ORIGINAL RESEARCH

Construction of Standardized Procedure for Early Activity After Cardiac Surgery in Elderly Based on Critical Care Scoring System and Effect Analysis

Xiuqin Chen, MM; Yongrui Wu, MM; Mei Li, MM; Kongqi Han, MM; Dengliang Zhang, MM

ABSTRACT

Objective • To analyze the construction and effect of standardized procedure of early activity after cardiac surgery in elderly patients based on the critical illness scoring system.

Methods • A total of 65 elderly patients who underwent cardiac surgery in our hospital from January 2020 to January 2022 were selected as the research objects and divided into the control group (n = 32) and the observation group (n = 33) according to the admission time. The standardized procedure for the early activity after cardiac surgery was implemented based on the critical illness scoring system. The inter-group comparison was conducted in terms of the recovery time, complications, cardiac function, and quality of life pre- and post-nursing.

Results • The observation group recovered faster than the control group following nursing care. The incidence rate of complications was 6.06% in the observation group, noticeably lower than 25.00% in the control group. The observation group exhibited remarkably higher left ventricular ejection fraction (LVEF), noninvasive cardiac output (NICO), and stroke volume (SV) but lower left ventricular end-diastolic dimension (LVED) post-nursing than the control group, which indicated that the cardiac function index was superior in the observation group. Following the nursing, the observation group attained higher scores in each item of the World Health Organization Quality of Living Scale (WHOQOL-BREF) than the control group.

Conclusion • The critical illness scoring system is of significant value in constructing a standardized process of early postoperative cardiac surgery in the elderly, which can effectively promote postoperative recovery, reduce the occurrence of complications, protect cardiac function, and improve the quality of life of patients affected. (*Altern Ther Health Med.* 2024;30(12):430-435).

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INTRODUCTION

Clinically, it is perceived as fundamental for post-operative cardiac patients to receive early activity interventions to facilitate recovery and is generally considered a safe and effective means for physical rehabilitation.[1] In a randomized study, Li et al[2] revealed that the application of goal-directed early activity interventions performed in patients after cardiac major vascular surgery not only allowed the effective improvement of body muscle strength and mobility but also reduced the risk of postoperative complications, thereby improving the treatment outcomes and reducing the medical costs and the economic burden on families and society. This helps to confirm the effectiveness of early activity in the postoperative rehabilitation procedure for clinical patients. However, regarding the value of early activity in the postoperative rehabilitation of critically ill patients, clinical data have been investigated, albeit without refining a standardized procedure for early activity based on the condition of the critically ill patients.[3]

Nowadays, the majority of medical institutions and primary care hospitals specify the criteria for patients to receive early activities after cardiac surgery through admission indications, whereas few publications confirmed the implementation of targeted early activities considering the criticality of the patient's condition.[3]

In this study, we have attempted to analyze the construction and effect of a standardized process of early activity based on a critical illness scoring system. To achieve our objectives, we have modified the

Acute Physiology and Chronic Health Evaluation (APACHE II) and Therapeutic Intervention Scoring System (TISS-28) for the critical illness scoring system for our study.

Modifications in our study were driven by the recognition of certain limitations inherent to these comprehensive systems. APACHE II and TISS-28, while widely used, are complex and resource-intensive, and their generic nature may not adequately address the unique characteristics of elderly patients undergoing cardiac surgery. Our modification aimed to tailor the scoring system to this specific population, ensuring its relevance to postoperative care and early activity interventions for elderly patients. By streamlining and customizing the system, we sought to enhance its practicality for routine clinical use, providing a more accurate reflection of the patient's condition and facilitating the implementation of our standardized early activity procedure.

