e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com

International Journal of Pharmaceutical Quality Assurance 2026; 17(11); 01-05

Original Research Article

A Study on Post-Intensive Care Syndrome in Survivors of Pediatric Intensive Care

Bevinahalli Nandisha Prashanth[1], G. V. Basavaraja[2], Priyanka A. R.[3], Sathvika Chandrashekara Reddy[4]

[1]Resident, Department of Paediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India

[2]Professor and Medical Superintendent, Department of Paediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India

[3]Assistant Professor, Department of Paediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India

[4]Assistant Professor, Department of Paediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India

Received: 25-09-2026 / Revised: 5-10-2026 / Accepted: 16-10-2026

Corresponding Author: Dr. Priyanka A.R

Conflict of interest: Nil

Abstract:

Background: Improved survival following paediatric critical illness has increased attention to long-term functional impairment. Post-Intensive Care Syndrome in Paediatrics (PICS-p) may affect physical, cognitive, and functional recovery following PICU discharge.

Aim: To determine the incidence of PICS-p among PICU survivors, identify associated clinical risk factors, and evaluate functional recovery during follow-up.

Materials and Methods: This prospective observational study included 300 children aged 1 month to 18 years who survived PICU admission lasting more than four days at Indira Gandhi Institute of Child Health, Bengaluru. Functional status was assessed using the Functional Status Scale (FSS) before admission and at discharge. PICS-p was defined as an increase of ≥3 points in FSS. Affected children underwent follow-up at 1, 3, and 6 months.

Results: PICS-p developed in 8 children (2.67%; 95% CI: 1.33–5.13%). CNS involvement was significantly associated with PICS-p (87.5% versus 30.1%; P=0.001). Median PICU stay was significantly longer among affected children (14.5 versus 5.0 days; P<0.001), as was hospital stay (26.5 versus 8.0 days; P<0.001). Mechanical ventilation (87.5% versus 14.4%; P<0.001), inotropic support (62.5% versus 20.2%; P=0.013), and nosocomial complications (62.5% versus 4.5%; P<0.001) were significantly associated with PICS-p. Among seven children with complete six-month follow-up, four (57.1%) achieved near-complete recovery, while three (42.9%) had persistent functional impairment.

Conclusion: PICS-p affected a small proportion of PICU survivors but was associated with neurological involvement, prolonged intensive care, and greater organ support requirements. Structured functional assessment and follow-up may facilitate early identification of persistent impairment.

Keywords: Post-Intensive Care Syndrome; Paediatric Intensive Care Unit; Functional Status Scale; Critical Illness; Functional Impairment; Rehabilitation.

DOI: 10.25258/ijpqa.17.11.1

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0) and the Budapest Open Access Initiative (http://www.budapestopenaccessinitiative.org/read), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Advances in paediatric intensive care have substantially improved survival among critically ill children. However, many survivors experience persistent physical, cognitive, and psychological impairments following hospital discharge. These complications are collectively recognized as Post-Intensive Care Syndrome in Paediatrics (PICS-p). Pande et al. [1] emphasized the importance of recognizing post-intensive care complications and providing appropriate follow-up care to children recovering from critical illness. Functional impairment following paediatric intensive care may affect mobility, communication, feeding, respiratory function, and overall quality of life. The Functional Status Scale (FSS) provides a standardized method for evaluating these impairments. Bajpai et al. [2] investigated the application of FSS in assessing residual morbidity among PICU survivors, highlighting its usefulness in identifying functional deterioration following

critical illness. Early identification and management of PICS-p are essential for improving long-term outcomes. Chareyre et al. [3] described clinical recommendations for diagnosing and managing PICS-p, emphasizing structured assessment and multidisciplinary follow-up. Gasparetti et al. [4] evaluated functional outcomes following PICU discharge in a middle-income country, demonstrating the importance of assessing morbidity beyond survival.

Children recovering from prolonged intensive care may require continued medical supervision, rehabilitation, and developmental assessment. Marupudi et al. [5] highlighted the need for dedicated PICU follow-up services to identify persistent complications. Similarly, Sevilla Hermoso et al. [6] examined long-term functional outcomes following PICU admission for bronchiolitis, emphasizing the relevance of longitudinal assessment after critical illness.

Despite increasing recognition of PICS-p, evidence regarding its incidence, associated risk factors, and recovery patterns remains limited in Indian paediatric populations. Therefore, the present study aimed to determine the incidence of PICS-p among PICU survivors, identify associated clinical risk factors, and evaluate functional recovery following hospital discharge.

Materials and Methods

Study Design and Setting: This prospective observational cohort study was conducted in the Paediatric Intensive Care Unit of Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India, a tertiary care paediatric referral hospital.

