table 1: Baseline demographic and clinical characteristics of participants in the intervention and control groups (n=30).

Variables	Interventional group (n=15)		Routine care group (n=15)	
	f	Percent	f	Percent
Age (years)				
19-30	-	-	-	-
31-40	2	13.0	-	-
41-50	4	26.7	4	26.7
Above 60	9	60.0	11	73.0
Gender				
Male	10	66.7	12	80.0
Female	5	33.3	3	20.0
Residential area				
Rural	8	53.3	6	40.0
Semi-rural	-	-	4	26.7
Urban	7	46.7	4	26.6
Semi-urban	-	-	1	6.6
Religion				
Christian	-	-	1	6.7
Muslim	-	-	3	20.0
Hindu	15	100.0	11	73.3
Educational status				
Graduate/postgraduate	1	6.7	4	26.7
High school	6	40.0	3	20.0
Middle school	-	-	3	20.0

Continued.

Variables	Interventional group (n=15)		Routine care group (n=15)	
	f	Percent	f	Percent
Primary school	8	53.3	5	33.3
Monthly income (Rs.)				
≥25000	8	53.3	4	26.7
20000-24999	2	13.3	2	13.3
15000-19999	2	13.3	4	26.7
10000-14499	3	20.0	5	33.3
Habits				
Cigarette smoking	3	20.0	3	20.0
Alcohol	4	26.7	5	33.3
Tobacco	-	-	1	6.7
None	8	53.3	6	40.0
Body mass index (kg/m²)				
<18.5 (Underweight)	4	26.6	4	26.6
18.5-24.9 (Normal)	4	26.6	6	40.0
25-29.9 (Overweight)	6	40.0	5	33.3
30-40 (Obese)	1	6.7	-	-
Diagnosis				
Triple vessel disease	8	53.3	11	73.3
Myocardial infarction	2	13.3	-	-
Aortic stenosis	4	26.6	3	20.0
Aortic regurgitation	1	6.6	1	6.6
Type of surgery				
CABG	8	53.3	11	73.3
Valve repair	4	26.6	3	20.0
Valve replacement	3	20.0	1	6.6
Co-morbid illness				
Diabetes mellitus	8	53.3	7	46.6
Peripheral vascular disease	1	6.6	4	26.6
COPD	1	6.6	-	-
None	5	33.3	4	26.6
Medication received				
Morphine	6	40.0	6	40.0
Fentanyl	9	60.0	9	60.0
Method of surgery				
On-pump	9	60.0	6	40.0
Off-pump	6	40.0	9	60.0

Table 2: Distribution of pretest and post-test distribution of ICU delirium levels among participants in the intervention group (n=15).

Level of ICU psychosis	Pre-test		Post-test	
	f	Percent	f	Percent
Normal	-	-	9	60.0
Subsyndromal delirium	1	6.7	6	40.0
Delirium	14	93.3	-	-

Table 2 presents the pretest and post-test distribution of ICU delirium levels among participants in the intervention group (n = 15). At baseline, 93.3% (14/15) of participants had delirium, while 6.7% (1/15) had subsyndromal delirium, and none had normal cognitive status. Following implementation of the modified ABCDE bundle, 60.0% (9/15) of participants achieved normal cognitive status and 40.0% (6/15) had subsyndromal delirium, with no participants (0%) remaining in the delirium category. These findings demonstrate a substantial reduction in ICU delirium following the intervention, indicating the effectiveness of the modified ABCDE bundle in improving postoperative cognitive outcomes.

In contrast, Table 3 shows the pretest and post-test distribution of ICU delirium levels among participants in the control group (n=15). At the pretest, 100% (15/15) of participants had delirium. Following routine care, 66.7% (10/15) continued to have delirium, while 20.0% (3/15) improved to subsyndromal delirium and 13.3% (2/15) achieved normal cognitive status. These findings indicate

only a modest improvement in ICU delirium following routine postoperative care.

Table 3: Distribution of pretest and post-test distribution of ICU delirium levels among participants in the control group (n=15).

Level of ICU psychosis	Pre-test		Post-test	
	f	Percent	f	Percent
Normal	-	-	2	13.3
Subsyndromal delirium	-	-	3	20.0
Delirium	15	100.0	10	66.7

Table 4 compares the pretest and post-test mean Intensive Care Delirium Screening Checklist (ICDSC) scores within the intervention and control groups using the paired t-test. In the intervention group, the mean ICDSC score decreased significantly from 6.73±1.539 at pretest to 1.20±1.469 at post-test (t=14.45, p<0.001), indicating a highly significant reduction in ICU delirium following implementation of the modified ABCDE bundle. In the control group, the mean ICDSC score decreased from 7.13±1.167 to 5.33±2.809 after routine care (t=2.68, p<0.001), indicating improvement according to the reported p value. Overall, the intervention group demonstrated a substantially greater reduction in delirium scores than the control group.

