

Transition model of caregiver supported nursing intervention to smoothen the transition from critical care

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Abstract

Background:

The transition from the critical care unit to the general ward and home is a vulnerable period, especially for children with complex healthcare needs. Caregivers play a crucial role during this phase but often face challenges due to the lack of structured training and guidance.

Objective:

This study aimed to assess the effectiveness of a transition care model designed to facilitate safe transition from the critical care unit by improving caregiver knowledge and skills.

Methods:

A quasi-experimental study was conducted among 160 caregivers of children admitted to the Pediatric Intensive Care Unit. Caregivers were divided into two groups: the control group received standard discharge care, while the intervention group received a caregiver-supported Transition Care Model. The intervention included structured education, hands-on training, and follow-up support. Data were collected using a researcher-developed caregiver knowledge questionnaire, caregiver satisfaction scale, and post-transition telephone follow-up proforma. Content validity was established by expert review (CVI = 0.90–1.00). Outcomes included caregiver knowledge, satisfaction, emergency visits, unscheduled outpatient visits, and follow-up adherence.

Results:

The intervention group showed a significant improvement in caregiver knowledge. The intervention group demonstrated a higher mean post-test score (17.50 ± 4.87) compared to the control group (7.97 ± 2.09). Readmission rates were lower in the intervention group (8%) compared to the control group (41.3%) ($p < 0.05$).

Conclusion:

The caregiver-supported transition care model improved caregiver preparedness and reduced readmissions. Further studies are recommended to evaluate long-term outcomes.

Introduction

Transition from the paediatric intensive care unit (PICU) to ward or home is a critical phase for children and their families. Children recovering from critical illness or surgery often have complex healthcare needs requiring continuous and coordinated care after discharge. During this period, they remain vulnerable to complications, prolonged recovery, and physical and emotional challenges, making the transition process particularly demanding (1, 2).

Caregivers play a central role in ensuring continuity of care during this transition. Their responsibilities extend beyond basic caregiving to include medication administration, nutritional management, monitoring for warning signs, and handling medical devices. However, many caregivers feel unprepared for these responsibilities and experience stress, anxiety, and lack of confidence due to inadequate discharge preparation and limited support (3, 4). Difficulties in understanding discharge instructions and ineffective communication with healthcare providers further contribute to caregiver burden.

Structured transition care programs have been shown to improve caregiver preparedness by enhancing knowledge, skills, and confidence. Interventions that include education, hands-on training, and follow-up support have demonstrated reductions in caregiver anxiety and improvements in caregiving practices and child outcomes (5). Despite this, most existing research focuses on adult populations or general chronic care, with limited attention to paediatric ICU-to-home transitions.

There remains a gap in structured, caregiver-focused transition interventions tailored specifically for children with complex care needs following PICU discharge (6). Therefore, the present study aimed to develop and evaluate a caregiver-supported nursing intervention model to facilitate a safe and effective transition from critical care to home, with a focus on improving caregiver preparedness and post-discharge outcomes.

Methodology

Study Design

This study utilized a quasi-experimental design with control and experimental groups to assess the effectiveness of a Nurse-Led Transitional Care Model (TCM) for caregivers of children in the Pediatric Intensive Care Unit (PICU). The study was interventional, and convenience sampling was employed for participant selection. The study was interventional but non-randomized; participants were allocated to the control and intervention groups without random sequence generation.

Clinical trial registration: The study was registered with the Clinical Trials Registry–India (CTRI) under registration number CTRI/2023/07/054787 dated 23.06.2023.

Study Setting

The study was conducted in the Pediatric Intensive Care Unit (PICU), a tertiary care academic hospital in Odisha, India. The majority of PICU admissions were from the emergency department, with occasional transfers from the Pediatric Medicine ward. All pediatric transfers to the PICU were considered for inclusion in the study.

Sample Selection

- The sample size was calculated using G*Power software with a power of 80% and a significance level of 5%, based on the effect size reported in the study by [Cechinel-Peiter C, Lanzoni GMM et.al,2022]. The minimum required sample size was estimated to be 80 participants per group. Considering possible attrition, 80 caregivers were recruited in each group.

Inclusion Criteria:

- Caregivers whose children were planned for discharge from the PICU.

Exclusion Criteria:

- Caregivers unwilling to participate or not providing consent.

The sample size of 160 participants (80 in each group) was determined based on a power calculation of 80% using previous study data.