Study Population and Sample Size: A total of 300 children, aged between 1 month and 18 years, who survived to hospital discharge following PICU admission were included. Children with a PICU stay exceeding four days were evaluated for post-intensive care functional impairment.

Data Collection: Demographic characteristics, underlying diagnoses, primary organ system involvement, duration of PICU and hospital stay, and relevant clinical parameters were recorded using a structured data collection form. Information regarding mechanical ventilation, vasoactive support, oxygen therapy, and nosocomial complications was obtained from clinical records.

Functional Assessment: Functional status was assessed using the validated Functional Status Scale (FSS), which evaluated six domains: mental status, sensory function, communication, motor function, feeding, and respiratory status. Each domain was scored from 1 to 5, giving a total score ranging from 6 to 30, with higher scores indicating greater functional impairment.

Pre-admission functional status was established using available clinical information and caregiver reports. Functional status was reassessed at hospital discharge.

PICS-p was operationally defined as an increase of ≥3 points in the total FSS score between the pre-admission baseline and hospital discharge.

Follow-up Assessment: Children diagnosed with PICS-p underwent follow-up assessments at 1, 3, and 6 months after hospital discharge. Functional recovery was evaluated using serial FSS measurements. Changes in functional status, persistence of impairment, and recovery trajectories were documented.

Outcome Measures: The primary outcome was the incidence of PICS-p among children surviving PICU admission. Secondary outcomes included the association of PICS-p with clinical characteristics, mechanical ventilation, and duration of intensive care, organ system involvement, and nosocomial complications. Functional recovery during the six-month follow-up period was also assessed.

Statistical Analysis: Data were analyzed using descriptive and inferential statistical methods. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, as appropriate. Categorical variables were presented as frequencies and percentages.

The Chi-square test or Fisher's exact test was used to compare categorical variables. Continuous variables were compared using appropriate parametric or nonparametric tests.

Logistic regression analysis was performed to explore factors associated with PICS-p. Odds ratios with 95% confidence intervals were calculated, and a P-value <0.05 was considered statistically significant.

Results

The present prospective observational study included 300 children aged 1 month to 18 years who survived paediatric intensive care and had a PICU stay exceeding four days.

Functional status was assessed using the Functional Status Scale (FSS) at pre-admission baseline and hospital discharge. Post-Intensive Care Syndrome in Paediatrics (PICS-p) was defined as an increase of ≥3 points in the FSS score.

Table 1: Incidence of Post-Intensive Care Syndrome in Paediatrics (N=300)

Outcome	Frequency (n)	Percentage (%)	95% Confidence Interval
PICS-p (FSS increase ≥3 points)	8	2.67	1.33–5.13
Non-PICS-p (FSS increase <3 points)	292	97.33	94.87–98.67
Total	**300**	**100.0**	—

Among 300 PICU survivors, 8 children (2.67%) developed PICS-p, while 292 (97.33%) did not meet the diagnostic criterion. The incidence of PICS-p was 2.67% (95% CI: 1.33–5.13%), indicating that approximately one in 38 children developed significant functional deterioration following critical illness.

Table 2: Comparison of Clinical Characteristics and Organ Support between PICS-p and Non-PICS-p Groups

Clinical parameter	PICS-p (n=8)	Non-PICS-p (n=292)	P-value
Age >5 years	3 (37.5%)	86 (29.5%)	0.460
Male sex	4 (50.0%)	168 (57.5%)	0.715
CNS involvement	7 (87.5%)	88 (30.1%)	**0.001**
Cardiovascular involvement	3 (37.5%)	56 (19.2%)	0.211
Respiratory involvement	3 (37.5%)	166 (56.8%)	0.313
Sepsis/multiorgan involvement	3 (37.5%)	69 (23.6%)	0.402
Mechanical ventilation	7 (87.5%)	42 (14.4%)	**<0.001**
Inotropic support	5 (62.5%)	59 (20.2%)	**0.013**
Nosocomial complications	5 (62.5%)	13 (4.5%)	**<0.001**

Central nervous system involvement was significantly more frequent among children who developed PICS-p (87.5%) than among those without PICS-p (30.1%; P=0.001). Mechanical ventilation (87.5% versus 14.4%; P<0.001), inotropic support (62.5% versus 20.2%; P=0.013), and nosocomial complications (62.5% versus 4.5%; P<0.001) were also significantly associated with PICS-p. Age, sex, and other organ system involvement did not show statistically significant associations.