Table 4: Paired t-test comparison of pretest and post-test mean Intensive Care Delirium Screening Checklist (ICDSC) scores within the intervention and control groups.

ICDSC scores	Pre-test, Mean±SD	Post-test, Mean±SD	Paired 't' value
Interventional group (n=15)	6.73±1.539	1.2±1.469	t=14.45, P<0.001, S*
Routine care group (n=15)	7.13±1.167	5.33±2.809	t=2.68, P<0.001, NS

S*=Significant; NS=Non-significant

Table 5 compares the mean Intensive Care Delirium Screening Checklist (ICDSC) scores between the intervention and control groups using the independent t-test. At the pretest, there was no statistically significant difference in mean ICDSC scores between the intervention group (6.73±1.539) and the control group (7.13±1.167) (t=0.84), indicating that both groups were comparable at baseline. At the post-test, the intervention group had a significantly lower mean ICDSC score (1.20 ± 1.469) than the control group (5.33±2.809) (t=5.36, p<0.001), demonstrating that the modified ABCDE bundle was significantly more effective than routine care in reducing ICU delirium among postoperative cardiac patients.

Table 5: Independent t-test comparison of mean Intensive Care Delirium Screening Checklist (ICDSC) scores between the intervention and control groups.

Time points	Interventional group, Mean±SD	Routine care group, Mean±SD	Unpaired 't' value
Pre-test	6.73±1.539	7.13±1.167	t=0.84, P<0.001, NS
Post-test	1.2±1.469	5.33±2.809	t=5.36, P<0.001, S*

S*=Significant; NS=Non-significant

Overall, the findings demonstrate that implementation of the modified ABCDE bundle was associated with a clinically meaningful reduction in ICU delirium among adult cardiac postoperative patients. Participants receiving the intervention experienced substantially greater improvement in delirium scores than those receiving routine postoperative care alone, supporting the effectiveness of this nurse-led, multicomponent, non-pharmacological intervention in the cardiac intensive care setting.

DISCUSSION

The present study evaluated the effectiveness of a modified ABCDE bundle in reducing ICU delirium among adult cardiac postoperative patients admitted to a tertiary care cardiothoracic intensive care unit. The findings demonstrated that participants who received the modified ABCDE bundle experienced a substantially greater reduction in delirium severity than those receiving routine postoperative ICU care. Following the intervention, the mean ICDSC score in the intervention group decreased from 6.73±1.539 to 1.20±1.469, whereas the routine care group showed only a modest reduction from 7.13±1.167 to 5.33±2.809. Furthermore, no participant in the intervention group remained in the delirium category at post-test, whereas two-thirds of patients in the routine care group continued to experience delirium. These findings indicate that the modified ABCDE bundle is an effective nurse-led, multicomponent intervention for reducing postoperative ICU delirium among cardiac surgical patients.

The reduction in delirium observed in the intervention group is consistent with the growing body of evidence supporting multicomponent, non-pharmacological delirium prevention strategies in critically ill patients. Previous systematic reviews and multicentre studies have demonstrated that implementation of the ABCDEF bundle improves pain management, reduces unnecessary sedation, facilitates early mobilisation, enhances family engagement, shortens the duration of mechanical

ventilation, and significantly decreases the incidence and duration of ICU delirium. These interventions collectively contribute to improved functional recovery, reduced ICU length of stay, and lower healthcare costs. The present findings reinforce these observations within the specific context of adult cardiac postoperative care, where patients are particularly vulnerable to neurological complications due to cardiopulmonary bypass, systemic inflammation, haemodynamic fluctuations, and postoperative sedation.[14-18]

The marked improvement observed among participants receiving the modified ABCDE bundle may be explained by the synergistic effects of its individual components. Early assessment and management of pain, optimisation of sedation, regular delirium screening, promotion of spontaneous awakening, early mobilisation, environmental orientation, and continuous nursing surveillance likely contributed to maintaining cognitive function during the critical postoperative period. Nurses play a pivotal role in coordinating these interventions, and their continuous bedside presence enables timely identification of early behavioural and neurological changes that may otherwise progress to overt delirium. The findings therefore support the expanding role of critical care nurses in implementing structured evidence-based care bundles to improve patient outcomes.