Data Collection Tools

The data collection tools included a caregiver knowledge questionnaire, satisfaction rating scale, and post-transition telephone follow-up proforma. These tools were developed by the researchers based on literature review. Content validity was established by five subject experts. The English versions of the tools are provided as Supplementary File 1. The study utilized three researcher-developed instruments: the Caregiver Knowledge Questionnaire, Caregiver Satisfaction Scale, and Post-Transition Telephone Follow-up Proforma. Content validity of all instruments was established through expert review, with the Content Validity Index (CVI) ranging from 0.90 to 1.00, indicating excellent content validity. The Caregiver Knowledge Questionnaire demonstrated good internal consistency reliability with a Cronbach's alpha coefficient of 0.80, while the Caregiver Satisfaction Scale demonstrated excellent reliability with a Cronbach's alpha coefficient of 0.90. The Post-Transition Telephone Follow-up Proforma was used to document healthcare utilization outcomes, including emergency department visits, unscheduled outpatient visits, and follow-up adherence, and was subjected to expert validation prior to use.

Control Group (Standard Discharge Care)

Caregivers in the control group received standard discharge care routinely provided in the pediatric department. This included verbal instructions from physicians and nurses regarding the child's diagnosis, medications, dietary recommendations, home care, warning signs requiring medical attention, and scheduled follow-up visits. No structured transition-care program, educational booklet, telephone follow-up, or post-discharge support was provided to this group.

Intervention Details

The Nurse-Led Transitional Care Model (TCM) was implemented in the experimental group, focusing on caregiver education, skill-building, and follow-up to ensure smooth transitions of care from the PICU to home.

Plan of Intervention

Admission Phase

Baseline assessment was conducted on the day of PICU admission, including the child's clinical status and caregiver's existing knowledge. This helped identify individualized care needs and guided the planning of tailored education and training.

ICU Phase

From Day 2 of PICU stay, caregivers received structured daily education (20–25 minutes) covering disease information, medication, warning signs, and post-discharge care. Teaching methods included videos, presentations, demonstrations, and reinforcement sessions. Hands-on training was provided for essential skills such as NG tube feeding, nebulization, suctioning, medication calculation, and input-output monitoring. Caregiver competency was assessed using the teach-back method.

Ward Phase

During the ward stay, caregivers received reinforcement sessions and practiced learned skills. Gaps identified during ICU training were addressed, and final teach-back sessions were conducted to ensure readiness for discharge and independent caregiving.

Discharge Phase

At discharge, caregiver knowledge was reassessed. A home-care booklet (in Odia) containing disease information, medication instructions, warning signs, and emergency contacts was provided to support home management.

Post-Discharge Phase

Follow-up was conducted via telephone every 15 days up to 45 days post-discharge to monitor the child's condition, address caregiver concerns, track readmissions or emergency visits, and reinforce care practices.

Data Analysis

Data were tested for normality using the Shapiro–Wilk test, which indicated a non-normal distribution ($p < 0.05$). Therefore, non-parametric statistical tests were applied. Descriptive statistics were used to summarize demographic variables and study outcomes. Differences between control and intervention groups were analyzed using appropriate non-parametric tests (Mann–Whitney U test), with a significance level set at $p < 0.05$. The analysis evaluated changes in caregiver knowledge, skill

competency, satisfaction, and healthcare utilization outcomes, including readmissions and emergency visits.

Results

The study aimed to assess the effectiveness of an intervention on caregivers' knowledge and satisfaction regarding the care of children with congenital heart disease. The results are divided into three main domains: Demographic Information, Knowledge Scores, and Satisfaction Feedback.

Table 1
Demographic characteristics of caregivers in the control and intervention groups (n = 160)

Variables	Categories	Control Group n (%)	Intervention Group n (%)
Age	< 20 years	1 (1.3)	—
	20–29 years	47 (58.8)	56 (70.0)
	30–39 years	32 (40.0)	24 (30.0)
Relationship with Child	Mother	48 (60.0)	42 (52.5)
	Father	32 (40.0)	37 (46.3)
	Other	—	1 (1.3)
Educational Qualification	10th pass	33 (41.3)	30 (37.5)
	12th pass	38 (47.5)	36 (45.0)
	Graduate	9 (11.3)	14 (17.5)
Occupation	Business	17 (21.3)	19 (23.8)
	Farming	7 (8.8)	3 (3.8)
	Job	18 (22.6)	24 (30.0)
	Housewife	38 (47.6)	34 (42.5)
History of Family Disease	No	23 (28.8)	37 (46.3)
	HTN	44 (55.0)	33 (41.3)
	Diabetes	13 (16.3)	8 (10.0)
	Other	—	2 (2.5)

Table 1 presents the demographic characteristics of caregivers in both the control and intervention groups (n = 160). In both groups, the majority of caregivers were aged 20–29 years, mothers, and had completed secondary education. Housewife was the most common occupation among caregivers. Hypertension was the most frequently reported family health condition in both groups.