MATERIALS AND METHODS

Study Subjects

In this study, 65 elderly patients who received cardiac surgery in our hospital from January 2020 to January 2022 were selected as the research subjects and divided into the control group (n = 32, from January 2020 to January 2021) and the observation group (n = 33, from February 2021 to January 2022) according to the admission time. Among them, the ratio of male to female patients in the control group was 21:11, aged 60 to 78 years, with an average of (68.88 ± 4.43) years. The ratio of male to female patients in the observation group was 24:9, aged 61 to 81 years, with an average of (70.27 ± 6.05) years. The inter-group comparison presented no significant difference in the baseline data ($P > .05$). This study has been reviewed and approved by the Ethics Committee of our hospital.

Inclusion and exclusion criteria

Inclusion criteria: (a) patients aged over 60 years; (b) patients who met the indications of cardiac surgery after clinical diagnosis and treatment; and (c) patients who were conscious and could cooperate with the treatment and nursing care.

Exclusion criteria: (a) patients with major organ diseases; (b) patients with severe visual and hearing impairment, and movement dysfunction; (c) patients with mental illness or unconsciousness, who were unable to cooperate with the relevant treatment or care; and, (d) those who withdrew from the treatment.

Method

Control group: patients were given routine nursing coupled with circulatory and respiratory system support to maintain normal organ function. Medical staff should guide patients to carry out some activity exercises when they do not demand the ventilator to maintain respiration. As for critically ill patients, bed activities could be adopted, such as regular turning, and raising the head of the bed > 30° to help patients in a semi-recumbent position.

Observation group: standardized procedure of early activity was implemented based on critical illness scores, as follows. (1) Construction of a postoperative condition scoring system for elderly cardiac patients: clinically, elderly patients who underwent cardiac surgery were defined as critically ill patients, and two systems- APACHE II[4] and TISS-28[5], were commonly used as the condition scoring system. Depending on the actual condition of the patient and the possible risk events, and based on our previous clinical experience, we have combined the ideas and concepts of clinical experts and considered the functional characteristics of elderly patients to improve the condition management system for critically ill patients. The main relevant information collected by the system included the clinical physiological indicators, test indicators, and medical prescriptions of the patients, which could be provided to the system to automatically analyze the patient's condition score and grade the degree of condition of elderly critical patients after cardiac surgery according to the different scores, with three levels: low risk (<41 points), moderate risk (41 to 80 points), and high risk (>80 points). (2) Construction of a standardized process for early activity after cardiac surgery: the early activity plan was developed according to the condition of elderly critically ill patients after cardiac surgery in the previous step and the quantitative assessment of the early four-level rehabilitation training program with reference to Lin and other scholars,[6] to determine the expected goals and specific measures of the activity, as shown in Table 1. (3) Implementation of the standardized procedure of early activity for elderly critically ill patients after cardiac surgery: adhering to the principle of gradual and progressive early activity, with the safety of patients as the primary concern, it is essential to arrange on-site guidance by cardiac surgeons for nurses to assist patients to perform ≥ grade III activities, to observe patients' vital signs and tube conditions, and to prevent the occurrence of unexpected events. Immediate discontinuation is required in case of discomfort such as dizziness, vomiting, arrhythmia, risk of accidental extubation, fall, abnormal excitement, or anxiety. Clinical parameters were suboptimal, such as heart rate ≤40 beats/min or >130 beats/min, systolic blood pressure

Table 1. Standardized Flow of Early Activity After Cardiac Surgery

Activity grade	Disease grading	Specific measures
Grade I	High-risk, patients were completely unconscious	Nurses dominated passive joint movements and gave wrist and ankle massages three times a day; turning was performed every 2 hours
Grade II	Intermediate-risk, patients were conscious and had a sedation score > -3 for the Richmond Agitation Sedation Scale (RASS)	Active activities of the patient were the priority, for example, the patient was instructed to perform joint activities of the upper limbs, including flexion and extension of the shoulder, elbow and wrist joints and toe joints, inversion and abduction, etc., and to maintain the sitting position in bed for at least 20 min (3 times/day), with the arm moving against gravity; passive joint activities were supplemented, 3 times/day.
Grade III	Intermediate-risk, patients were conscious with muscle strength of the upper limb assessed as grade 3	Based on level II active activity, the bed sitting position was transitioned to the bedside sitting position for lower limb joint movement, including hip joint, knee joint, ankle joint extension, flexion and extension, and other movements as well as to resist gravity movement of the lower leg; passive joint movement was indispensable, 3 times/day.
Grade IV	Low risk, patients were conscious with muscle strength of lower extremities assessed as grade 4	Based on activity level III, patients were advised to leave the bed for ambulation and actively sit in a chair for at least 20 min daily.