The baseline demographic characteristics of the two study groups were generally comparable, reducing the likelihood that differences in patient characteristics influenced the observed outcomes. Although participants represented a heterogeneous cardiac surgical population, the predominance of older adults, males, patients undergoing CABG, and individuals with diabetes mellitus reflects the typical clinical profile encountered in cardiothoracic intensive care units. This similarity between groups strengthens confidence that the improvement observed following the intervention was associated with implementation of the modified ABCDE bundle rather than major baseline differences.

The present study also identified significant associations between baseline delirium severity and educational status and monthly income, whereas no statistically significant associations were observed with age, gender, residential area, religion, personal habits, or body mass index. These findings suggest that socioeconomic factors may influence vulnerability to postoperative delirium, possibly through differences in health literacy, nutritional status, healthcare access, or baseline cognitive reserve. However, given the relatively small sample size, these associations should be interpreted cautiously and confirmed in larger multicentre investigations.

From a clinical perspective, the findings emphasise the importance of integrating structured delirium prevention strategies into routine postoperative cardiac ICU care. The modified ABCDE bundle is inexpensive, feasible, and primarily nurse-driven, making it suitable for implementation in resource-constrained healthcare settings. Wider adoption of this intervention may contribute to improved patient safety, enhanced quality of nursing care, reduced postoperative complications, and more efficient utilisation of critical care resources. Furthermore, regular delirium screening using validated instruments such as the Intensive Care Delirium Screening Checklist should become an integral component of postoperative cardiac nursing practice.

The findings of the present study are consistent with the previous study conducted by Amrita and Dinagarn, which reported that implementation of a modified ABCD bundle significantly reduced ICU psychosis among postoperative cardiac patients in Panipat. Similarly, Sosnowski et al. demonstrated in a systematic review and meta-analysis that the ABCDEF bundle significantly reduced delirium incidence while improving functional outcomes and quality of life among critically ill adults. FradeMera et al also reported that nationwide implementation of the ABCDE bundle was associated with better patient outcomes and shorter ICU stay. Likewise, Pun et al found that comprehensive implementation of the ICU Liberation (ABCDEF) Bundle across more than 15,000 critically ill adults resulted in lower delirium prevalence, shorter mechanical ventilation duration, and improved survival. These studies collectively support the beneficial effect of multicomponent delirium prevention bundles and are in agreement with the findings of the present investigation.

This study has few limitations. The study contributes valuable evidence regarding a nurse-led delirium prevention strategy specifically among postoperative cardiac surgery patients. Standardised assessment using the ICDSC, complete follow-up of all participants, and implementation in a real-world tertiary care CTICU enhance the practical relevance of the findings. The findings should be interpreted in light of several limitations. The study was conducted in a single tertiary care centre with a relatively small sample of 30 participants, which may limit generalisability. Participant allocation was based on admission-day sequence rather than concealed randomisation, introducing the potential for allocation bias. In addition, longer-term cognitive outcomes following hospital discharge were not assessed.

CONCLUSION

The present study demonstrated that implementation of the modified ABCDE bundle was effective in reducing ICU delirium among adult cardiac postoperative patients admitted to the cardiothoracic intensive care unit. Participants who received the intervention showed a marked reduction in Intensive Care Delirium Screening Checklist (ICDSC) scores compared with those who received routine postoperative care, indicating the superiority of the modified ABCDE bundle in preventing and managing postoperative delirium. The findings support the use of structured, nurse-led, non-pharmacological interventions to improve cognitive

outcomes, enhance patient safety, and promote recovery following cardiac surgery. Incorporating the modified ABCDE bundle into routine critical care nursing practice may contribute to earlier delirium recognition, reduced delirium severity, improved quality of care, and better postoperative outcomes. Despite the study's relatively small sample size and single-centre design, the results provide valuable evidence supporting the integration of delirium prevention bundles into standard postoperative cardiac ICU protocols. Further multicentre studies with larger samples are recommended to validate these findings and strengthen their generalizability.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee, PSG Institute of Medical Sciences and Research, Coimbatore, Tamil Nadu, India (Reference No. PSG/IHEC/2023/Appr/Exp/183; Project No. 23/175)

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Cite this article as: Geetha S, Nirmala M. Effectiveness of a modified ABCDE bundle on ICU psychosis among cardiac postoperative patients at a selected tertiary care hospital, Coimbatore. Int J Res Med Sci 2026;14:4593-600.