Table 2
Demographic characteristics of children in the control and intervention groups (n = 160)

Variables	Categories	Control Group n (%)	Intervention Group n (%)
Development Category	Infant	42 (52.5)	34 (42.5)
	Toddler	4 (5.0)	10 (12.5)
	Preschooler	8 (10.0)	9 (11.3)
	School-age	10 (12.5)	18 (22.5)
	Adolescence	16 (20.0)	9 (11.3)
Gender	Male	48 (60.0)	56 (70.0)
	Female	32 (40.0)	24 (30.0)
Previous History of Hospitalization	Yes	73 (91.25)	14 (17.5)
	No	7 (8.75)	66 (82.5)
Disease Category	Neurological Disorders	4 (5.0)	18 (22.5)
	Cardiac Disorders	11 (13.75)	2 (2.5)
	Respiratory Disorders	19 (23.75)	23 (28.8)
	Gastrointestinal Disorders	18 (22.5)	5 (6.3)
	Genitourinary Disorders	8 (10.0)	17 (21.3)
	Foreign Body Aspiration	5 (6.25)	4 (5.0)
	Carcinoma	4 (5.0)	—
	Other Disorders	10 (12.5)	11 (13.0)
Comorbidity Present	No	66 (82.5)	60 (75.0)
	Respiratory Problem	7 (8.75)	20 (25.0)
	Other Conditions	7 (8.75)	—

Table 2 presents the demographic characteristics of children in both the control and intervention groups (n = 160). In both groups, the majority of children were infants and male. Respiratory disorders were the most common diagnosis, and most children had no comorbid conditions. A higher proportion of children in the control group had a previous history of hospitalization compared to the intervention group.

Table 3
Descriptive statistics of post-test knowledge scores among caregivers in the control and intervention groups (n = 160)

Group	Minimum Score	Maximum Score	Mean $\pm$ SD	Range
Control Group (n = 80)	3	15	7.97 $\pm$ 2.09	12
Intervention Group (n = 80)	10	30	17.50 $\pm$ 4.87	20

Table 3 presents the descriptive statistics of post-test knowledge scores among caregivers in both groups. The intervention group demonstrated a higher mean post-test score (17.50 $\pm$ 4.87) compared to the control group (7.97 $\pm$ 2.09).

Table 4
Comparison of post-test knowledge scores between the control and intervention groups using the Mann–Whitney U test (n = 160)

Variable	Group	Mean Rank	Sum of Ranks	Mann–Whitney U	Z value	p-value
Post-test Knowledge Score	Control Group	41.57	3325.50	85.50	-	< 0.001*
	Intervention Group	119.43	9554.50		10.652	

Table 4 presents the comparison of post-test scores between the control and intervention groups using the Mann–Whitney U test. A statistically significant difference was observed between the groups (U = 85.50, Z = -10.652, p < 0.001), with the intervention group demonstrating higher mean ranks than the control group.

Table 5
Comparison of caregiver satisfaction scores between the control and intervention groups using the Mann–Whitney U test (n = 160)

Variable	Mann–Whitney U	Wilcoxon W	Z value	p-value
Satisfaction Score	0.00	3240.00	-11.578	< 0.001*

Table 5 shows the comparison of caregiver satisfaction scores between the two groups using the Mann–Whitney U test. A statistically significant difference was observed in satisfaction scores between the control and intervention groups (U = 0.000, Z = -11.578, p < 0.001). Caregivers in the intervention group reported higher satisfaction with transition care services compared to the control group.