<90 mmHg or >200 mmHg, oxygen saturation <95%, and respiratory rate <12 times/min or >30 times/min.[7]

The construction process of the standardized procedure for early activity after cardiac surgery involves several steps, including the development and selection of specific activities to be included in the procedure. Here is a detailed explanation of the process:

Literature review: The construction process began with a comprehensive review of the existing literature on early activity after cardiac surgery. This involved examining published studies, clinical guidelines, and best practices to identify the range of activities that have been recommended or found beneficial for patients in the early postoperative period.

Expert input: Experts in the field of cardiac surgery and cardiac rehabilitation have been consulted to provide their insights and recommendations. These experts include cardiac surgeons, cardiologists, anesthesiologists, physiotherapists, and other healthcare professionals with expertise in postoperative cardiac care. Their input help in shaping the procedure and selecting appropriate activities.

Clinical practice observation: The research team have observed the current clinical practice in early activity after cardiac surgery within their institution or other healthcare settings. This observation provides valuable information about the activities commonly performed and any variations in practice.

Consensus building: The research team, along with the input from experts and observations from clinical practice, then collaborate to establish a consensus on the specific activities to be included in the standardized procedure. Discussions, meetings, and iterative feedback processes have been employed to reach a consensus on the selection of activities.

Evidence-Based decision-making: The selection of specific activities have been guided by the available evidence on their safety, feasibility, and effectiveness in promoting early recovery and reducing complications after cardiac surgery. The research team has considered studies evaluating the impact of different activities on outcomes such as mobility, pulmonary function, muscle strength, and patient satisfaction.

Pilot testing: Before finalizing the standardized procedure, a pilot testing phase has been conducted. This involves implementing the procedure on a small sample of cardiac surgery patients to evaluate its feasibility, acceptability, and any potential modifications needed. Feedback from patients and healthcare providers involved in the pilot testing inform the refinement of the procedure.

Iterative refinement: The construction process has involved iterative refinement of the standardized procedure based on feedback and evidence gathered during the pilot testing phase. The research team has considered the practicality of implementing the procedure within the specific healthcare setting, ensuring it aligns with the available resources and staff expertise.

Observation indicators

Inter-group comparison of recovery. The nursing staff collected the relevant data of the patients using a table designed by our hospital: ventilator time, ICU stay, the first time to get out of bed after the operation, and the length of hospital stay. Complications such as pulmonary infection, delirium, and venous thrombosis of lower limbs were recorded after nursing in both groups.

Inter-group comparison of the changes in cardiac function pre- and post-nursing. The nursing staff carried out the assessment 24 hours after admission (before nursing) and before discharge (after nursing), involving left ventricular ejection fraction (LVEF), left ventricular end-diastolic dimension (LVED), noninvasive cardiac output (NICO), and stroke volume (SV). LVEF, LVED, NICO, and SV are widely recognized in the medical field and have demonstrated clinical relevance in assessing cardiac function and monitoring postoperative recovery after cardiac surgery. By monitoring these indicators, healthcare providers can evaluate the patient's cardiac performance, guide the management of fluid status, optimize hemodynamics, and tailor interventions to promote effective postoperative recovery and improve patient outcomes.

Inter-group comparison of the quality of life pre- and post-nursing. The nursing staff carried out the assessment 24 hours after admission (pre-nursing) and before discharge (post-nursing). The World Health Organisation Quality of Living Scale (WHOQOL-BREF) was adopted to assess the physical, psychological, social, and environmental domains, covering 29 questions in 4 domains, on a 5-point scale, with higher scores indicating better quality of life.