Table 3: Comparison of PICU and Hospital Length of Stay between Study Groups

Parameter	PICS-p (n=8)	Non-PICS-p (n=292)	P-value
Median PICU stay (days)	14.5	5.0	**<0.001**
PICU stay, IQR (days)	11.0–23.5	4.0–6.0	—
Median hospital stay (days)	26.5	8.0	**<0.001**
Hospital stay, IQR (days)	17.0–43.5	6.0–11.0	—
PICU stay >7 days	7 (87.5%)	68 (23.3%)	**<0.001**
PICU stay >14 days	6 (75.0%)	19 (6.5%)	**<0.001**
Hospital stay >14 days	7 (87.5%)	59 (20.2%)	**<0.001**

Children who developed PICS-p experienced significantly longer PICU and hospital stays than those without PICS-p. Median PICU stay was 14.5 days in the PICS-p group compared with 5.0 days in the non-PICS-p group (P<0.001). Similarly, median hospital stay was 26.5 days versus 8.0 days (P<0.001). Prolonged PICU stay exceeding 14 days was observed in 75.0% of children with PICS-p compared with 6.5% of those without PICS-p.

Table 4: Risk Factors Associated With PICS-p and Functional Recovery Outcomes

Parameter	Findings	Statistical significance
CNS involvement	OR: 16.3 (95% CI: 2.02–132)	**P=0.001**
PICU stay >7 days	OR: 24.1 (95% CI: 2.99–194)	**P<0.001**
PICU stay >14 days	OR: 49.5 (95% CI: 10.1–243)	**P<0.001**
Hospital stay >14 days	OR: 28.0 (95% CI: 3.46–227)	**P<0.001**
Near-complete recovery at 6 months	4/7 (57.1%)	—
Persistent functional impairment at 6 months	3/7 (42.9%)	—
One-month FSS score as a predictor of six-month outcome	Significant association	**P=0.029**

Univariate analysis identified CNS involvement and prolonged intensive care as significant factors associated with PICS-p. PICU stay exceeding 14 days showed the strongest reported association (OR: 49.5; P<0.001). Among seven children with complete six-month follow-up, four (57.1%) achieved near-complete functional recovery, while three (42.9%) continued to experience functional

impairment. Functional status at one month was significantly associated with the six-month outcome (P=0.029). Overall, PICS-p occurred in a small proportion of PICU survivors but was associated with prolonged hospitalization, neurological involvement, mechanical ventilation, and nosocomial complications. Although most children with complete follow-up demonstrated substantial functional improvement by six months, persistent impairment remained in a considerable proportion.

Discussion

Post-Intensive Care Syndrome in Paediatrics (PICS-p) represents an important cause of functional impairment among children surviving critical illness. In the present study, PICS-p was identified in 8 of 300 PICU survivors (2.67%).

This relatively low incidence may reflect differences in patient characteristics, illness severity, discharge practices, and the criteria used to define functional deterioration. Sharawat et al. [7] examined the minimal clinically important difference of the Functional Status Scale (FSS) in paediatric neurocritical care patients, emphasizing the importance of appropriate thresholds when interpreting functional outcomes. Central nervous system (CNS) involvement was significantly associated with PICS-p, occurring in 87.5% of affected children compared with 30.1% of unaffected survivors (P=0.001). Children with neurological involvement had higher odds of developing PICS-p (OR: 16.3). Williams et al. [8] reviewed the clinical spectrum and therapeutic approaches for PICS-p, highlighting the contribution of neurological impairment, prolonged critical illness, and rehabilitation needs to post-discharge morbidity.

Prolonged intensive care was another important finding. Children with PICS-p had a significantly longer median PICU stay (14.5 versus 5.0 days; P<0.001) and hospital stay (26.5 versus 8.0 days; P<0.001). Ketharanathan et al. [9] investigated long-term functional and neuropsychological outcomes following intensive care admission for multisystem inflammatory syndrome in children, demonstrating the relevance of continued assessment after discharge.

Mechanical ventilation was required in 87.5% of children with PICS-p compared with 14.4% of those without PICS-p (P<0.001). Inotropic support and nosocomial complications were also significantly associated with functional deterioration. Choong et al. [10] evaluated post-intensive care sequelae following implementation of early rehabilitation strategies, supporting the potential role of rehabilitation during critical illness in improving functional outcomes. The present study demonstrated variable recovery patterns during follow-up. Among seven children with complete six-month assessments, four (57.1%) achieved near-complete functional recovery, while three (42.9%) continued to experience impairment. Curley et al. [11] described the design of a longitudinal PICS-p cohort study, emphasizing the importance of evaluating recovery across multiple functional domains. Gouda and Pinto [12] examined parental perceptions and measured functional outcomes following paediatric critical illness, highlighting the value of combining objective assessments with caregiver-reported information. Functional status at one month was significantly associated with six-month outcomes (P=0.029), suggesting that early post-discharge assessment may help identify children requiring continued rehabilitation. Dannenberg et al. [13] evaluated long-term functional outcomes among children surviving critical illness, supporting the importance of monitoring recovery beyond hospital discharge. Annamalai et al. [14] also investigated PICS-p in a heterogeneous paediatric population, providing evidence that functional deterioration may occur across different diagnostic groups.