Table 6
Healthcare utilization outcomes among the control and intervention groups (n = 160)

Outcome	Group	Mean Rank	U Value	Z Value	p-value
Emergency Visits	Control Group	91.00	2160.00	-4.732	< 0.001*
	Intervention Group	70.00			
Unscheduled OPD Visits	Control Group	94.00	2120.00	-4.733	< 0.001*
	Intervention Group	67.00			
Adherence to Follow-up	Control Group	72.00	3120.00	-0.340	0.734
	Intervention Group	89.00			

Table 6 presents healthcare utilization outcomes among participants in both groups. The intervention group had fewer emergency visits (8.0%) compared to the control group (41.3%). Similarly, unscheduled OPD visits were lower in the intervention group (11.3%) than in the control group (45.0%). Follow-up adherence was slightly higher in the intervention group (32.5%) compared to the control group (30.0%).

Discussion

The present study evaluated the effectiveness of a nurse-led transition care model in improving post-discharge care among pediatric patients. The findings demonstrated significant improvements in caregivers' ability to manage their child's care, including better understanding of medication administration, increased confidence in recognizing emergency signs, and improved follow-up care adherence. These results are consistent with previous studies showing that telephonic follow-up support reduces 30-day readmissions and enhances caregiver satisfaction in pediatric post-surgical patients⁷. Similarly, structured post-discharge support, including telephone follow-up, has been shown to improve understanding of care and reduce complications in surgical patients^{8–10}. However, some studies have reported that caregiver education improves knowledge but does not significantly influence medication adherence or complication rates, possibly due to less interactive approaches. The strength of the present study lies in its tailored, nurse-led intervention combining education with practical skill training. Nevertheless, limitations such as a relatively small sample size and lack of long-term follow-up should be considered. Future research should include larger, more diverse samples and extended follow-up periods to assess sustained outcomes. An important consideration in the present study is the presence of baseline differences between the control and intervention groups, particularly regarding previous hospitalization history and certain clinical characteristics. Caregivers of previously hospitalized children may have had greater prior exposure to healthcare information and caregiving practices, which could influence preparedness and healthcare utilization outcomes. As the study employed a non-randomized quasi-experimental design, these differences may have introduced confounding effects. Therefore, although the intervention demonstrated significant improvements in caregiver outcomes, the findings should be interpreted with caution.

Limitations

This study has several limitations that should be considered while interpreting the findings. First, the study was conducted in a single tertiary care hospital, which may limit the generalizability of the findings to other healthcare settings. Second, convenience sampling and the quasi-experimental non-randomized design may have introduced selection bias and reduced comparability between groups. Third, some outcomes such as caregiver satisfaction and preparedness were self-reported and may be influenced by response bias. Fourth, follow-up was limited to 45 days post-discharge; therefore, long-term sustainability of the intervention could not be evaluated. Finally, the study did not assess the economic burden or cost-effectiveness of the transition care model.

Conclusion

The findings of this study suggest that the nurse-led transition care model may improve caregiver knowledge, preparedness, and satisfaction during the ICU-to-home transition. The intervention was also associated with reduced emergency visits and unscheduled healthcare utilization. However, due to the single-center quasi-experimental design and short follow-up period, the findings should be interpreted cautiously. Further multicenter studies with larger samples and longer follow-up are recommended to confirm the effectiveness and sustainability of the intervention.

Declarations

Funding Declaration: No funding was received

Author Contribution

SRP: Conceptualization, study design, data collection, data analysis, and manuscript drafting.

APS: Supervision, methodological guidance, critical revision of the manuscript, and final approval.

BD: Data analysis support, interpretation of results, and manuscript review and editing.

All authors read and approved the final manuscript.

Data Availability

The datasets generated and/or analyzed during the current study are not publicly available due to institutional and ethical restrictions but are available from the corresponding author on reasonable request, with permission from the Institutional Ethics Committee, All India Institute of Medical Sciences Bhubaneswar (IEC approval no. IEC/AIIMS BBSR/Nursing/2022-23/03) .

Clinical trial registration: Clinical Trials Registry–India (CTRI), CTRI/2023/07/054787; first registration date: [DD/MM/YYYY].

Human Ethics and Consent to Participate Declarations

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Ethics Committee, All India Institute of Medical Sciences Bhubaneswar (IEC approval no. IEC/AIIMS BBSR/Nursing/2022-23/03) . Written informed consent was obtained from all participating caregivers prior to enrolment in the study. For participants under the age of 16 years, written informed consent was obtained from parents or legal guardians, and assent was obtained from children whenever developmentally appropriate. Participants aged 16 years and above provided their own informed consent to participate. All procedures were carried out according to institutional ethical guidelines.

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