Early activity interventions for each activity grade and progress monitoring. Early activity interventions were systematically implemented based on the critical illness scoring system, categorizing patients into different grades of risk. For Grade I, involving unconscious patients at high risk, nurses conducted passive joint movements, wrist and ankle massages three times a day, and regular turning every 2 hours. Grade II, targeting conscious patients with moderate risk, emphasized active joint activities, with patients instructed to perform various limb movements and spend at least 20 minutes sitting in bed three times a day. Grade III, focusing on conscious patients with upper limb muscle strength assessed as Grade 3, included transitions to bedside sitting positions and resistance exercises for lower limb joints. Grade IV, for low-risk conscious patients with Grade 4 lower limb muscle strength, encouraged ambulation and active sitting in a chair daily. Progress was meticulously monitored through on-site guidance by cardiac surgeons, continuous observation of vital signs, and regular assessments of recovery indicators and complications, ensuring a safe and effective early activity program tailored to each patient's condition.

Sample size. With these assumed rates, a 2-sided type I error rate of 0.05, a power of 80%, and an assumed dropout rate of 15%, a maximum overall sample size of 65 was chosen.

Statistical analysis

The data of this study were processed and analyzed using SPSS 22.0. The measurement data were expressed as ($\bar{x} \pm s$),

Table 2. Inter-Group Comparison of Recovery After Nursing ($\bar{x} \pm s$)

Stage	Ventilator time (h)	ICU stay (h)	First time to get out of bed after operation (h)	Length of stay (d)
Control group (n = 32)	34.15 ± 2.81	110.72 ± 6.94	109.79 ± 5.34	26.41 ± 2.33
Observation group (n = 33)	31.13 ± 2.54	106.03 ± 5.74	104.13 ± 5.52	22.58 ± 2.44
t	4.548	2.973	4.200	6.357
P value	.000	.005	.000	.000

Figure 1. Inter-Group Comparison of Complications Post-Nursing

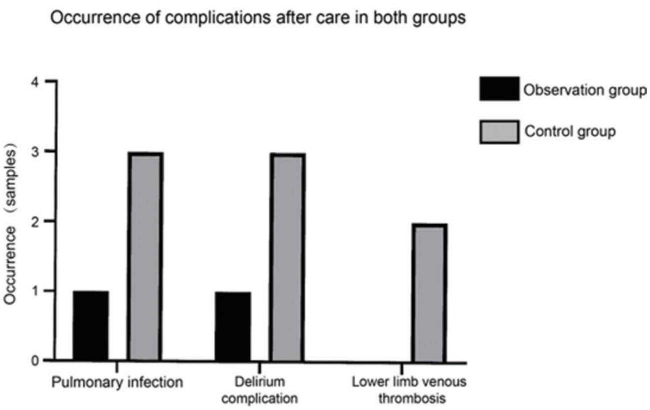

Table 3. Inter-Group Comparison of Changes in Cardiac Function Pre- and Post-Nursing ($\bar{x} \pm s$)

Observation indicators/Group	Stage	Control group (n = 32)	Observation group (n = 33)	*t*	*P* value
LVEF (%)	Pre-nursing	49.28 ± 5.12	48.78 ± 6.01	0.354	.725
	Post-nursing	55.34 ± 3.25[a]	58.16 ± 3.17[a]	3.484	.001
LVED (mm)	Pre-nursing	52.67 ± 4.26	53.03 ± 4.55	0.323	.748
	Post-nursing	45.94 ± 3.11[a]	40.07 ± 3.16[a]	7.419	.000
NICO (l/min)	Pre-nursing	3.31 ± 1.27	3.32 ± 1.40	0.030	.977
	Post-nursing	3.52 ± 1.29[a]	4.84 ± 1.33[a]	3.991	.000
SV (ml)	Pre-nursing	46.02 ± 2.31	46.13 ± 2.28	0.190	.850
	Post-nursing	51.24 ± 3.18[a]	55.32 ± 3.55[a]	4.786	.000

[a]Pre- and post-nursing comparison was performed in the same group, $P < .05$.