The principal limitations of the present study were its single-centre design, small number of PICS-p cases, and incomplete follow-up in one affected child. The low event rate also limited the precision of risk estimates. Nevertheless, the findings support systematic functional assessment, particularly among children with neurological disorders, prolonged PICU stays, and mechanical ventilation requirements.

Conclusion

PICS-p was observed in 2.67% of PICU survivors and was significantly associated with CNS involvement, prolonged hospitalization, mechanical ventilation, and nosocomial complications. Although most children with complete follow-up demonstrated functional improvement, persistent impairment was observed in 42.9% at six months. Early functional assessment and structured post-discharge follow-up may help identify children requiring rehabilitation.

References

1. Pande CK, Risen S, LaRosa JM, Kudchadkar SR. Post intensive care syndrome in pediatrics—what the general pediatrician needs to know about life after critical illness. Pediatr Rev. 2026;47(10):557-567. doi:10.1542/pir.2024-006723.
2. Bajpai N, Dubey KC, Chowdhoury SR, Nandi M, Irene M. Functional Status Scale as a measure of functional impairment and residual morbidity in pediatric intensive care unit survivors: a single-center observational study. Indian J Crit Care Med. 2026;30(3):225-230. doi:10.5005/jp-journals-10071-25147.

3. Chareyre J, Pouletty M, Morin L, Sebaiti MA, Brosolo J, Berthaud C, et al. Diagnosis and management of children with post-intensive care syndrome in paediatrics: clinical practice guidelines by the French National Authority for Health (HAS). Anaesth Crit Care Open Access. 2026;16:100097. doi:10.1016/j.aicoj.2026.100097.
4. Gasparetti RM, Areco KCN, Leite HP, Nogueira PCK, Konstantyner T. Functional status of pediatric patients after discharge from intensive care units in a middle-income country. Pediatr Int. 2026;68(1):e70300. doi:10.1111/ped.70300.
5. Marupudi N, Morgan J, Karabatsos S, Pinto NP. The need for PICU follow-up and evaluation of post-intensive care syndrome in pediatrics in a community children's hospital. Clin Neuropsychol. 2026;40(6):1622-1636. doi:10.1080/13854046.2025.2566200.
6. Sevilla Hermoso P, Mor Conejo M, Alejandre C, Roig Cortes L, Rodriguez O, Cambra Lasaosa FJ, et al. Long-term functional outcomes after pediatric intensive care unit admission for bronchiolitis: a 12-month cohort study. Children (Basel). 2026;13(5):636. doi:10.3390/children13050636.
7. Sharawat IK, Panda PK, Elwadhi A, Gupta T, Kumar S, Deo VK, et al. Minimal clinically important difference of the Functional Status Scale in pediatric neurocritical care patients: post hoc analysis of a randomized controlled trial. Neurocrit Care. 2026;45(1):83-90. doi:10.1007/s12028-026-02512-4.
8. Williams CN, Pinto NP, Colville GA. Pediatric post-intensive care syndrome and current therapeutic options. Crit Care Clin. 2025;41(1):53-71. doi:10.1016/j.ccc.2024.08.001.
9. Ketharanathan N, Buysse CMP, Seijbel TC, Hordijk J, Bos L, Joosten K, et al. Longitudinal functional and neuropsychological 2-year follow-up after intensive care admission for multisystem inflammatory syndrome in children. Eur J Pediatr. 2025;184(10):617. doi:10.1007/s00431-025-06396-y.
10. Choong K, Fraser DD, Cameron S, Cuello C, Debigaré S, Ewusie J, et al. post-intensive care sequelae in pediatrics—results of an early rehabilitation implementation study. Pediatr Crit Care Med. 2024;25(6):563-568. doi:10.1097/PCC.0000000000003467.
11. Curley MAQ, Watson RS, Killien EY, Kalvas LB, Perry-Eaddy MA, Cassidy AM, et al. Design and rationale of the Post-Intensive Care Syndrome–paediatrics (PICS-p) longitudinal cohort study. BMJ Open. 2024;14(2):e084445. doi:10.1136/bmjopen-2024-084445.
12. Gouda SR, Pinto NP. Parental perception and measured functional status following pediatric critical illness: a secondary analysis of the Survivor Outcomes Study. Pediatr Crit Care Med. 2023;24(12):e621-e626. doi:10.1097/PCC.0000000000003342.
13. Dannenberg VC, Rovedder PME, Carvalho PRA. Long-term functional outcomes of children after critical illnesses: a cohort study. Med Intensiva (Engl Ed). 2023;47(5):280-288. doi:10.1016/j.medine.2022.02.022.
14. Annamalai MR, Kuehne JT, Mainali K, Bhalala U. Post-intensive care syndrome in a heterogeneous pediatric population. Cureus. 2022;14(12):e32928. doi:10.7759/cureus.32928.