Table 4. Inter-Group Comparison of WHOQOL-BREF Scores Pre- and Post-Nursing ($\bar{x} \pm s$)

Observation indicators/ Group	Stage	Control group (n = 32)	Observation group (n = 33)	*t*	*P* value
Physiological domain	Pre-nursing	13.13 ± 3.22	12.98 ± 3.54	0.175	.861
	Post-nursing	16.02 ± 3.29[a]	18.11 ± 3.12[a]	2.587	.012
Psychological domain	Pre-nursing	15.32 ± 3.37	15.34 ± 3.45	0.023	.982
	Post-nursing	18.01 ± 2.26[a]	20.95 ± 3.05[a]	4.311	.000
Social relations domain	Pre-nursing	13.28 ± 1.89	13.03 ± 2.01	0.507	.614
	Post-nursing	16.16 ± 1.09[a]	18.15 ± 1.12[a]	7.134	.000
Environmental domain	Pre-nursing	13.17 ± 0.95	13.23 ± 1.05	0.237	.814
	Post-nursing	16.02 ± 1.31[a]	18.24 ± 1.16[a]	7.134	.000

[a]Pre- and post-nursing comparison was performed in the same group, $P < .05$.

including recovery indicators, cardiac function index, and quality of life score, and tested using the *t* test. The counting data represented the rate of complications and were presented as n% and χ^2 test. $P < .05$ denotes the statistically significant difference for the inter-group comparison.

RESULTS

Inter-group comparison of recovery after nursing

The observation group experienced accelerated recovery post-nursing compared to the control group ($P < .05$), as reported in Table 2.

Inter-group comparison of complications

One case each of pulmonary infection and delirium occurred in the observation group, with a complication rate of 6.06% (2/33); three cases each of pulmonary infection and delirium and two cases of lower limb venous thrombosis were reported in the control group, yielding a complication rate of 25% (8/32). The inter-group comparison showed a statistically significant difference in the rate of complications after nursing ($\chi^2 = 4.477$, $P = .034$), see Figure 1.

Inter-group comparison of changes in cardiac function pre- and post-nursing

Post-nursing, the observation group exhibited higher LVEF, NICO, and SV but lower LVED than the control group. The cardiac function was more advantageous in the observation group ($P < .05$), as shown in Table 3.

Inter-group comparison of quality of life pre- and post-nursing

Following the nursing, the observation group attained higher scores in each item of WHOQOL-BREF compared to the control group ($P < .05$). See Table 4.

DISCUSSION

Currently, surgery is the key treatment modality for cardiac diseases, such as cardiac bypass, interventional procedures, ventricular septal defect repair, atrial septal defect repair, or cardiac valve replacement surgery. According to incomplete statistics, patients undergoing cardiac surgery had a higher incidence of various postoperative complications, which can seriously affect the functional recovery of patients.[8,9] In particular, elderly patients undergoing cardiac surgery had degenerated body functions, and their functional recovery was not as good as that of young and middle-aged patients, together with the frequent occurrence of complications, which may result in unsatisfactory surgical outcomes, prolonged hospitalization, and reduced quality of life.[10] Early postoperative rehabilitation care is proposed for patients undergoing cardiac surgery, and nursing staff are required to pay attention to the nursing guidance of cardiac exercise rehabilitation.[11] At present, no scientific and standardized procedures and protocols have been developed for the early activities of postoperative cardiac patients. In addition, cardiac surgery is a high-risk procedure, and a safe, effective, and standardized early activity program for post-operative cardiac patients with critical illnesses is essential to ensure their prognosis.

The critical care scoring system is an objective scale set up to facilitate the evaluation of patients' conditions with different diseases.[12] In this study, it is proposed that a standardized process of early activity is constructed based on the critical care scoring system to consider the patient's intensity of activity and set the patient's postoperative activity goals by assessing the criticality of the patient's condition, and to implement the activity plan according to these goals to obtain the optimal results. In this study, as Table 2 illustrated, after the construction of this nursing process, the recovery of patients in the observation group was significantly improved, such as the length of hospital stay, ventilator use, ICU stay, and first postoperative bed activity were shorter than those in the control group, indicating that the construction of standardization procedure of early activity based on the critical care scoring system had a positive impact on the postoperative recovery of elderly cardiac surgery patients.

The nursing process was implemented with a person-centered concept, taking the patient as the center and launching a series of nursing processes from the actual condition degree of the patient as the starting point, which eventually effectively shortened the recovery time of the patients and reduced the family and medical burden. In addition, this study also counted the complications of patients in both groups, and the observation group had a lower complication rate.

Granting patients early activity based on a critical care scoring system presents the following benefits from a clinical perspective: (1) it effectively improves coronary blood flow and increases LVEF and SV, thereby protecting cardiac function and improving blood supply;[13,14] (2) it increases vital capacity and improves the ventilation and ventilation environment, which not only effectively expels secretions from the trachea and bronchi, but also reduces the risk of pulmonary complications; (3) it effectively restores gastrointestinal function and prevents dyspnea caused by abdominal distension without affecting surgical incision healing; (4) early mobilization can also effectively prevent deep venous thrombosis of lower extremity caused by long-term bed rest in patients.[15] Tu Dan[16] showed that the incidence of delirium in the observation group was lower in a study on the preventive effect of early mobilization combined with occupational therapy on delirium in patients after cardiac surgery, which was consistent with the report of this study. In addition, after early mobilization of critical illness scoring system for elderly patients after cardiac surgery, the cardiac function and quality of life in the observation group were significantly better than those in the control group. After cardiac surgery, cardiac function decreases and myocardial structure changes significantly, and early activities could slow down the process of myocardial remodeling, enhance cardiovascular reserve, and improve cardiac function. On the other hand, in a study by Guo Huijie et al,[17] it was reported that critically ill patients undergoing cardiac surgery need to be bedridden for a long period, resulting in the patient's mood and sleep quality being affected and the sympathetic nerves being stimulated and prone to negative emotions, which, together with physical discomfort, deteriorates the patient's quality of survival. A large body of clinical data demonstrates that patients with cardiovascular disease undergoing early activity experience improved function, remarkable improvement in quality of survival, and an accelerated rehabilitation process.[18] In this study, the construction of a standardized process of early activities based on the critical illness scoring system can also effectively prompt nursing staff to understand the early warning of disease risk and implement risk control. The critical illness scoring results obtained from multiple dimensions can help to avoid the scoring errors caused by accidents, thus ensuring that scientifically correct early activities are effectively implemented. This can help to make risk management more standardized and effective, and ultimately deliver optimal clinical outcomes.

Benefits

The standardized procedure of early activity after cardiac surgery, based on the critical illness scoring system, holds the potential for significant long-term benefits on patient outcomes beyond the immediate postoperative period. One of the key long-term advantages is the potential for improved cardiovascular health. Early mobilization and activity have been associated with enhanced coronary blood flow, increased LVEF, and improved SV. These cardiovascular improvements can contribute to the long-term preservation of cardiac function and may reduce the risk of future cardiac events.

Moreover, the early initiation of rehabilitation activities could positively impact respiratory function. By encouraging early ambulation and respiratory exercises, the standardized procedure may prevent complications such as pulmonary infections and decrease the risk of respiratory issues in the long run. Improved respiratory function can enhance overall pulmonary health, potentially reducing the incidence of respiratory-related complications in the future.

Additionally, the positive effects on the quality of life observed in the postoperative period may have enduring benefits. The standardized procedure's focus on person-centered care and early mobilization aligns with the principles of patient-centered rehabilitation, which can contribute to sustained improvements in physical function, psychological well-being, and social engagement over the long term.

Furthermore, the reduction in complications observed during the implementation of the standardized procedure, such as the lower incidence of delirium and thrombosis, suggests a potential long-term impact on reducing the burden of postoperative complications. This, in turn, may lead to shorter hospital stays and decreased healthcare costs, contributing to the overall economic and social well-being of patients.

Challenges

The implementation of the standardized early activity procedure faced several potential challenges and difficulties. One notable challenge was the varying degrees of patient compliance and tolerance to the prescribed activities, especially for those in higher-risk categories. Some patients may have experienced discomfort, dizziness, or anxiety during early mobilization, potentially hindering adherence to the recommended exercises.

To address these challenges, a person-centered approach was employed, tailoring the early activity plan to individual patient needs and capabilities. Continuous communication with patients was emphasized to address concerns and ensure their comfort. Additionally, the on-site guidance by cardiac surgeons played a crucial role in closely monitoring patients' responses and promptly modifying the activity plan if adverse reactions occurred.

Another challenge was the need for interdisciplinary coordination among nursing staff, physical therapists, and other healthcare professionals. Coordinating the frequency and duration of activities, especially in a busy healthcare environment, required effective communication and collaboration. Regular team meetings and training sessions were conducted to enhance interdisciplinary understanding and cooperation.

Moreover, the standardized procedure's success relied on accurate and timely critical illness scoring. Challenges related to scoring accuracy and potential bias were mitigated through comprehensive training of healthcare staff responsible for scoring. Regular audits and feedback sessions were implemented to ensure consistency and reliability in the application of the critical illness scoring system.

Implications

Healthcare professionals, particularly nurses and rehabilitation specialists, can benefit from incorporating a standardized procedure into their clinical practice. The detailed activity grades and associated measures provided in the study offer a practical guide for designing and implementing early activity interventions tailored to the criticality of each patient's condition. Regular training and education sessions for healthcare staff on the critical illness scoring system and the associated standardized procedure can enhance their competence and confidence in delivering optimal care.

Institutions should consider integrating the standardized procedure into their cardiac surgery protocols. This may involve updating clinical guidelines, developing standardized training modules for staff, and establishing monitoring mechanisms to ensure adherence to the procedure. Collaboration between healthcare disciplines, including nursing, physiotherapy, and critical care teams, is crucial for the successful implementation of the standardized procedure.

Furthermore, healthcare institutions may explore the use of technology to facilitate the monitoring and documentation of patient progress in real-time. Digital platforms and electronic health records can streamline communication among healthcare professionals and provide a comprehensive overview of patient outcomes. Regular audits and quality improvement initiatives can help institutions assess the effectiveness of the standardized procedure and make necessary adjustments to optimize patient care.

Limitations

Despite several strengths, it is essential to acknowledge the potential limitations and sources of bias in the study. One significant limitation is the potential impact of patient compliance with the early activity program. The success of the standardized procedure relies on patients' ability and willingness to adhere to the prescribed activities, frequency, and duration. Factors such as patient motivation, physical condition, and overall health could influence compliance. Non-compliance or incomplete adherence to the early activity program might introduce bias and affect the overall outcomes of the study.

Additionally, the lack of information on patient characteristics, such as comorbidities, pre-existing conditions, and socio-economic factors, is a limitation. These factors can influence both the implementation of the standardized procedure and patient outcomes. Without detailed information on these variables, it's challenging to assess their potential impact on the study results.

Moreover, the study does not provide information on the long-term follow-up of patients beyond the immediate postoperative period. Understanding the sustained effects of the standardized procedure on patient outcomes would enhance the study's overall relevance and applicability.

To address these limitations, future research could incorporate measures to improve patient compliance, such as patient education, ongoing support, and closer monitoring. Including a more comprehensive assessment of patient characteristics and extending the follow-up period would provide a more in-depth understanding of the intervention's long-term impact and potential biases in the study.

CONCLUSION

In summary, the critical illness scoring system is of significant value in the construction of a standardized process of early postoperative activities in elderly patients after cardiac surgery, which can effectively promote postoperative recovery, reduce the occurrence of complications, protect cardiac function, and improve the quality of life of patients.

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The authors have no conflicts of interest to declare.

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